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The Different Perspective of Managerial and Operational Level toward Customer Relationship Management (CRM) Practice

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ABSTRACT

Customer Relationship Management is not any longer thought of a business trend, however associate business common place that's needed to secure and maintain competitive advantage. CRM, once properly and effectively utilized, ends up in enhanced gain and larger client loyalty, 2 key wants for any organization. Now-a-days, client Relationship Management (CRM) has become the necessary and crucial a part of business owing to the advantages of analyzing the sale opportunities, campaigns management, and personalization to every individual client, cross-selling and up-selling. It conjointly supports the organization in increasing the amount of client relationships, client satisfaction, efficiency, effectiveness of its internal processes and better revenue. As a result of these benefits lots of organizations try and invest their cash and energy in CRM follow. Sadly, several analyses proof shows that almost all of the businesses fail to create their CRM effort to pay off. Thus, success CRM needs co-operation from the management high down within the CRM put in organizations. However there's no normally united framework for the effective CRM's implementation and CRM's prestigious factors toward the social control and operational perspective. So this study can try and fulfill the gap and highlight the various prestigious factors. The finding has shown that every a part of the organization must pay attention for his or her role and responsibility so as to attain success in CRM follow.

Keywords: CRM, prestigious issue, Perspective, CRM follow.

I. INTRODUCTION

Customer relationship management (CRM) may be a wide enforced model for managing a company's interactions with customers, clients, and sales prospects. It involves exploitation technology to prepare, automate, and synchronize business processes principally sales activities, however conjointly those for selling, client service, and technical support. The general goals are to search out, attract, and win new shoppers; nurture and retain those the corporate already has; provoke former shoppers back to the fold; and scale back the prices of promoting and client service. Client relationship management describes a company-wide business strategy together with customer-interface departments yet as alternative departments. Measurement and valuing client relationships is crucial to implementing this

strategy (Customer relationship management, 2012; Prajová, 2011; Witkovski, 2009; Horová-Taušl Procházková, 2011).

Now-a-days, client Relationship Management (CRM) has become the necessary a part of business, particularly massive business organizations whereas the little and medium sized firms ar increasing the interest owing to the advantage of analyzing the sale opportunities, campaigns management, personalization to every individual client, cross-selling and up-selling (Greenberg, 2010). CRM conjointly helps the organization in increasing the amount of client relationships, client satisfaction, efficiency, effectiveness of its internal processes and better revenue (Valsecchi, Renga, Rangone, 2007). The construct of CRM isn't solely another info tool, if the organization enforced properly,

CRM will yield associate exceptional come back within the revenue and enhance client service (Nguyen, Sherif & Newby, 2007). Support from the study of Kimiloglu and Zarali (2009) has shown the finding on seventy two businesses in Turkey that the organization United Nations agency specialize in adopting CRM follow in their organizations have vital improvement on speed, effectiveness, dependability of their business method, client satisfaction, revenue, complete image, with efficiency business method, and technology utilization (Kimiloglu & Zarali, 2009). With these benefits of an efficient CRM follow, the overall worldwide client Relationship Management (CRM) package market reportable by the AMR analysis and Gartner had been exceeded to \$13 Billion (USD) within the year 2008 (Bull & Adam, 2010) and can probably to succeed in \$22 billion within the year 2012 with thirty six pace rate (Greenberg, 2010). sadly, over 1,700 firms worldwide are surveyed, the findings show that solely sixteen.1% of the client Relationship Management follow firms a reportage that CRM system usage is leading to enhanced revenues within the their firms whereas the bulk of companies or eighty three. 9% ar underutilizing the CRM tools they need in situ (Dickie, 2009).

II. METHODS AND MATERIAL

A. Review of Literature

Kennedy (2006) defines client relationship management as being “about distinctive a company’s best customers and increasing the worth from them by satisfying and holding them”.

Before implementing CRM, organization needs to value the work of CRM in their organization, current CRM capabilities and sensible reason to implementing CRM, beside the nice implementing strategy (Nguyen, Sherif & Newby, 2007). wherever the finding from the study of sunshine (2003) UN agency interview twenty four users and managers concerning the structure CRM software package expertise unconcealed that organizations ought to perceive the theoretical and sensible implication of organization’s CRM perspective before implementing the CRM system in their organizations, the shortage of understanding can seemingly to form the matter to CRM put in firms. Support from the study of Chahal (2009) UN agency studied in operational and analytical CRM of health care services has shown the result that mentality

amendment is that the key to {make} the competitive interest instaff and make them learn their role to reinforce loyalty and client satisfaction. However, CRM could be a thought that needs appropriate business method, effective system integration, analysis method (Zineldin, 2006) and CRM feedback that allows a company to extend CRM’s potency (Palsinghtoor, 2009), wherever the business processes that adapt to support CRM follow will modify the businesses to extend their relationship with the staff, customers and suppliers by making an honest atmosphere for business to work (Skrinja, Vuksic, Stemberger, 2008). The study of Palanisamy, Verville, Bernadas & Taskin (2010) reveals that the finding on interview 183 samples of organizations in North America, that CRM performance, strategy, business method re-engineering, management support and user buy-in are the authoritative factors for CRM system acquisition. Therefore, CRM success depends on the amendment in structure traditional business method to support the CRM system that styles the trail thanks to best follow, beside the high level of employees’ commitment (Shum, Bove & Auh, 2008), a transparent CRM vision, management support, user involvement, appropriate company culture and focus of user demand, these success issue are often applicable each massive, medium and tiny sized of CRM put in firms (Xevelonakis, 2005; Doom, Milis, Poelmans & Bloemen, 2010; Lambert, 2010).Also support from the study of Ifinedo (2008),sixty two managements of forty four companies placed in Suomi and Baltic State has united that the support of high management and business vision ar considerably associated with the amount of CRM system success. Another support from the study of Dimitriadis and Stevens (2008) UN agency prompt the effective CRM needs the integrated perspective and co-ordination among all elements that a strategy (a clear company’s vision connected CRM and adequate management commitment),structure (align business method and client central culture), human (CRM consciousness and mindset) and technology (integrated knowledge and quality).

The study from Ranjan and Bhatnagar (2009) prompt that the made implementation of CRM within the organization depends upon employees’ interest and loyalty to just accept the amendment to the new system, more new CRM system needs to be versatile, rectifiable, reliable and consistent enough to support necessary amendment as prompt by the management and also the

organization. Moreover, info Technology infrastructure incorporates a positive and important relationship to the client responsiveness that results in the business advantage to the businesses (Bhatt & Emdad, 2010). Where the findings from the study of Chang Jiang, Lie and Fan (2010) in eighty seven samples of high four assets brokerage firms in Taiwan showed that employees' pc self-efficacy that magnified by adequate support and coaching, will build the CRM user with efficiency agitate the issues and enhance their usage of CRM system. The study of Limsarun and Pacapol (2010) UN agency studied within the CRM follow of ICT public listed firms in Asian country, has shown the finding on social control views that the executives believe individual level of pc self-efficacy, IT and Business culture gap, structure CRM mentality, and CRM software package Utilization ar the authoritative factors to the success of CRM follow (Limsarun & Pacapol, 2010). In distinction, most of the social control works concentrate on decision-making, communication, coordination, circularize info and inspire the individuals within the organization (Pearson & Chatterjee, 2003). Thus, the attitude of social control and operational level towards the CRM authoritative issue is probably going to disagree in keeping with the task title and roles in organization (Palanisamy, Verville, Bernadas & Taskin, 2010) and there's no distinctive united set of practices for the effective CRM's implementation and CRM's authoritative factors (Lo, Stalcup & Lee, 2010) as shown within the Table1. Therefore, the aim of this study is to analyze and highlight the various perspectives of social control and operational level towards CRM follow.

Table 1: Influential Factors toward Customer Relationship Management System (CRM)

Influential Factor toward (CRM) success	Authors/References
Individual's ability to use Customer Relationship Management System (Computer Self-Efficacy).	Chang, Lie & Fan, 2010; Limsarun & Anurit, 2010.
Level of information sharing, data security and performance of Customer Relationship Management System (CRM System Utilization).	Ranjan & Bhatnagar, 2009; Bhatt & Emdad, 2010.

Employee's perception toward the benefit and important of Customer Relationship Management System (Employee's CRM Mindset).	Dimitriadis & Stevens, 2008; Chahal, 2009.
Organization's perception toward the benefit and important of Customer Relationship Management System (Organization's CRM Mindset).	Light, 2003; Aruthari, 2005.
The different between believe, attitude and way to conduct job of Information Technology and Business Culture in Organization (Organization IT and Business Culture Gap).	Doom, Milis, Poelmans and Bloemen, 2010.
The change in business process to support Customer Relationship Management System (Business Process Change Management).	Shum, Bove & Auh, 2008; Skrinja, Vuksic, Stemberger, 2008.
Clear vision of management toward the Customer Relationship Management System (Management Vision).	Xevelonakis, 2005; Ifinedo, 2008.
Cooperate within organization to use the Customer Relationship Management System (Employee Buy-In).	Palanisamy, Verville, Bernadas & Taskin, 2010.
Support from the management in term of tangible and intangible resources to support Customer Relationship Management System (Management Support).	Lambert, 2010.
Evaluation process after implement Customer Relationship Management System (CRM Evaluation Process).	Zineldin, 2006; Palsinghtoor, 2009.

B. Analysis Objectives

To offer a tenet and to the highlight key success factors for firms active CRM.

The output of this paper would produce a larger awareness on the attitude gap between social control and operational level in a company, since CRM success

needs to be initiated by the management high down (Xevelonakis, 2005).

C. Analysis Methodology

In order to seek out the angle gap between social control and operational level toward the CRM observe, the qualitative approach was applied as a result of it permits a research worker to induce nearer and perceive people's beliefs and theoretical model for a way they perceived and organize their life activity and daily routines in meaning ways that and gathering quality data for deeper understanding of their expertise (Lieber, 2009). Each the first information and secondary information were used. The first information was collected by techniques together with formal and informal interviews and direct observations by the research worker. Secondary information was taken from the reports, journals, on-line resources etal., that were thought of helpful for the aim.

Non-probability sampling procedure was adopted by the judgment sample that the analyst actively selects because the best sample to answer the research queries. The participants area unit operating within the operational level and that they were designated from the CRM put in firms active for over one year in their organization as a result of come back on investment study should be done a minimum of a year once the system has been with success enforced. This can be obligatory so as to own enough time to spot truth saving and prices (Tanoury and Pease, 2002. Ingevaldson, 2009). With the purposive, convenience and snowball technique, the researchers contacted to the eighty six samples United Nations agency add the operational level of CRM put in firms, whereas twenty two persons or twenty five.58 percents provide the permission to interview separately. All informants (22 females and nine males) were designated from many departments that area unit MIS, Marketing, Sale and client Service of CRM put in firms that had staff vary from but a hundred to over five hundred staff. Whereas the participants area unit experiencing and dealing associated with the CRM system in their organization vary from one year to over five years as shown in Table a pair of. The researchers believe that each one the participant's designated interviewees were knowledgeable, extremely veteran. As a result, the chosen techniques were thought of to be helpful and appropriate for empirical study.

The sampling style for this qualitative study started with AN identification of sampling units United Nations agency worked within the operational level and sampling organizations that area unit the CRM put in firms. Initially, the targeted units were by design contacted through mail official letter requesting to the collect the info in connectedness to the CRM areas within the involved organizations. The official letters and pointers of needed data were enclosed along so as to specify the understanding regarding the interview objectives and knowledge which is able to be collected and recorded by the researchers. Every in-depth interview took around 30-40 minutes in every subjecting line with the supply and quality of the informants.

The semi-structured survey questionnaires that wasn't framed into any explicit model, however the interviewees were interacted and questioned among the scope of this study. The interviewed pointers are ready as per the necessity. By asking specifically worded queries in an exceedingly pre-determined order, the research worker ensures an exact level of consistency once conducting the interviews. The interviewees were inspired to share their opinions and perspectives towards a CRM observe of their work atmosphere and therefore the organization. The attention-grabbing quotes from the participants were recorded and analyzed by the research worker so as to spotlight the numerous and various factors toward their perspective that associated with the secondary information and former studies. Before the tip of interview, the research worker has given the participants bound ranks- one (the necessary most vital most significant} factor) to ten (the least important factor) on the CRM prestigious factors toward their perspective. Subsequently the results of ranking are calculated to seek out the common, so all-time low average is that the most vital issue to the CRM success.

III. RESULTS AND DISCUSSION

A. Analysis and Interpretation

The result from this study shows that operational levels believe management vision, level of co-operation among the organization (Employee Buy-in) and management support area unit the foremost vital issue to the success of CRM observe for any organization. Whereas IT and Business Culture Gap and CRM analysis method appear

to be more modest to their perspective toward CRM observe for any organization. As shown in Table3.

Table 2 : Participant’s Profile

Category	Frequency	Percentage
Department		
Management Information System	9	40.91%
Marketing	4	18.18%
Sale and Distribution	4	18.18%
Customer Service and support	5	22.73%
Number of Employees in organization		
Less than 100	5	22.73%
100-200	7	31.82%
201-500	3	13.63%
More than 500	7	31.82%
Year of CRM experience		
Less than 1 year	4	18.18%
1-5 Year	8	36.36%
More than 5 year	10	45.46%

Table 3 : The operational perspective toward CRM practice

Influential Factors	Total Score	Average
Management Vision	69	3.1364
Employee Buy-in	104	4.7273
Management Support	104	4.7273
Organization’s CRM Mindset	106	4.8182
Employee’s CRM Mindset	109	4.9545
CRM System Utilization	110	5.0000
Change in Business Process	120	5.4545
Computer Self-Efficacy	130	5.9091
IT and Business Culture Gap	173	7.8636
CRM Evaluation Process	185	8.4091

B. Finding and Discussion

The results of the study was terribly fascinating wherever the social control level believe that IT and Business culture gap, pc self-efficacy, CRM system utilization and organization’s CRM outlook area unit the foremost necessary factors for the success of the CRM apply. In distinction, IT and Business culture gap and pc self-efficacy appear to be the slighter factors and much distinct within the operation level perspective, whereas the management support and vision area unit the foremost necessary. Since the success of the CRM apply needs to be initiated by the management top-down (Xevelonakis, 2005). Therefore, it's been all over that the necessary factors ought to return from the CRM common understanding of each social control level and operation level as shown in Figure one. Firstly, the social control level ought to focus clearly on the vision and support to the CRM applies. Secondly, the operational level ought to focus within the level of co-operation inside organization and positive perceptions to the CRM apply. Thirdly, the CRM apply within the organization ought to utilize their CRM in system and alter their business to support CRM system.



C. Limitation of the Study

It is evident from this study that it's somewhat biased in terms of getting access to the targeted sample teams for in-depth interview because of the interior policies concerning providing data to the outsiders. Conjointly it took a protracted time to contact the participants and follow up for the permission to interview.

IV. CONCLUSION

Since the target of the study was to supply the rules and to spotlight the various views between the social control and operational level towards the CRM active firms. The result has shown that every level features an important varied perspective; thus organizations ought to focus to additional on the communication inside organization to unfold the clear and precise data and hear each individual's would like. Moreover, the organization could have coaching to support and form the outlook each for social control and operational level, so it'll doubtless to enhance the success rate of CRM apply inside the organizations.

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Application for Securing Credentials

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ABSTRACT

This tool lets you securely store your user valuable data such as bank documents, insurance policy papers, IDs and passwords and other credentials in a secure database. This software has a neat and uncomplicated interface that lets you arrange your credentials in user-specified categories. Credential Protection offers ample security measures such as saving valuable data using a picture so that could be able to verify it. It provides security that no other tool can provide since hiding valuable data inside an image's part by cropping it makes it a most difficult technique for intruders to hack it. Credential protection using an image is a very secure password management program. It is designed to permanently store, secure and organize all your passwords and account details and can be highly used by security conscious people. This web application provides users to put all their credentials in one database, which is locked with one master key or a key file. So they only have to remember one single master password or select the key file to unlock the whole database. The databases are encrypted and there is also a facility to update and change information is provided.

Keywords: SQL, HTML, Credential Projection Manager, JSP

I. INTRODUCTION

Credential protection is locking software that helps a user to organize his valuable information like trade credential, academic and professional credentials, bank documents, credit card and debit card numbers and user having multiple passwords. This project explains about password hacking and thefts of important and confidential information of an individual. We normally face problems in forgetting password or confused with different passwords of different accounts. Also placing our important documents and credentials at a proper and secured place is a big issue to worry. People generally use same passwords for saving their id's and data which is prone to be hacked. This project is designed for solving this problem. Credential protection manager application helps user to organize his number of passwords and other valuable data in a secure way, using this application user can put all his passwords and data in to single database which is protected with a single master key or a key file and that key will be located in the cropped part of the image selected by the user. When

the user click at the position selected by him, he will be given a verification code on hi given contact number which he can enter in the key file and access his/her valuable data. This system is implemented using java language and HTML, JSP are used as front end and MySQL as back end.

This tool lets you securely store your user valuable data such as bank documents, insurance policy papers, ID's and passwords and other credentials in a secure database. This software has a neat and uncomplicated interface that lets you arrange your credentials in user-specified categories. Credential Protection offers ample security measures such as saving valuable data using a picture so that could be able to verify it. It provides security that no other tool can provide since hiding valuable data inside an image's part by cropping it makes it a most difficult technique for intruders to hack it. Credential protection using an image is a very secure password management program. It is designed to permanently store, secure and organize all your passwords and account details and can be highly used by security conscious people.

II. METHODS AND MATERIAL

A. Objectives

- To provide security to highly confidential data such as id's and passwords that may span from PC applications to financial information.
- Provides registration to public in order to access the application.
- The user can change his password.
- Registered users can store critical and confidential data in a secured form.
- Unprotect and Retrieve data as and when necessary.
- The data can be retrieved anytime, from anywhere and any number of times.
- Protection provided to the stored data using simple algorithm.
- To provide an effective and user friendly website.
- To provide a very secure mechanism using image processing.
- To provide an easy to use website which is fast saves time and reliable.
- To provide an easy and effective GUI interface for the user to deal with the software.

B. Problem Statement

In the present scenario every person is associated with some id and password. It may pertain to accessing the PC, the web, emails, financial institutions, access to credit cards, ATM's etc. Most often a person tries to remember them in order to use it. It is always known that a person or individual confuses between passwords of different Id's. Some individuals in order to avoid confusion adapt to use -

- Simple passwords - short in length, that use words found in dictionaries, or don't mix in different character types (numbers, punctuation, upper/lower case), or are otherwise easily guessable
- Passwords others can find - on sticky notes on monitors, in a notepad by the computer, in a document in computer, whiteboard reminders, smart device storage in clear text, etc.
- The same password - using the same password for multiple sites, never changing account passwords, etc.
- Shared passwords - users telling others passwords, sending unencrypted emails with password

information, contractors using same password for all their accounts, etc.

It is typical to make at least one of these mistakes. This makes it very easy for hackers, crackers, malware and cyber thieves to break into individual accounts, corporations of all sizes, government agencies, institutions, etc.

Some individuals even try to save critical information in books or registers or electronic diaries and carry them along. The possibility of this carrier being lost or damaged is high. In the present scenario certain passwords can be recovered after a procedural delay.

Some applications available to store all the passwords securely at one place do not provide high security and are prone to be hacked and these kind of software installed on one system can be accessed from there only, means no portability.

C. Solution Approach

This system is a password protector, which helps you to manage your passwords in a secure way.

1. You can put all your passwords in one database at server, which is locked with one master key.
2. 'N' no. of passwords can be stored in database.
3. Can be accessed from anywhere, portable.
4. So you only have to remember one single master password to unlock the whole database.
5. The master password can be changed from time to time.
6. The master password will be a part of image that the user will select from a large image as per his/her choice. This is more secure than character password.
7. After successful matching of the password, a random code is sent at user's mobile which the user will enter for further proceeding and after matching of this code the database will be unlocked. This further increases the level of security.
8. The databases will encrypt.
9. A facility to update and change information will be provided.
10. The site is made using Struts and Hibernate so that no one can hack it.

This online application provides a secure mean to store and retrieve passwords anytime, anywhere securely.

D. Literature Survey

Passwords have been used with computers since the earliest days of computing. MIT's CTSS, one of the first time sharing systems, was introduced in 1961. It had a LOGIN command that requested a user password. "After typing PASSWORD, the system turns off the printing mechanism, if possible, so that the user may type in his password with privacy." In the early 1970s, Robert Morris invented the idea of storing login passwords in a hashed form as part of the UNIX operating system. The system was based on a simulated Hagelin rotor crypto machine, and first appeared in 6th Edition Unix in 1974. A later version of his algorithm, known as crypt(3), used a 12-bit salt and invoked a modified form of the DES algorithm 25 times to reduce the risk of pre-computed dictionary attacks.

Software developers have taken different to creating password management software, including where it stores the data, how it's secured and what additional features should be available for saving and retrieving account information. The earliest type of password management software was the standalone application not associated with any other software. Many such apps still exist today, including KeePass and Aurora. Aurora boasts strong encryption along with added features such as form-filling for Web pages, a password generator and the option to export passwords to a readable file. Password managers using embedded security hardware is a less commonly employed approach than other types of password management. This software requires hardware embedded on your device to save and encrypt data. For example, Lenovo's T-series ThinkPad laptops feature a chipset mounted on the motherboard called the Embedded Security Subsystem. Used in combination with Lenovo's password management software, you can save passwords and other data to the device.

With the frequent use of technology from the last few decades, in almost all the field increases the requirement for securing the information so that no other person can have access of it and make misuse of the information. For securing all the credential there are many application formed like Password Manager and many more to store the password but they have some lacking which are

surely eliminated by our software and provide even more confidentiality to ones credentials.

E. Proposed Method

The proposed system is a web based system which can be accessed by customer from anywhere around the world. The system can offer secured storage of our credentials.

- The user will first of all get register into the system. He will provide his user name and select an image password as a master password and provide other necessary details.
- Now the user can login to the system anytime from anywhere. He will enter his id and image password and all inputs are correct and login is successful then he will be directed to the main page. Here pages are not connected directly by hyperlink; instead there is an XML file which contains controller which tells the direction path to another page.
- The advantage is that this file is not compiled but only saved and hence the system does not gets slow even if the system is updated.
- Another advantage is that the address of the web page seen at the address bar is not the actual address, mapping is there. Also the logic code and view code are on different pages. So, the system cannot be hacked.
- Then the user can perform all the functions like storing and retrieving information, changing password.

For all this a very user friendly GUI will be provided. The user not having much knowledge about the computers can also use it easily and efficiently.

F. Design

UML Modeling

The Unified Modeling Language (UML) is a standard language for writing software blueprints. The UML may be used to visualize, specify, construct, and document the artifacts of a software intensive system. The UML is appropriate for modeling systems ranging from enterprise information systems to distributed Web-based applications and even to hard real time embedded systems. It is a very expressive language, addressing all

the views needed to develop and then deploy such systems. Even though it is expressive, the UML is not difficult to understand and to use. Learning to apply the UML effectively starts with forming a conceptual model of the language, which requires learning three major elements: the UML's basic building blocks, the rules that dictate how these building blocks may be put together, and some common mechanisms that apply throughout the language.

G. Methodology Flow Chart

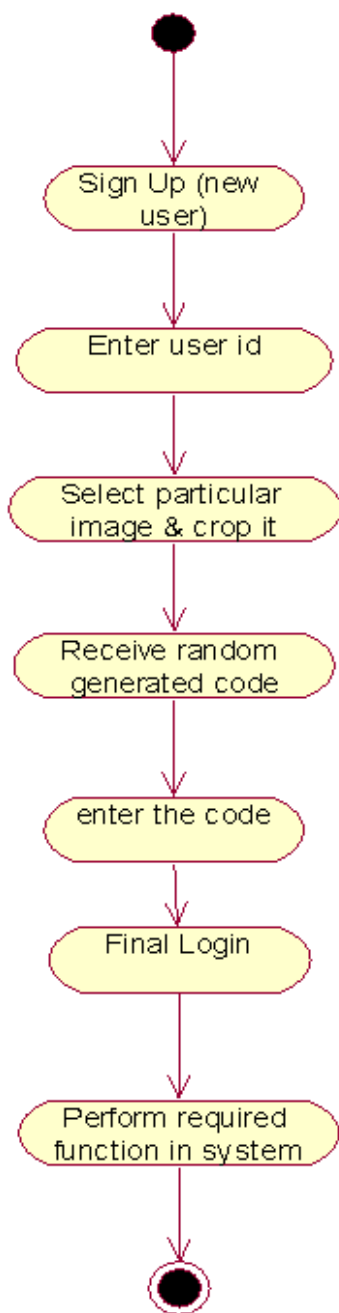


Figure 1: Work Flow

III. RESULTS AND DISCUSSION

Use-Case Description

Login:

- ✓ **Brief description** → the user can enter the system by login.
- ✓ **Flow of events** → User enters the valid username and password. Click the login button. Receive a random code on mobile and enters it correctly. Welcome page will be displayed.
- ✓ **Alternate flow** →
 - ❖ User enters the invalid username and password. An error message is displayed that invalid username or password
 - ❖ User enters incorrect code. An error message is displayed that incorrect code.
- ✓ **Special requirement** → the system should be able to match username and password with accuracy. System should be able to generate a unique random code every time and send it to user's mobile.
- ✓ **Pre-condition** → The user should be a registered user.
- ✓ **Post-condition** → If action is successful, the user is logged in. If error occurred the state will not be changed.

Reset Password:

- ✓ **Brief description** → the user can set the new password.
- ✓ **Flow of events** → user enters the correct old password, new password and then enters the same new password. The message will be displayed telling that password is changed.
- ✓ **Alternate flow** → user enters the incorrect old password or the new password is not same both the times. An error message is displayed showing the problem.
- ✓ **Special requirement** → the user should be a registered user.
- ✓ **Pre-condition** → the user should be logged in.
- ✓ **Post-condition** → If the action is successful, the password will be updated and user has to again login using new password. If error occurs state does not change.

View Users

- ✓ Brief description → Admin can view the users' details.
- ✓ Flow of events → Admin will click on view users.
- ✓ Alternate flow → none
- ✓ Special requirement → none
- ✓ Pre-condition → Admin is logged into the system.
- ✓ Post-condition → List of users will be displayed.

Sign Up

- ✓ Brief description → the user can register himself.
- ✓ Flow of events → user enters all the required details correctly. He/she will be registered.
- ✓ Alternate flow → User enters incorrect details or do not enter all the mandatory details.
- ✓ Special requirement → none
- ✓ Pre-condition → None
- ✓ Post-condition → User will be directed to the login page

Store ID – Password

- ✓ Brief description → the user can store the passwords of various accounts with corresponding id.
- ✓ Flow of events → User clicks on store password and enters the id and password of account. Details will be stored successfully.
- ✓ Alternate flow → none
- ✓ Special requirement → none
- ✓ Pre-condition → the user should login to the system.
- ✓ Post-condition → none

Store Files

- ✓ Brief description → the user can store the important files.
- ✓ Flow of events → user clicks on store files and uploads the file. File will be stored successfully.
- ✓ Alternate flow → none
- ✓ Special requirement → none

- ✓ Pre-condition → the user should login to the system.
- ✓ Post-condition → none

Retrieve ID – Passwords

- ✓ Brief description → the user can view the passwords of his/her various accounts.
- ✓ Flow of events → user clicks on view Passwords.
- ✓ Alternate flow → none
- ✓ Special requirement → none
- ✓ Pre-condition → the user should login to the system.
- ✓ Post-condition → user will get the list of all the id with corresponding passwords.

Retrieve Files

- ✓ Brief description → the user can view and download the files that are stored by him/her.
- ✓ Flow of events → user clicks on view files.
- ✓ Alternate flow → none
- ✓ Special requirement → none
- ✓ Pre-condition → the user should login to the system.
- ✓ Post-condition → user will get the list of all the files.

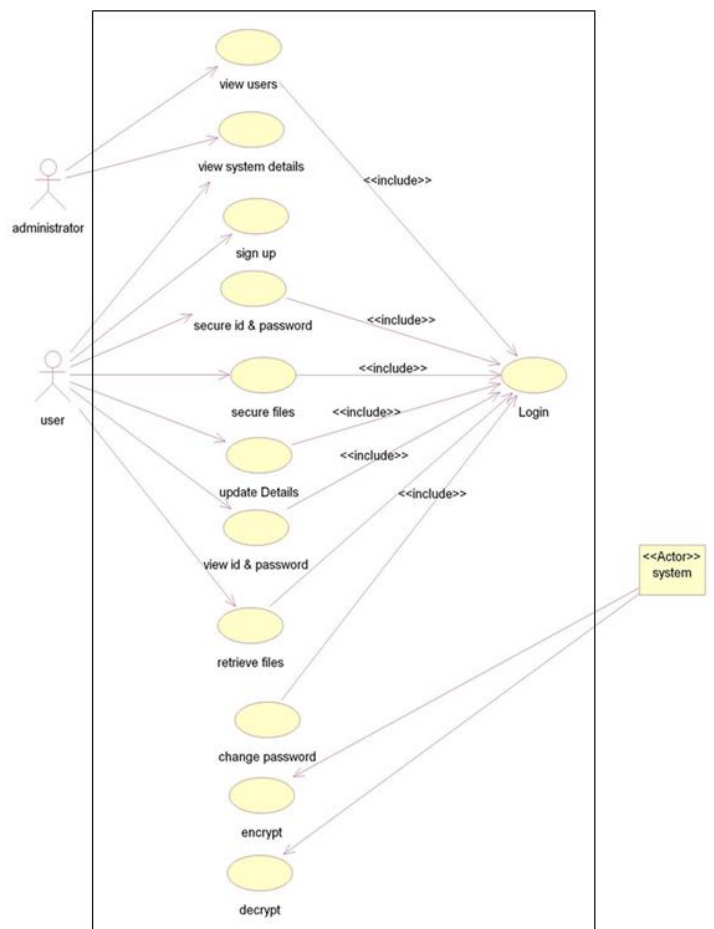


Figure 2: Use Case Diagram

vulnerabilities of graphical passwords are still not fully understood.

Overall, the current graphical password techniques are still immature. Much more research and user studies are needed for graphical password techniques to achieve higher levels of maturity and usefulness.

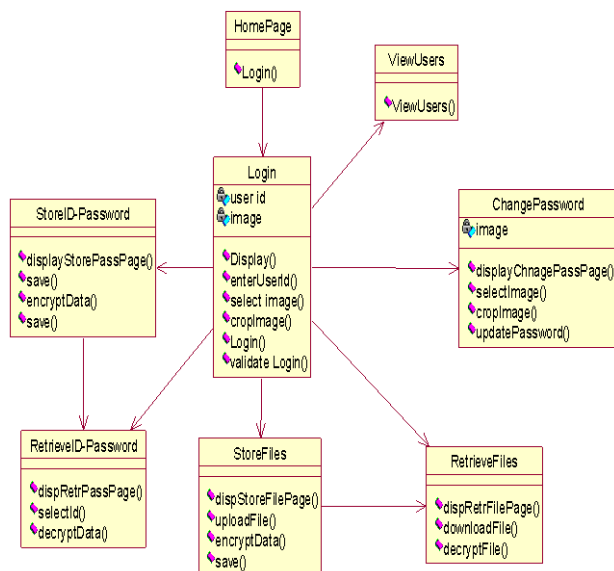


Figure 3: Class Diagram

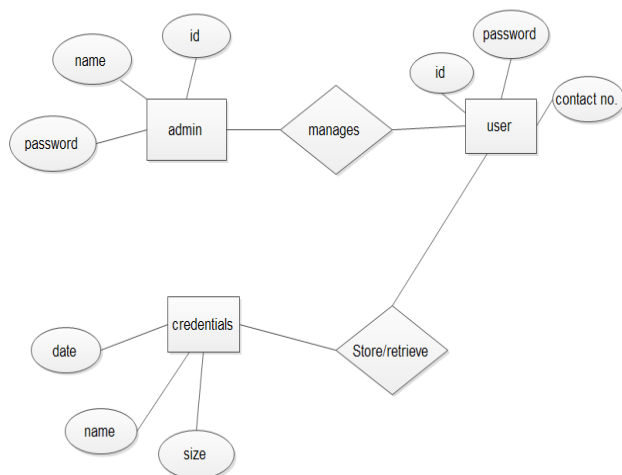


Figure 4: E-R Diagram

IV. CONCLUSION

The past decade has seen a growing interest in using graphical passwords as a relative to the traditional text-based passwords. The main argument for graphical passwords is that people are better at memorizing graphical passwords than text-based passwords; the existing user studies are limited and there is not yet convincing evidence to support this argument. Our preliminary analysis suggests that it is more difficult to break graphical passwords using the traditional attack methods such as brute force search, dictionary attack, or spyware. However, since there is not yet wide deployment of graphical password systems, the

V. LIMITATIONS

1. Since all passwords and credentials will be stored in this single password manager, it is very crucial and important to remember this password.
2. Internet connection is required to get access or to retrieve the passwords or any other credentials.
3. The major limitation of online password managers is the requirements that the user trusts the hosting site and thus we have to provide best security of data.

VI. CONSTRAINTS

1. User need to crop the image for hiding the credentials: Since this will be the first step after login user will have to select and crop the image before securing the credentials.
2. Mobile Number Authentication is must: User has to register with a unique and permanent mobile number which can't be changed afterwards.

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Human Protection with the Disaster Management Using an Android Application

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ABSTRACT

We are design Help me an android application which is useful for saving so many human being life. Help me app is working on an android operating system. Number of people squanders their precious life in natural calamities such as accidents, kidnapping etc. This application is helping the android users who are in climatic situation like this by sending some information about the location of that person who is in trouble via message to their love once, fire station, police station and ambulance. The user need to make an account once on the server giving some useful personal data after that it will confirm whether the person is robot or not with the next step succeeding to create an account. We are created Geo-fences that will help to alert about the restricted area which is made by the user manually in the app. Database likewise complete data of the user and the co-ordinates of the Geo-fences is store on server. Later we will access those data from server to our mobile by using this application.

Keywords: Client server architecture, Server operation, Geo-fences, Client activity, Notification alertness.

I. INTRODUCTION

Disaster management is the formation of arrangement through which society decreases vulnerability to risk and cope with disasters. It does not preclude or eradication the defiance, instead it concentrates on making plans to reduce the impact of disasters. Omission to produce a plan could lead to damage to assets, human mortality, and lost revenue. We can't predict the future of nature. Natural disaster like earthquake, flood is increased day by day which lead to loss life as well as property. Some of affliction is given by human being, now a day's in some area girls are not safe. We can see so many news and incidences of rape, kidnapping cases where some girls get mentally disturb and many of them also loss there life. So many people lose their life because of unavailability of facility on time. Sometimes in deep oceans and seas, fishermen in search of fishes cross the water boundaries and enter another country. Because of this they get arrested by police of other countries. This application is aimed to overcome the entire above

mentioned problem by including separate modules for each problem and integrate them in one system.

II. METHODS AND MATERIAL

A. Client Server Architecture

We are working as client-server based application where android device is client and PHP server is server side. The complete database is store on the server, user retrieve it in his/her device anytime anywhere tills it is connected to internet.

Data is store in JSON format alternative to XML. There are two methods for posting information on the web in PHP.

- (1) Get
- (2) Post

Get method is default set in PHP language. This method allows whatever data you are giving as an input shows in browser URL. While post method cannot display any input inside the URL.

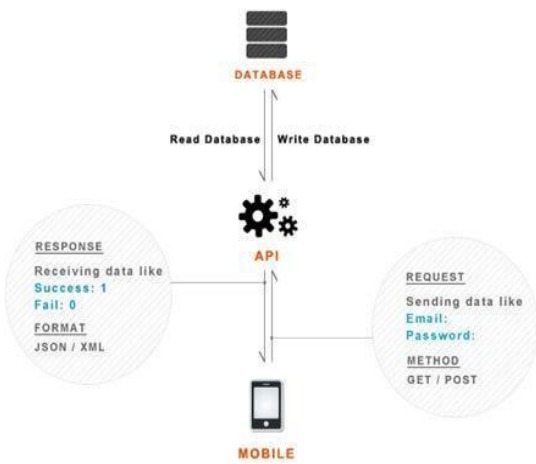


Figure 1: Architecture of the data flow from mobile To PHP server

B. Server Operation

Programming is mainly created for android mobile which will act as client. Our app will run on android mobile. The data of android mobile will be sent to PHP server and we will fetch data from PHP server to android devices in the form of JSON.

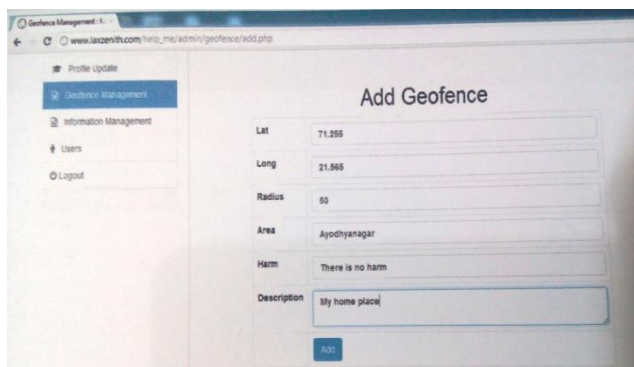


Figure 2: Insertion of Geo-fence

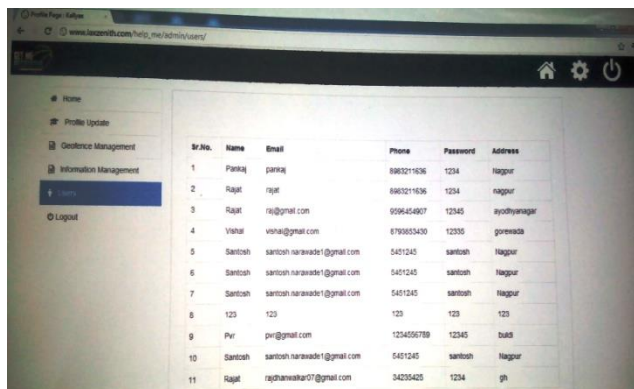


Figure 3: Registered User on server

JSON (Java Script Object Notation) is an open standard format that uses human readable text to transmit data objects consisting of attribute value pairs.

It is used primarily to transmit data between a server and web application, as an alternative to XML (Extensible Markup Language)

C. GEO-Fence

Geo-fence is created by storing latitude, longitude and radius of harmful areas. For storing the value in geo-fences, we are using PHP server. PHP server will also store information about the users who are using this application. Geo-fencing enables remote monitoring of geographic areas surrounded by a virtual fence and automatic detections when tracked mobile objects enter or exit these areas. A huge set of LBS (location based services) use geo-fence observation as a key feature. Location plays a basic role in context-aware applications.

Geo-fences are user defined areas. Here locations are cities, towns, other identifiable landmarks. Usually, the user is able to define the boundary of geo-fence area e.g. in simplest case it is just a radius defines some circular area. On practice, in the vehicle tracking system, a vehicle is determined to be at a particular Location if it is within the geo-fence.

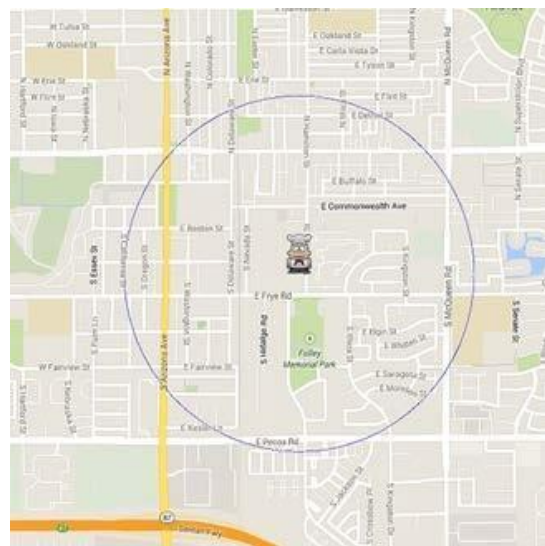


Figure 4: Geo -fence encapsulated circular area

Any geo-fence implementation requires obviously some form of location monitoring. Technically, this monitoring could be performed either right on the mobile device or via some centralized scheme (e.g. Telecom operator observes the location for own

subscribers). The main sources for user's raw coordinates on mobile phones as Global Positioning

System (GPS) and Wireless Positioning System (WPS) using cell tower and Wi-Fi access points.

III. RESULTS AND DISCUSSION

D. Client Activity

We are sending notification on client device by using GCM. Google Cloud Messaging for Android (GCM) is a service that lets developers send data from servers to their applications on Android devices. This could be a lightweight message telling the Android application that there is new data to be fetched from the server (for instance, a movie uploaded by a friend), or it could be a message containing up to 4kb of payload data (so apps like instant messaging can consume the message directly).

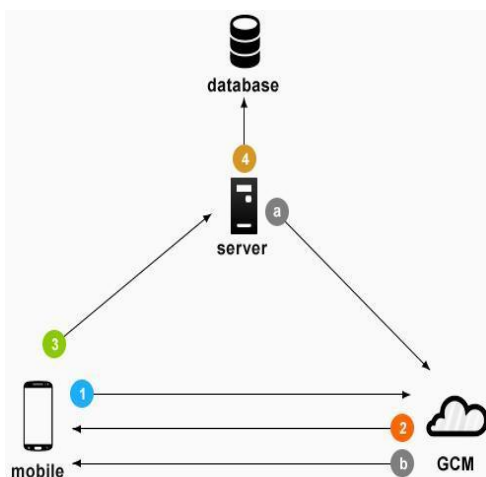


Figure 5: Android- Google Cloud Messaging

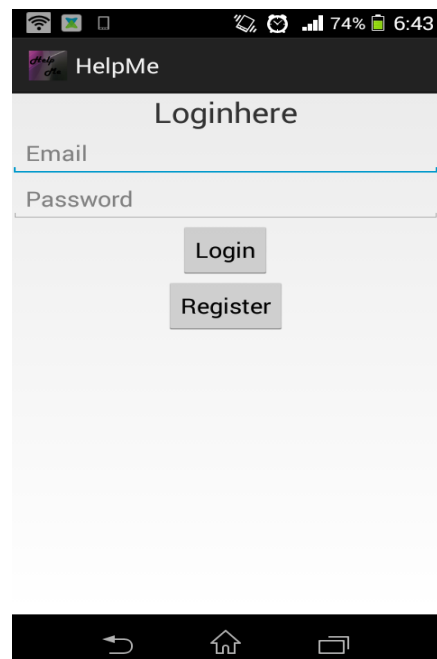


Figure 6: Login Panel

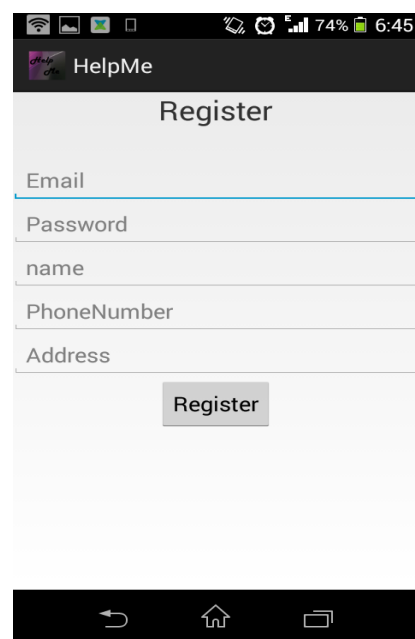


Figure 7: New User Registration

After registration process the user enters the home page of the application as shown in the fig. 8



Figure 8: Application Overview

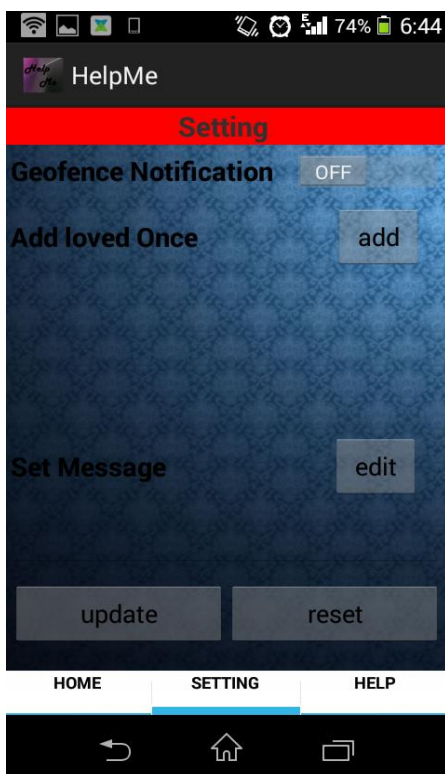


Figure 9: Application Setting

As shown in fig.5 The GCM service handles all aspects of queuing of messages and delivery to the target

Android application running on the target device.5 GCM allows 3rd-party application servers to send messages to their Android applications. GCM deployment depends on two things

- (1) Application ID
- (2) Registration ID

Application ID assigned to the Android application that is registering to receive messages. The Android application is identified by the package name from the manifest. This ensures that the messages are targeted to the correct Android application. Registration ID is unique ID issued by the GCM servers to the Android application that allows it to receive messages. Once the Android application has the registration ID, it sends it to the 3rd-party application server, which uses it to identify each device that has been registered to receive messages for a given android application.

In other words, a registration ID is tied to a particular Android application running on a particular device.

E. Notification Alertness

Help me application giving the following features:

- Providing facility to send his/her GPS location to loved ones, police station, ambulance, and fire stations.
- Informing users by giving notification when they entered in restricted areas or before he/she crosses country boundaries.
- We are likely to provide facility for user to activate our app on voice recognition, this will help user when he/she is not able to activate this app manually.

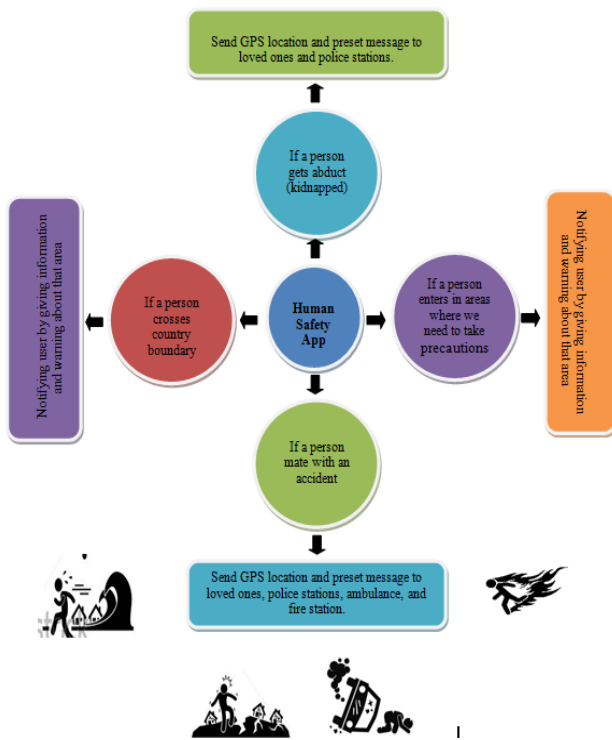


Figure 10: Response of Help me app

Help me app useful in following areas such as

- 1) People visit new places
- 2) Fishermen to show the right way
- 3) Flood tragedy.
- 4) Fire tragedy
- 5) Earthquake tragedy
- 6) Girls safety
- 7) Accidents

The application is working on any device which has android operating system. It will provide correct information about the new place also help people who are stuck into Flood, Fire, and Earthquake tragedy as well as in case of accident on highway where no facilities are available by sending Global Positioning System (GPS) location of that person to their loved once, ambulance and police.

II. CONCLUSION

Most of the people in today's era are use the android phone. There are no apps for human safety to provide facilities to them as fast as possible when they are in any critical situation such as fire accident, road accident, kidnapped etc. For this purpose our app will provide them facility to inform their love once, police station, fire station and ambulance to provide help as fast as possible. One most important thing about this

application is an android phone which is using the help me app must connect to the internet.

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Manganese Removal from Aqueous Solution by Steel Slag: Kinetic and Equilibrium Studies

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ABSTRACT

Batch experiments were conducted to evaluate the ability of steel slag in removing manganese from aqueous solution. Several variables had been setup to evaluate the performance of steel slag to remove manganese from aqueous solution in different experimental condition. The variables include contact time, size, dosage, pH and initial concentration of manganese. The equilibrium contact time was achieved at 10 hours. The small size of adsorbent has the higher removal of manganese from aqueous solution compared to the large size. 1 g of adsorbent of dosage is considered enough to remove heavy metal from aqueous solution. The optimum pH for manganese adsorption onto steel slag was 6. Higher initial concentration leads to the decrease in percentage removal of Mn from solution, but increase in adsorption capacity. The Langmuir isotherm models fit well with data of Mn adsorption on steel slag compared to Freundlich isotherm model. Kinetic test using several models indicate that data obtained fit well with the pseudo second order model. Steel slag are capable to remove to remove high percentage of Mn from aqueous solution (>95%) thus suggesting that steel slag has the potential to be used in real application.

Keywords: Batch Experiment, Adsorption, Steel Slag, Manganese, Isotherm Model, Kinetic Test

I. INTRODUCTION

Water from industry activity has been a source of concern because of its contamination by toxic metals and other substance that require treatment before discharge. Such treatment must be carried out using operations and processes that aim to reduce the contamination concentration to level required by environmental regulation or the authorities. Once discharge to the stream without proper treatment, questions will arise whether this water is safe for potable water usage and aquatic consumption or not safe for both. Manganese is common toxic metal that found in the effluents of many industries, as well as in mine waters, either neutral or in acid mine drainage (Silva et al. 2012). The toxicity of Mn is related to kidney, lung and intestinal damage and its compound may reasonably be anticipated to be carcinogens (Dal Bosco et al. 2006). Generally, it is absorbed by the human body by oral or respiratory via and in high

amounts, can cause irreversible damages to the nervous system and other pathologies as pneumonia, circulatory collapse, edema of the respiratory tract, among others (Crossgrove and Zheng 2004). The most common health problems in workers exposed to high levels of manganese involve the nerve system. These health effects include behavioral changes and other nerve system effects, which include movements that may become slow and clumsy.

Current method for the removal of heavy metals from water industry includes precipitation, ion-exchange, reverse osmosis, solvent extraction, flocculation and membrane separation (Kwon et al. 2010). Oxidation and precipitation is the most common method to remove Mn(II). Such method is based on the Mn (II) oxidation to its insoluble manganese dioxide (Roccaro et al. 2006). Adsorption is one of the most widely applied techniques for pollutant removal from contaminated media (Qiu et al. 2008). Steel slag is

solid waste material which is by product of steel making industry. The reported annual global steel slag production is fifty millions ton and dumping it off is gradually becoming a major environmental issue (Yusuf et al. 2014). For this study, steel slag was chosen as low cost adsorbent. The main objective of this research was to study the ability of steel slag to remove manganese under different experimental conditions. These different experimental approaches include effect of contact time, size of adsorbent, dosage, pH and initial concentration of manganese. The adsorption isotherm and kinetic aspect also have been investigated to provide greater understanding of its performance.. The purpose of this document is to provide you with some guidelines. You are, however, encouraged to consult additional resources that assist you in writing a professional technical paper.

II. METHODS AND MATERIAL

A. Preparation and characterization of adsorbent

Steel slag from this study was provided by Mega Steel Sdn Bhd, one of the leading companies for steel production in Malaysia. The steel slag was washed with distilled water to remove any debris and dried at 105°C for period of 24 hours in oven. The steel slag was then crushed and sieved into the sizes of 0.5mm, 1mm, 1.5 mm and 2 mm. The physical surface characteristics of steel slag (specific surface area and pore size) were determined using BET (Brunauer-Emmette-Teller) and BJH (Barrett-Joyner-Halenda) pore size distribution analysis. Scanning electron microscopy (SEM) along with EDX analyzer was used to obtain the morphological structure of steel slag and also the elemental composition of steel slag before and after adsorption.

B. Chemical and reagent

All the chemical and reagents used in this work were analytical grade (Sigma-Aldrich, Bendosen). Stock solution of Mn with concentration of 1000 mg/L was prepared by dissolving an appropriate amount of $MnSO_4 \cdot H_2O$ (manganese (II) sulfate-1-hydrate) with deionized water (Milipore Corp, USA). The stock solution further diluted with deionized water to obtain desired concentration of Mn used in this study. 0.1 M NaOH and 0.1 M HNO_3 were used to adjust the desired pH throughout the experiments.

C. Batch experiments

Several batch experiments with variation of variables were conducted in this study to assess the performance of Mn adsorption into steel slag. Orbital shaker with agitation speed of 200 rpm were used throughout whole experiment to ensure homogenous mixing. The experiments were carried out at maintained temperature between 24-25°C. During the experiment, all the solutions were tightly cap-covered to prevent any circumstances that might occur such as contamination and spillage. The effect of equilibrium contact time, size, dosage, pH and initial concentration of were studied in this experiment. The first experiment was to analyze the effect of adsorbent equilibrium contact time. 1 g of adsorbent with size of 1mm was added into 30 mL of Mn solution at concentration of 30 mg/L with a required interval time of 24h.

Second experiment aim to determine the effect of adsorbent size of adsorbent. Various size of adsorbent 0.5mm, 1mm, 1.5mm, 2.0mm were added into 30 mL Mn solution at concentration of 30mg/L. Third experiment was to look into the effect of adsorbent dosage. 0.1, 0.5, 0.8, 1.0, 1.2, 1.8 and 2.0g of adsorbent were added into 30 mL Mn solution at concentration of 30 mg/L. Fourth experiment was to assess the performance of adsorbent at various pH conditions. Using 0.1 M NaOH and 0.1 M HNO_3 , the pH of Mn solutions were adjusted from 3.0 to 8.0. Fifth experiment was to study the effect of initial Mn solution. 5, 10, 30, 50 and 100 mg/L of Mn solution were used in this experiment. All solution samples were filtered using 0.45µm nylon membrane filter and kept at 4°C before analysis. The Mn concentration was analyzed using atomic absorption spectrophotometer (AAS). The whole batch experiments were conducted in duplicate to ensure the findings were precise and consistent.

D. Removal efficiency and adsorption capacity

Removal efficiency of adsorbent is calculated at time (qt) and also at equilibrium (qe).

The calculation of removal efficiency is calculated as:

Removal percentage (%):

$$\frac{c_0 - c_e}{c_0} \times 100 \quad (1)$$

$$\frac{c_0 - c_t}{c_0} \times 100 \quad (2)$$

The amount of adsorbate adsorbed per unit mass of adsorbent, is calculated as:

$$\frac{C_0 - C_t}{m} \times V \quad (3)$$

$$\frac{C_0 - C_e}{m} \times V \quad (4)$$

C_0 and C_e are the initial and final Mn concentrations at equilibrium time (mg/L). C_t represent Mn concentration of contact time (mg/L). V represent the volume of working solution (L) and m (g) is the mass of the adsorbent used.

E. Adsorption Isotherms

Langmuir and Freundlich isotherm models were used in this study to analyze equilibrium data obtain from the removal of Mn. The assumptions made in derivation of the Langmuir model are the adsorbed layer is made up of single layer of molecules with adsorption can only occur at a finite (fixed) number of definite localized sites, that are identical and equivalent, with no lateral interaction (Vijayaraghavan *et al.* 2006). The Langmuir equation is given as follow:

$$\frac{C_e}{q_e} = \frac{1}{b q_m} + \frac{C_e}{q_m} \quad (5)$$

b and q_m are Langmuir constants, which relate to the rate of adsorption (L/mg) and adsorption capacity (mg/g). Langmuir constant (b and q_m) can be determined from the slope and intercept from linear graph of C_e/q_e versus C_e . The effect of Langmuir isotherm whether favorable or not can be determined by the following equation:

$$R_L = \frac{1}{1 + b C_0} \quad (6)$$

Where b is Langmuir constant and C_0 represents initial concentration of Mn. The R_L value indicates whether the isotherm is suitable for the adsorbent. When $R_L = 1$, it indicates a linear relationship. The $R_L > 1$ value shows that the type of isotherm is not favorable, when $0 < R_L < 1$, the isotherm is likely to be favorable and when $R_L = 0$ it shows an irreversible relationship.

The Freundlich isotherm can be applied for non-ideal adsorption on heterogeneous surface and multilayer adsorption (Foo and Hameed 2014). The Freundlich equation is given as follow:

$$\log q_e = \log k_f + \frac{1}{n} \log C_e \quad (7)$$

k and n are Freundlich constant which can be obtained from the slope and intercept from linear graph of $\log q_e$ versus $\log C_e$.

F. Kinetics test

Lagergren's pseudo first order, pseudo second order and intra particle diffusion model were selected in this in this study to describe the kinetic adsorption of manganese onto steel slag as adsorbent. The Lagergren's pseudo first order equation (Ho, 2004) can be expressed as

$$\log(q_e - q_t) = \log q_e - \frac{k_1}{2.303} t \quad (8)$$

Where q_e and q_t are adsorbate concentration at equilibrium and also at time (minute) while k_1 (min^{-1}) is the rate constant of this model. k_1 and q_e can be determined from the slope and also the intercept from the graph of $\log(q_e - q_t)$ versus t (minutes). The pseudo second order equation (Ho and McKay, 1998) can be expressed as

$$\frac{dq}{dt} = k_2 (q_e - q_t)^2 \quad (9)$$

This equation was integrated and can be rearranged to obtain a linear form:

$$\frac{t}{q_t} = \frac{1}{k_2 q_e^2} + \frac{t}{q_e} \quad (10)$$

Where k_2 (g/mg min) is the rate constant of this model. q_e and k_2 (g/mg min) can be determined from the slope and intercept of t/q_t versus t (minutes). Webber and Morris had proposed in intra particle diffusion model in 1962. The intra particle diffusion model can be written as,

$$q_t = k_i t^{1/2} + C \quad (11)$$

Where k_i is the intra particle diffusion rate constant ($\text{mg/g min}^{1/2}$). For the intercept C , McKay *et al.* stated that the intercepts are proportional to the extent of the boundary layer thickness that is, the larger the intercept, the greater the boundary layer effect. The k_i can be determined from the slope of q_t (mg/g) versus $t^{1/2}$ ($\text{min}^{0.5}$) graph.

III. RESULTS AND DISCUSSION

A. Characterization of steel slag

The specific surface area and pore size distribution of steel slag were derived from BET analysis and BJH pore size distribution analysis method. The results were obtained from N_2 adsorption/desorption isotherm

at 77 K. The result from multi point BET analysis and BJH pore size distribution analysis were tabulated in table 1:

TABLE I
Surface data of steel slag

Parameters	Value
BET surface area, m ² /g	30.268
Pore volume, cc/g	0.028
Pore Radius, Å	15.364

Scanning Electron Microscopy (SEM) revealed the surface image of steel as shown in figure 1. The images illustrates that there are pores that exist in surface of steel slag thus confirm its porosity. Particle size, pore diameter, specific surface area of considered as a main factors that affecting the adsorption capacity of adsorbent (Wang *et al.* 2010). EDX analysis also conducted to determine the major element that present in steel slag before and after adsorption (Table 2). The presence of high amount of aluminosilicate compound (aluminium, silicon, oxygen) in the presence of calcium oxide could facilitate in the provision of sufficient negatively charged sites for cation exchange reactions to take place with heavy metal present in aqueous solution (Aziz *et al.* 2014). Moreover, the present of aluminosilicate is responsible for the removal of metal ions from aqueous solution (Das *et al.* 2006). From the result, Mn is present after the adsorption occurs. Some other metals present before adsorption also gain some loss after adsorption give suggestion that ion exchange is potential mechanism responsible for the adsorption of Mn onto the steel slag.

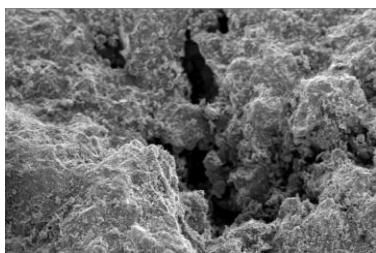


Figure 1: SEM images of steel slag

TABLE II

Element present in steel slag before and after adsorption

Element	Before (%)	After (%)
N	8.09	5.23
O	33.32	26.97
Mg	3.10	1.77
Al	3.66	1.22
Si	12.53	5.61
Ca	22.09	11.63
Fe	17.21	36.91
Mn	-	10.67
Total	100	100

B. Effect of contact time

The effect of contact time was assessed to determine the optimum time for Mn adsorption onto steel slag. The time was set at 24 hour and reading was taken for every 2 hour. Figure 4 shows the effect of contact time and adsorption capacity of steel slag. For the first two hours, the removal percentage shows rapid increase and then slowly increases until it reached optimum time at 10 hours. Higher removal percentage at the beginning of experiment is caused by the large surface area of steel slag that available for the sorption of the metals (Yusuf *et al.* 2013). Therefore, there are available abundant free binding sites are that lead to the higher removal at early experiment (Aziz *et al.* 2014).

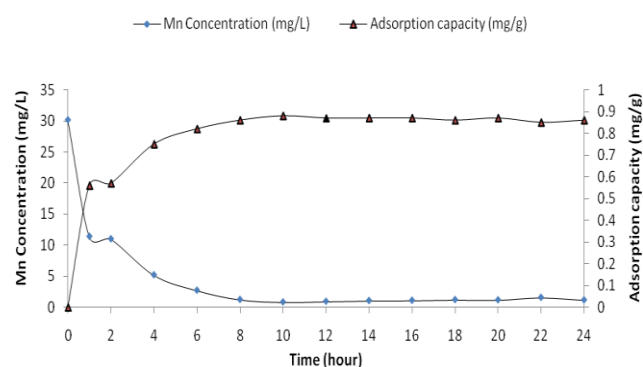


Figure 2: Effect of contact time on adsorption of Mn onto steel slag (Initial Mn concentration: 30 mg/L, dosage: 1 g, size: 1 mm, initial pH: 5.7)

After 10 hours, the removal percentage shows no significance difference of removal. The graph starts to

slightly decrease an increase in inconsistent way but still shows high removal rate (> 95%). The removal percentage within 24 hour contact time can be referred from figure 2. The concentration of Mn was lowered from 30 mg/L to 0.78 mg/L after 10 hours contact time, achieving 97.4% removal of Mn from solution. The equilibrium time was noted at 10 hours which is considered as optimum time enough to remove Mn from solution. Therefore, the contact time was set at 10 hours for the next experiment.

C. Effect of size

Generally, small sizes have the large surface area. Figure 3 shows the concentrations of Mn reduce from 30 mg/L to 0.35 mg/L when the size of adsorbent is 0.5 mm. Figure 6 shows the increasing of removal percentage from 84.3 % to 98.8% when the sizes of adsorbent tend to decrease from 0.5 to 30 mm. Larger particle size has a longer diffusion path, while smaller particle has a shorter diffusion path, allowing adsorbate to penetrate quickly and deeply into the adsorbent particles, resulting to higher rate of adsorption (Yusuf *et al.* 2013). Smaller particles sizes reduce internal diffusional and mass transfer limitation to penetration of the adsorbate inside the adsorbent.

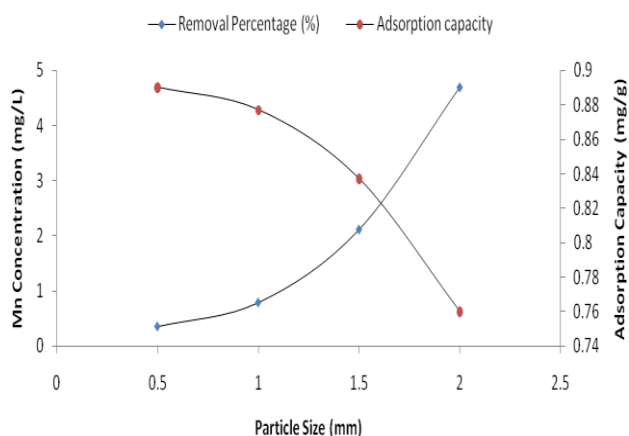


Figure 3: Effect of particle size (Initial Mn concentration: 30 mg/L, contact time: 10 hours, dosage: 1 g, initial pH: 5.7)

D. Effect of adsorbent dosage

Adsorbent dosage does have a great influence towards the rate of adsorption. Figure 4 show the percentage removal of manganese using different adsorbent dosage ranging from 0.1 g until 2.0 g. There is rapid

removal percentage when using adsorbent used ranging from 0.1 until 1.0 g. The percentage removal was increased from 12.37% to 97.37%. After exceed that range, the percentage removal of manganese start to become constant. The initial rapid removal might be due to the increase in adsorbent surface and therefore results in more active site for Mn adsorption (Kumar and Kirthika 2009). Increase in availability of surface active sites resulting from the increased dose of adsorbent, especially at higher doses (Emmanuel and Rao 2008). After 1.0g, the removal percentage starts to become constant or no significant increase due to saturation level attained during adsorption process (Ragheb 2012). Therefore the dosage of 1 g was chosen for the next experiment. The equilibrium achieves between Mn concentration and solution also results in this constant removal percentage. Based on figure 4 also, the adsorption capacity of the adsorbent decrease when the adsorbent dosage start to increase. Many factors can contribute to this adsorbent concentration effect. The most important factor is that adsorption sites remain unsaturated during the adsorption of the adsorption reaction. This decrease in adsorption capacity with the increase in adsorbent dosage is mainly because of non-saturation of the adsorption sites during the adsorption process (Han *et al.* 2006)

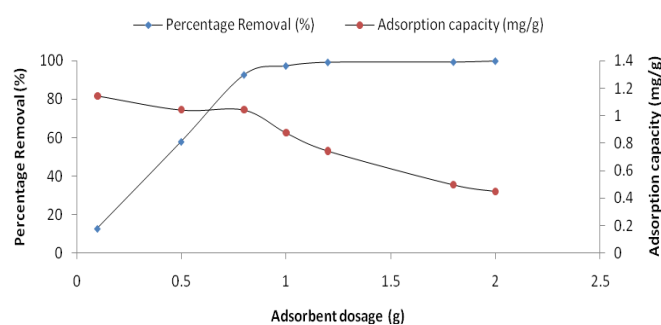


Figure 4: Effect of dosage (Initial Mn concentration: 30 mg/L, contact time: 10 hours, size: 1 mm, initial pH: 5.7)

E. Effect of pH

The pH of the metal ion solution is an important parameter for adsorption of heavy metal. The adsorption of heavy metal depends on the pH of aqueous solution (Omri and Benzina 2012). This is because hydrogen ion competing with positively charged metal ion on the site of adsorbent (Lohani *et al.*

2008). To examine the effect of pH on Mn removal efficiency, the pH was varied from 3.0 to 8.0 and changed manually using 0.1 M HNO₃ and 0.1 M NaOH. As shown in Figure 5, the percentage removal of manganese at pH conditions 3.0-8.0 is relatively high which exceeds 93% of percentage removal. The graph also shows that at low pH condition (pH 3), the removal of heavy metal is low compared to others pH condition. After pH 3, the removal percentage slowly increase until it reached constant range between ranges of initial pH (5.7) until pH of 8. The best results were obtained at pH 6. It was observed that the value of pH solution after 10 hours contact time increase between range of 8-9. This may due from the result of CaOH formation from CaO that present in steel slag. Similar result was obtained from the study by Aziz et al. that using POFA as adsorbent to remove selected heavy metal. The POFA also contain CaO which results in hydroxide ion (-OH) liberation thus increase the solution pH during adsorption process. The absence of adsorption at lower pH is apparently due to higher concentration of hydrogen ion present in the reaction solutions, which can compete with metal ion for the adsorption sites. With an increase in pH, the competing effect of hydrogen ions decreased and the positively charged of metal ion hook up the free binding sites. Hence, the metal ion uptake was increased on the surfaces of the adsorbent with the increase in pH (Duan and Su 2014). When the pH is reduced to an acidic condition, the hydrogen ions also increase thus increase the competition between metal ions to be adsorbed on binding sites of adsorbent (Kour et al. 2012).

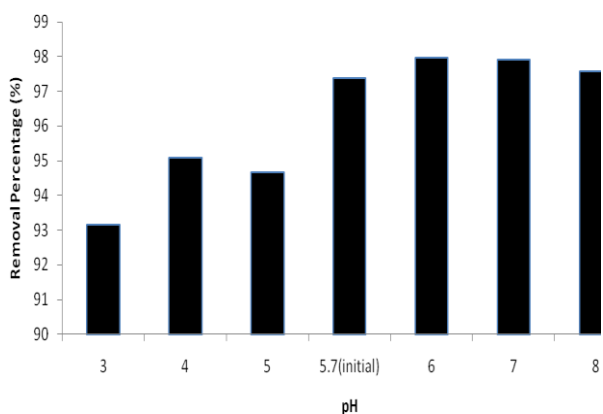


Figure 5: Effect of different pH (Initial Mn concentration: 30 mg/L, contact time: 10 hours, size: 1 mm, dosage: 1g)

F. Effect of initial concentration

The next experiment was to assess the effect of different initial concentrations towards removal efficiencies and also adsorption capacity. The figure 6 shows the removal percentages and adsorption capacity of Mn onto steel slag. The Mn removal decrease when initial concentration of Mn increase, while the adsorption capacity of Mn onto steel slag increases with the increase of initial Mn concentration. The metal ions are dependent on initial concentration. At low initial concentration the surface area and the availability of adsorption binding sites are relatively high and the metal ions is easily adsorbed and removed. Meanwhile, the total available active sites are limit in higher initial concentration thus results in decrease of metal ions uptake (Wang et al. 2010). From the results, the highest initial concentration, 100 mg/L had the lowest removal percentage which is 38.82%. The adsorption capacity increase with the increase of initial concentration due to the driving force that initiated by initial concentration to reduce the mass transfer resistance, thus results in higher adsorption capacity (Almasi et al.2012). The data obtained from this experiment will be use to determine the Mn adsorption isotherms in the next experiment.

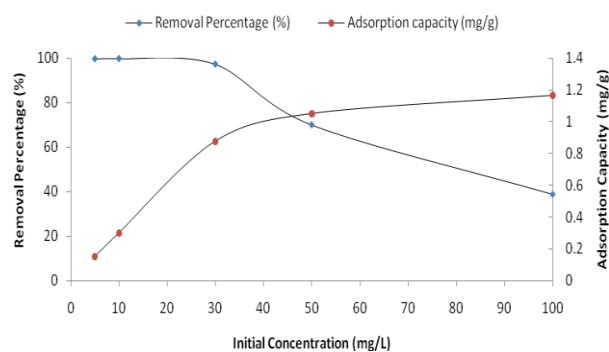


Figure 6: Effect of different initial concentrations (contact time: 10 hours, pH: 6 size: 1 mm, dosage: 1g)

G. Adsorption Isotherm

The equilibrium data were analyzed using Langmuir and Freundlich isotherm model, two isotherm models that generally use to describe adsorption isotherm of adsorbent. Other than that, adsorption isotherm can be described as a model that illustrates the distribution of the adsorbate species among adsorbent and liquid (Lu, Liu, and Rao 2008). Adsorption data for Mn removal

have been correlated with this isotherm model and figure 7 and 8 represent this relation. Table 3 represent the Langmuir and Freundlich constant that obtain from the slope and intercept of both graphs. Based on the figure 10, Langmuir model shows coefficient of determination ($R^2= 0.9993$) for steel slag while Freundlich model in figure 11 shows ($R^2= 0.9395$). Langmuir model fits the data well compared to the Freundlich model. This may be due to homogenous distribution of active sites on steel slag surface since Langmuir equation makes assumption that the surface is homogenous (Foo and Hameed 2014). This concludes that Langmuir model is best model to explain the adsorption of Mn onto steel slag surface compare to Freundlich isotherm model. Moreover, figure 12 shows the graph of R_L versus initial concentration of Mn. The R_L value indicates whether the isotherm is suitable for the adsorbent. When $R_L = 1$, it indicates a linear relationship. The $R_L > 1$ value shows that the type of isotherm is not favorable, when $0 < RL < 1$, the isotherm is likely to be favorable and when $R_L = 0$ it shows an irreversible relationship. The graph shows that the value of RL fell within range $0 < R_L < 1$ which means that the adsorption of Mn onto steel slag is assume as favorable. Table 4 shows the value of R_L and level of favorable isotherm

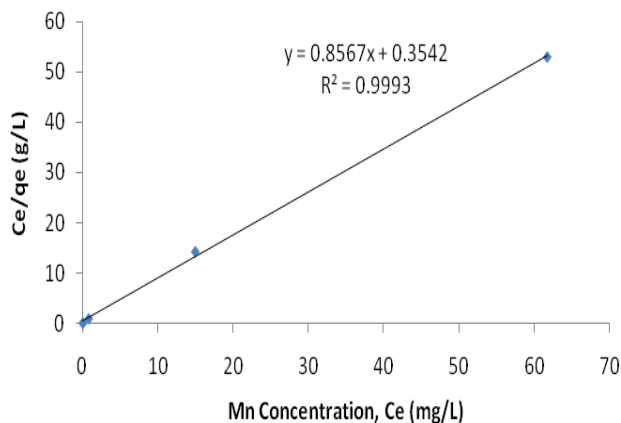


Figure 7: Langmuir plot for Mn adsorption onto steel slag

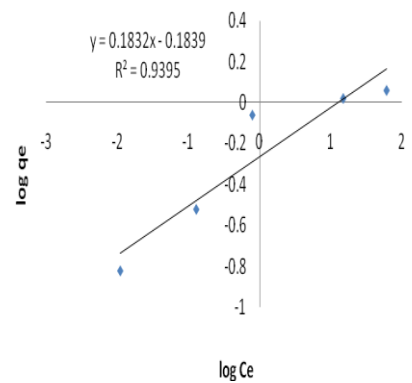


Figure 8: Freundlich plot for Mn adsorption onto steel slag

TABLE 3

Isotherm model constant of Langmuir and Freundlich isotherm model

Isotherm model	Parameters	Values
Langmuir isotherm	qm (mg/g)	1.1673
	b (L/mg)	2.4186
	R ²	0.993
Freundlich isotherm	k	0.6547
	1/n	0.1832
	R ²	0.9395

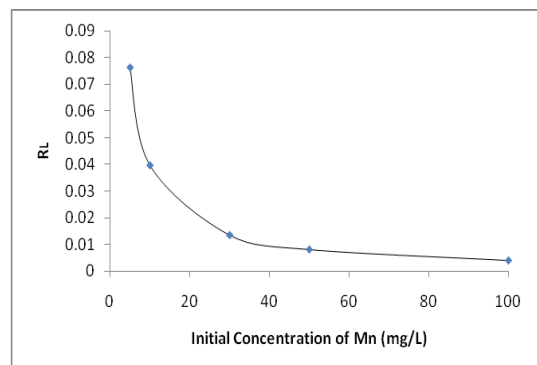


Figure 9: Value of RL against initial concentration of Mn

TABLE 4

R_L and Level of favorable isotherm

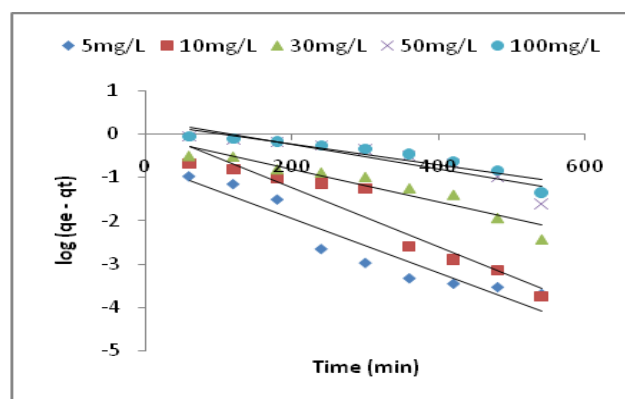
Value	Indicator
$(0 < R_L < 1)$	Favorable
$(R_L > 1)$	Unfavorable
$(R_L = 1)$	Linear
$(R_L = 0)$	Irreversible

H. Kinetic Test

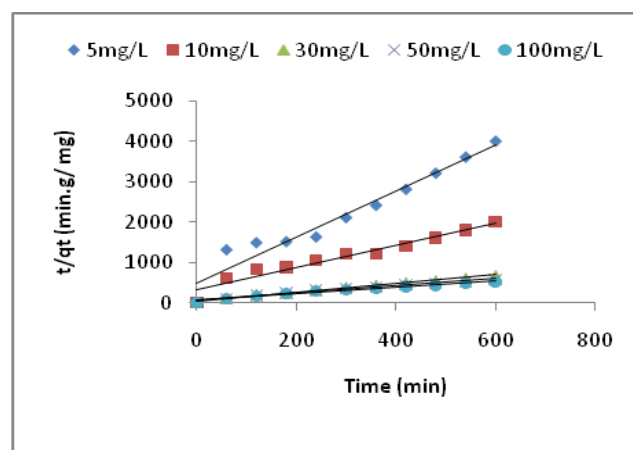
Figure 10 shows the linear form of the kinetics model that had been chosen to describe the kinetic adsorption of manganese onto steel slag. Table 5 shows the rate constant and other parameter for each kinetic model. The theoretical q_e values obtained from the pseudo first order and pseudo second order linear were compared with experimental q_e value and there is large difference for pseudo first order compared to pseudo second order. The correlation coefficient R^2 for pseudo second order at different initial concentration shows better agreement (≥ 0.9436) compared to the correlation coefficient R^2 (≥ 0.8702) for pseudo first order at different initial concentration which indicate that the adsorption of manganese onto steel slag fit well with the pseudo second order model. The pseudo second order model are based on the assumption that the rate limiting step may be chemical adsorption involving valent forces through sharing or the exchange of electrons between adsorbent and adsorbate (Ho and Mackay, 2000). One of the advantages of the pseudo second order equation for estimating q_e values is its small sensitivity to the influence of random experimental errors (Aly *et al.* 2014).

The intra particle diffusion model are also presented in this study to analyze the adsorption kinetic data due to the result from pseudo second order model that are insufficient to predict diffusion mechanism (Akar *et al.* 2008). Generally, the kinetic process of adsorption is always controlled by liquid film diffusion or intra particle diffusion in which one of the process should be the rate limiting step (Qiu *et al.* 2008). Intra particle diffusion plots may represent multi-linearity, which considered two or three steps are involved in this adsorption process. In this form, the external surface adsorption or instantaneous adsorption occurs in the first step; the second step is the gradual adsorption step, where intra particle diffusion is controlled; and the third step where the solute moves slowly from large pores to micro-pores causing a slow adsorption rate (Wu, Tseng and Juang 2009). A plot of q_e vs $t^{1/2}$ would yield a straight line with a slope of k_i when the intra particle diffusion is a rate-limiting step (Qiu *et al.* 2008). If the graph passes through origin, the intra particle diffusion process would not only be involved in adsorption process, but would be a rate limiting step

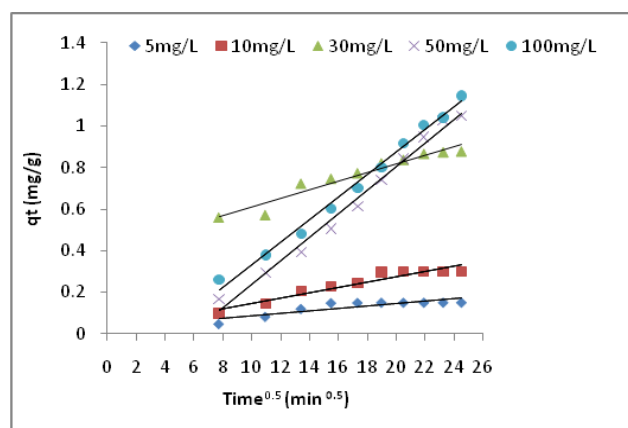
(Aly *et al.* 2014). Based on figure 10, the linear form obtained from a plot of q_e vs $t^{1/2}$ did not pass through origin thus indicate that the intra particle diffusion mechanism is not the sole rate determining step.



a) Lagergren's pseudo first order



b) Pseudo second order



c) Intraparticle diffusion

Figure 10: Kinetic model for adsorption of manganese onto steel slag a) Pseudo first order b) Pseudo second order c) Intra particle diffusion

TABLE 5

Initial concentration (mg/L)	Experimental q_e (mg/g)	Pseudo 1 st order			Pseudo 2 nd order			Intraparticle diffusion model	
		k_1 (min ⁻¹)	q_e (mg/g)	R^2	k_2 (g/mg min)	q_e (mg/g)	R^2	k_i (mg/g min ^{1/2})	R^2
5	0.1499	0.0143	0.1927	0.9045	0.0694	0.1748	0.9517	0.0058	0.7478
10	0.2997	0.0157	1.2868	0.9187	0.0244	0.3606	0.9436	0.0128	0.9198
30	0.8764	0.0085	0.8652	0.9091	0.025	0.9261	0.9907	0.0207	0.9383
50	1.0508	0.0064	2.0403	0.8361	0.0135	1.109	0.9743	0.0566	0.9874
100	1.146	0.0056	1.7227	0.8702	0.0112	1.2323	0.9724	0.0544	0.9909

The rate constant and other parameter for each kinetic model

IV. CONCLUSION

The results from 24 hours contact time shows rapid removal percentage at first 2 hours and optimum time was achieved at 10 hours of contact time, with the removal percentage of 97.4 %. After 10 hours, the removal percentage shows no significance difference of removal. Therefore, the equilibrium time is considered to be 10 hours which is enough to remove Mn from solution. It was found that the size of adsorbent also influences the removal percentage of Mn from solution. From the experiment, the small size adsorbent shows higher percentage removal compared to the large size. Higher adsorbent dosage leads to increase rate of adsorption and starts to become constant after reaching equilibrium amount. Higher adsorbent dosage also leads to the decrease of adsorption capacity. Even in low pH (e.g. pH 3 and 4), the steel slag still had ability to remove Mn from solution above 93%. The removal percentages of Mn from solution reached constant removal at pH ranged between 5.7 - 8. The best results were obtained at pH 6. The final pH of solution ranged between pH 8 and 9. Higher initial concentration (e.g. 100 mg/L) leads to the decrease in percentage removal of Mn from solution, but increase in adsorption capacity. The Langmuir isotherm models fit well with data of Mn adsorption on steel slag compared to the Freundlich isotherm model. Although the maximum adsorption capacity of manganese onto steel slag is not as high

compared to other previous studies, steel slag is still capable to remove high percentage of Mn from aqueous solution (>95%) thus showing potential for real application.

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Measurement of GPRS Performance over Libyan GSM Networks: Experimental Results

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ABSTRACT

The General Packet Radio Service (GPRS) is a new bearer service for GSM that greatly simplifies wireless access to packet data networks, such as the Internet, corporate LANs or to mobile portals. The aim of this work is the measurement of the quality of service (QoS) parameters of GPRS over the Libyan GSM networks, Libyana mobile phone and Al-Madar Al-Jadeed Company. The measured parameters of GPRS are the throughput, round trip-time, delay time, packet loss, packet duplicate, upload speed, and download speed. To evaluate these Parameters, End-to-End measurements are used. At one end is the client (mobile) and at the other end is the measurement server. This server is located with interne address. A special analysis algorithm was implemented.net and used for analysis the measured data. Finally, the measured values of quality of surface parameters of GPRS over the two Libyan mobile operators are illustrated and compared with the theoretical values that could be calculated beforehand.

Keywords: General Packet Radio Service, Quality of Service, Data Performance, Signal Quality, Radio Frequency Performance.

I. INTRODUCTION

The General Packet Radio Service (GPRS), developed by the European Telecommunications Standards Institute (ETSI) [1]. It applies a packet radio standard to transfer user data packets in well-organized way between Mobile Stations (MS) and external packet data networks^[1]. The nature of wireless links is quite different compared to wire line networks; their latency and error prone characteristics make it a challenging environment for providing efficient transport. The GSM system can only support data services up to 9.6kbit/s circuit switched. The GPRS can improve this bit rates. However, commercial GPRS systems will be able to support rates up to 115kbit/s [2].

These provided GPRS services are affected with loss of packets during transmission over wireless network. The Packet losses may occur in the wireless environment more often than in wire line networks because of

multiple reasons. The congestion traffic and surrounding buildings may cause interference resulting in packet losses as well as the hand offs in cellular wireless networks. Such conditions can also cause excess delays as the radio link layer may locally retransmit the corrupted segments [3,4].

This paper presents a system that measures the parameters of Quality of Service (QoS) over the two Libyan GSM networks (libyanna and AL-Madar Al-Jadeed), which have effect on the data transmission over these networks. The investigated Parameters are throughput, round-trip time, download and upload. The QoS can be classified as subjective and objective QoS.

II. GPRS MEASUREMENT PRINCIPLE

GPRS measurements are divided into three categories: data performance, signal quality, and Radio Frequency RF performance as shown in Fig.1.

- The Data Performance category emphasizes data-transfer-quality measurements (as perceived by customers) and GPRS layer-specific measurements.
- The Application layer measurements are used to evaluate the parameters directly perceived by the user (such as throughput and delay).
- The GPRS layer measurements offer insight about events on the GPRS layers that can impact the application layer performance. The measurements are made using a test mobile connected to a computer to trace data packets.

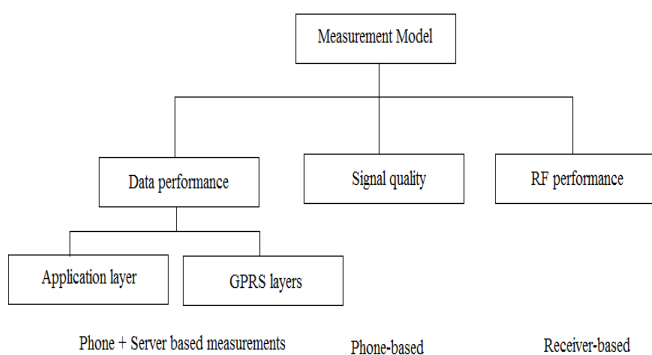


Figure.1: GPRS measurements model

Data performance at the application layer is measured end-to-end, which can be described as follows: One node (mobile) transmits data and another node (server) receives the data and measures its performance. The server can be located at the Internet world. Since the measurements are made end-to-end, in the uplink the server measures the data received from the mobile and sends back the results. The ultimate objective at the application layer is to get the user perspective.

A. The Principles of QoS Measurement

Measuring network quality of service (QoS) is basically very close to network traffic measurements. In network traffic studies, the main point is the effects of the traffic on the network: network load, queuing performance, source traffic processes, large scale traffic flow models. Especially the analysis of traffic processes and models requires accurate information of collected traffic [6]. In QoS analysis, the network traffic itself is not the interesting thing, but it is rather just used as a tool to

reveal the performance characteristics (delay, throughput, etc.) of networks. The measurement of QoS is divided into three separated functional entities, measurement point, traffic measurement tool, and QoS analysis tool, as shown in Fig 2.

The actual measurements are done at measurement points that are, in practice, some network nodes under interest (e.g., routers, terminals...). General rule is that the more measurement points, the more accurately the network behavior can be determined, while the analysis also gets more complicated [7].

The QoS analysis tool is used to analyse the data provided by traffic measurement tools and calculates the actual QoS metrics. In practice, this means, for example, delay calculation of single packets traveling through measurement points. There usually exists a single QoS analysis entity in the measurement system, but naturally the actual calculation process can be distributed in nature.

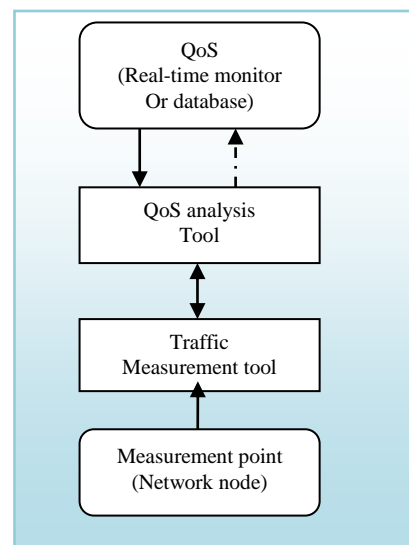


Figure 2: The basic principle of QoS measurements

B. End-to-End performance measurements

The end-to-end performance measurements can be executed as single-point measurements directly from the terminal, which uses some service as shown in Fig.3. The measurement software can be an application on top of the protocol hierarchy, in which case the measurement gives directly an idea about the application layer performance that is usually the desired case in QoS.

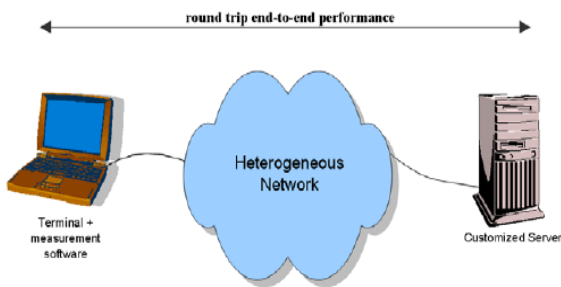


Figure 3: The single-point end-to-end performance measurement

As it can be assumed, with this kind of measurement setup, it is only possible to obtain information about the total round trip performance of the system. One way to enhance the end-to-end performance measurement is to attach measurement software to both ends of the link. Then the performance of different directions (from terminal to server and from server to terminal) can be analyzed separately in addition to the total round trip performance.

III. SYSTEM ARCHITECTURE

The system is developed using client server architecture (end-to-end measurement). One end node is the client and the other is a measurement server as shown in Fig. 4. This server can be a located at the Internet world. The end-to-end measurements can be described as follows: One node transmits data and another node receives the data and measures its performance.

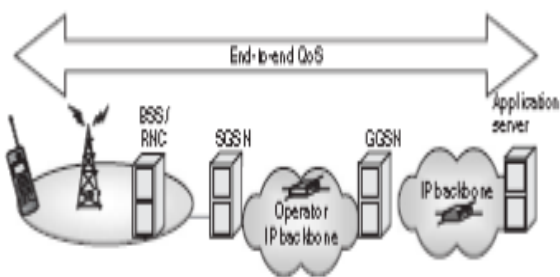


Figure 4: Block diagram of developed system

Two different computers are used, one was used as end hosts and the other was running as a client on the GSM network. Time of the client computer is equipped with a 2.8 GHz Intel (Due Core Centreno processor) and a 1GB RAM. The end host is equipped with 2.0 GHz Intel Pentium running Windows XP service Pack2 as its operating system and a 1GB RAM. As the

measurements are done in real-time, it is important that the whole measuring environment does not produce wrong results. Therefore, these computers dedicated for measurements purpose only and there were no CPU consuming applications running, on them during the measurements.

Since the measurements are made end-to-end, in the uplink the server measures the data received from the mobile and sends back the results. In the downlink the measurements are made by the same software that generated the uplink data. For end-to-end throughput measurements, special software is used to generating bulk data transfers over TCP. For measuring latency a standard ping program can be used [5].

IV. MEASUREMENTS AND ANALYSIS

A. Packet Drop Test

In this test, the packet drops during transmission over wireless network is measured. First, the UDP protocol at transmitter is used to send many packets over GPRS network to server. Every packet represents identified record from database that is prepared for this test. At the receiver side we checked every delivered record. If it is not received at certain time we mark it as lost. If the packet correctly received at the receiver we acknowledge the transmitter. If it is received many times, we mark it as a duplicate in the table. The algorithms that implemented to perform these tasks are shown in flowcharts of fig. 5 and fig. 6 respectively.

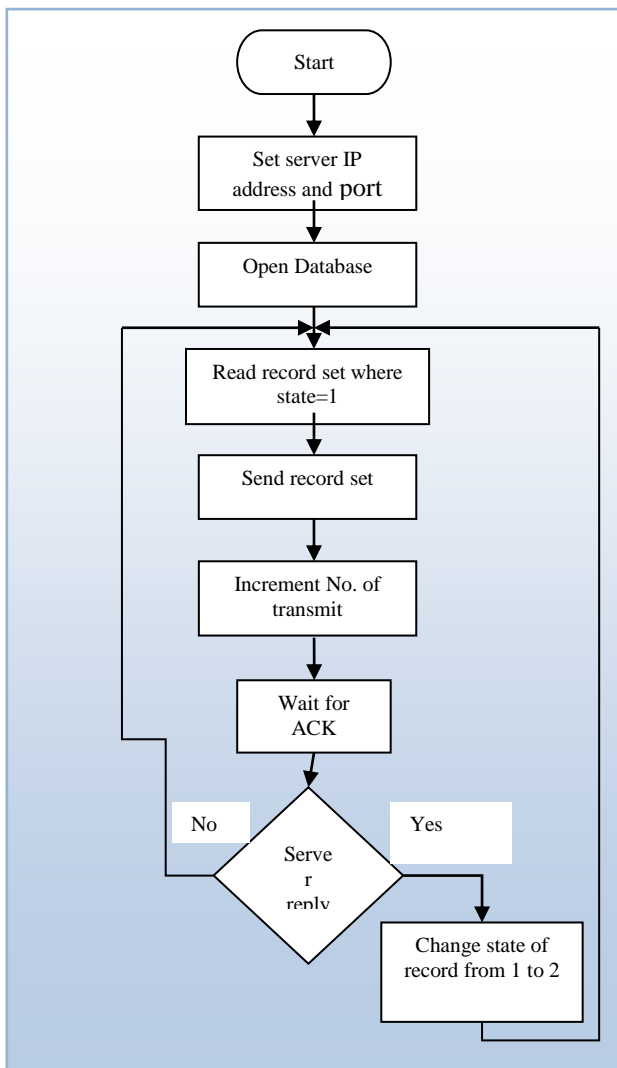


Figure 5: Flow chart of Transmitting Program (client)

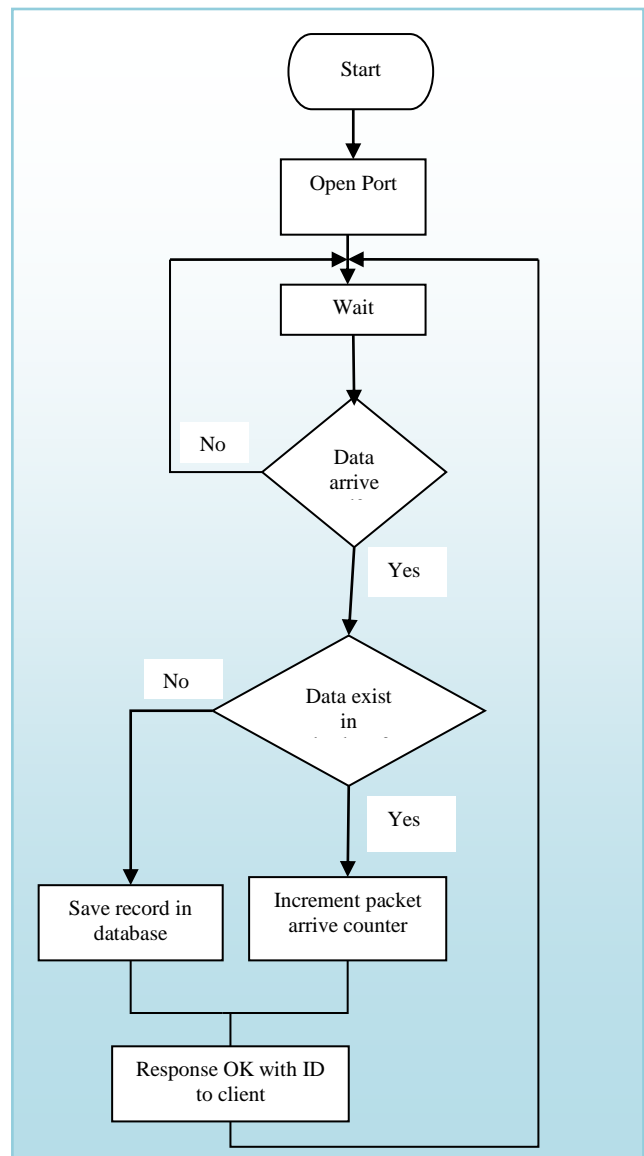


Figure 6: Flow chart of Receiving Program (Server)

B. Reliability Test

In this test the number of times disconnection that may occurs in GPRS is measured. To accomplish this we wrote two programs, one for client and other for server. We used WinSocket tool to make connection between them. After we read the state of connection to check if it is still connected, we record the time and state of the connection in database to know when the disconnection occurs. Fig. 7 shows the flowchart of this program.

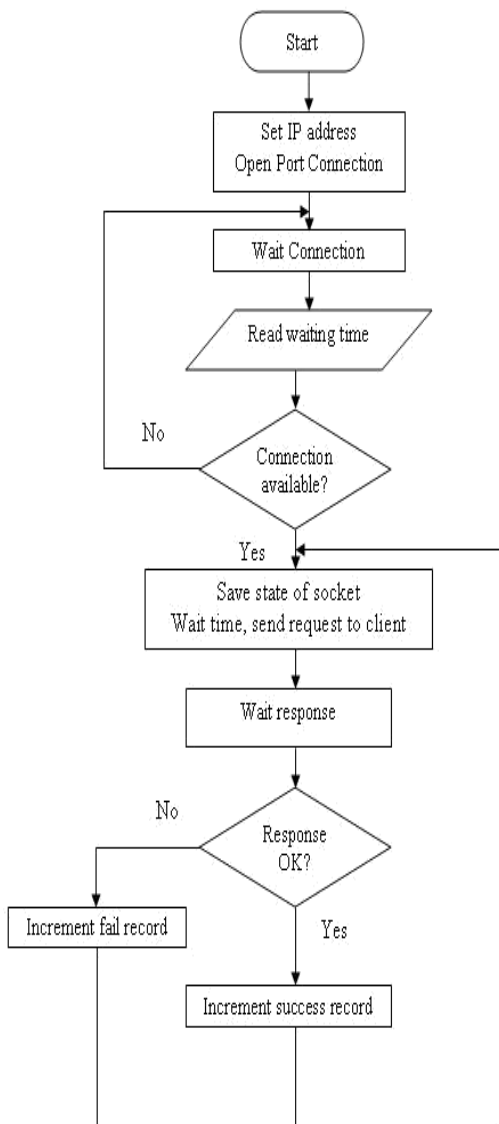


Figure 7 : Flow chart of Connectivity test program

C. Delay Test

In this test we measure the delay of packets in the GPRS link end to end for two direction upload and download. This method also uses two separate programs one on the client and one on the server. TCP protocol was implemented on both programs. The delay is computed during the time taken for the packet to traverse from sender to receiver.

D. Throughput Test

Throughput of a TCP transfer is calculated in the server end of a TCP transfer. The throughput is calculated by dividing the size in bytes of the transferred object with the time in seconds taken for the objects transfer. The transfer time is calculated from the arrival of the clients segment to the sending of the ACK to the clients segment. There is therefore some additional time in the transfer time. The additional time is typically close to a RTT, because the request is always small enough to fit in one segment. This metric gives us extra information to be used in the evaluation of stability of TCP transfers in a test.

V. RESULTS AND DISCUSSION

A. Round Trip Time (RTT) Performance

As mentioned earlier, the aim of this program is to send short packets from client to be received by the server application and finally received back at the client. It characterizes the end-to-end latency, which is important for time-critical applications and dynamic behavior of Internet protocols. Averages, maximum and minimum of round trip times were measured by this program from consecutive Ping commands. The test was repeated many times for several Ping packet sizes. Results are presented in fig. 8. Short packet's PING measurements are useful to characterize, for instance, the initial three-way TCP handshake. Two different locations in Tripoli were selected for stationary tests. These locations (Tripoli University and Alhani) were chosen due to their service availability.

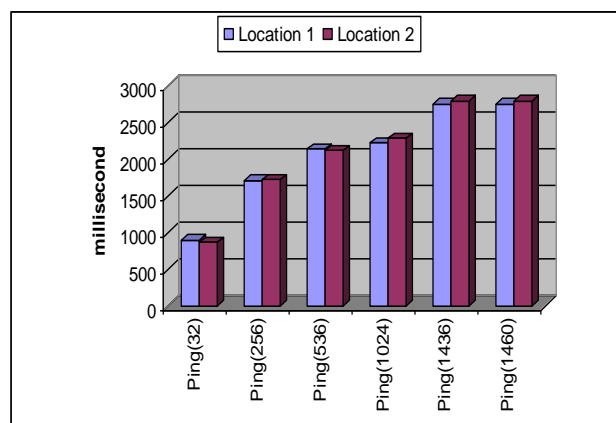


Figure 8: Average Round trip time measured with Ping command in two locations

Fig. 9 shows the comparison of round trip time between Libyana and Al-madar. Sending large size files (greater than 1Kilo bytes) over Al-madar network causes time out some times, due to the restriction in the router of Al-madar to prevent congestion caused by internet control message packet. However sending smaller file sizes over Al-madar gives better time response than Libyana which means traffic due colloquies in A-lmadar less than in Libyana network.

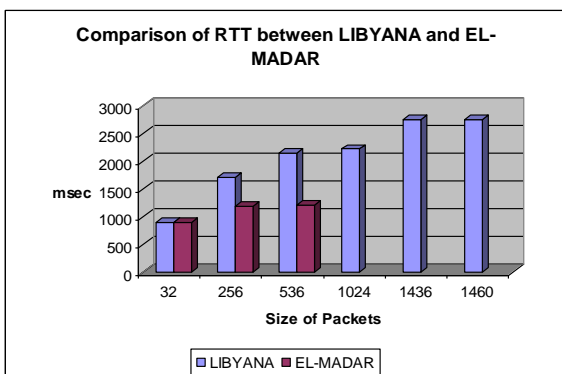


Figure 9: Comparison of RTT over Libyana and Al-madar

B. Impact of Latency on Service Performance

The RTT has effects on different mechanisms that directly impact end-user performance:

- Session setup delay. When a new service is activated, the mobile network (client) may first establish one or several Packet Data contexts in order to reserve resources.
- TCP performance. The establishments of a TCP connection and transmission rate are directly affected by the RTT.
- Service interactivity. Some services (such as voice or real-time gaming) that require small end-to-end delays may not be well supported over packet-switched technology if the round trip time is large. In general interactive response time should not exceed the well-known human factor limit of 100 to 200 milliseconds [5]. So a tradeoff should be found between efficiency and latency in the design of a sub-network.

C. TCP Performance

TCP performance impact in cellular networks is largely affected by the RTT. Large round trip delay makes initial data rates slow due to TCP long connection establishment. The amount of data a TCP can send at once is determined by the minimum value between the receiver's advertised window and the congestion window.

The receiver's advertised window is the most recently advertised receiver window and is based on the receiver buffering status and capabilities. The TCP sender also maintains a timeout timer for every packet sent. If no ACK is received after the expiration of this timer, the congestion window drops to one segment and the oldest unacknowledged packet is retransmitted.

D. UDP Performance

User Datagram Protocol (UDP) transport protocol is less problematic than TCP in wireless, as it does not require retransmissions and the protocol overhead is significantly lower. Some streaming services, such as Voice over IP (VoIP), use Real-Time Protocol (RTP) over UDP.

E. Throughput Performance

Data throughput is especially important in interactive data services, where the user expects to receive and send data files within a reasonable time. File downloads with different file sizes were performed with FTP application. The average throughput depends on file size due to TCP dynamic behavior. The throughput was measured during five file downloads of the same size. Table I and Table II shows the measured throughput during download and upload sessions respectively.

TABLE I: Application Throughput measured in download

File Size (KB)	Download time (sec)	Throughput (Kbyte/sec)
50	19.69	2.60
200	85.34	2.41
500	198.15	2.58

TABLE II: Application Throughput measured in upload

IP Receiving	41.208.168.105
Media Locator	ftp:// 41.208.168.105
File Size	200 KB
Download time	277.5 sec
Speed	0.74 Kbyte/sec

Table I shows the throughput measured in download, where the average throughput is about 20 Kbps for all size of files. In the other direction upload is about 5.9 Kbps. The difference is due to the fact that more time slots are assigned download than upload. The comparison of throughput between Libyana and Al-madar shows that, the throughput is better in Al-madar than Libyana as shown in Fig. 10. The reason is the number of customers in Al-madar is less than Libyana where GPRS signals is effected with number of calls.

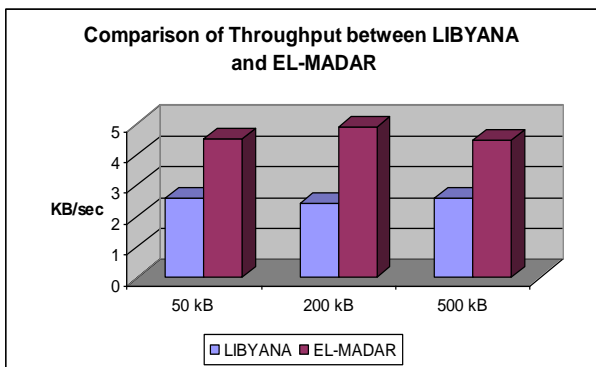


Figure 10: Throughputs Comparison between Libyana and Almadar

F. Effect of Connectivity

The aim of connectivity program is to measure the events and time that when the connection between GPRS client and server falls over one complete day. The result of this program show that, there is no disconnection happened during the whole day as shown in Fig. 11. This means the GPRS connection between client and remote server is always available where no traffic, but when burst traffic takes place the disconnection occur randomly.

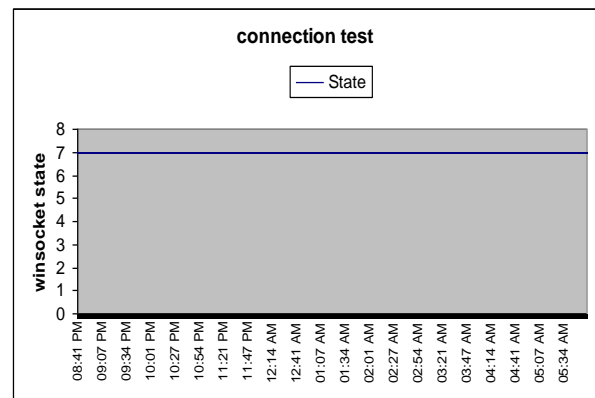


Figure 11: Connection availability over the whole day

G. Packet Delay Measurement

Fig. 12 shows the comparison results of delay time between Libyana and Al-madar for different size of files. The Al-madar GSM network has less delay time than Libyana GSM network for all type of files because Al-madar have traffic less than Libyana GSM network. When download small file (50 KB) few of seconds is different, while at large size of files (500 KB) the different is less than one hundred second.

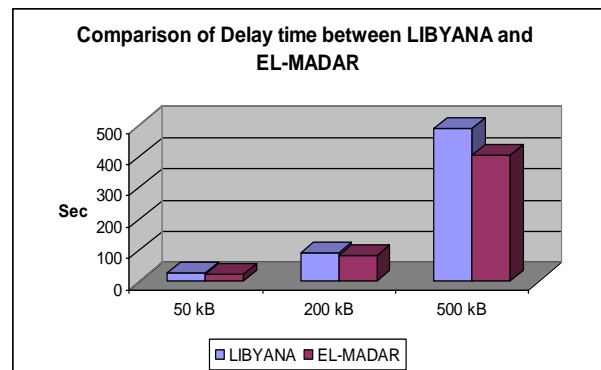


Figure 12: Comparison of delay time between Libyana and Al-madar

H. Packet Loss Measurement

In this experiment, the UDP protocol (connectionless oriented) is used as the base of all packet transmission over the network. Table III shows the percentage of packet loss and duplicate of packets during transmission from total packets for Libyana network.

TABLE III: lists the parameters of our Experiment

IP Receiving	41.208.168.105
File Size	50 KB
Format type	Microsoft Data Base Access(MDB)
Total No. packets sent	140
% Packet loss	10.1%-13.9%
% Packet Duplicate	7%-11%

VI. CONCLUSION

The objective of this paper was to specify and implement measurement system based on parameter of quality of service over GPRS networks. The protocols used for communication between the server and client are TCP and UDP. The implemented system was developed using Visual Basic package. The system was divided into number of sub-blocks. Each sub-block was studied separately using one of the quality of service parameters. The developed programs measured the GPRS system performance in varies conditions. The Ping Test was used for computing the round trip delay for wireless networks which is important factor in TCP protocol.

This work proved that the throughput is the most significant factor in determining usefulness of data download. Besides that, duplication of packets occur when the acknowledge packet does not arrive to transmitter, so it must allocate more packets in upload directions. Some TCP implementations are actually pretty good and getting close to the upper bound under different network conditions. The upper bound is the average throughput between a server and client, regardless of any latency.

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Design and Fabrication of Hydraulic Dough Divider

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ABSTRACT

A hydraulic drive system uses pressurized hydraulic fluid to power hydraulic machinery. Pascal's law is the basis of hydraulic drive system. Present paper deals with the design and manufacturing of a hydraulic controlled system which divides the dough into desirable number of parts. Two stage telescopic cylinder controls the entire operation, in which the first stage compresses and distributes the dough and the second stage raises the blade to cut the dough. Entire system is designed and simulated using fluid SIM-H software and is modelled using CREO.

Keywords: 2 Stages Telescopic Cylinder, Hydraulic Circuit, Power Pack

I. INTRODUCTION

In the present day, with the revolution in the materials and mechanical elements, applied technologies perceive folded growth. Food industries focus on production of hygienic food (quality) with highly optimal machineries which have better maintenance and cost effectiveness [1]. The role of machines in the production is utmost important. Hydraulic dough divider which is mainly used in food industries for dividing dough into equal pieces and weight for the production of food products like pizzas, croissants, buns, rolls etc. The shape of the tray guarantee even distribution of the mass and regular weight of the dough pieces and the lever which is fitted helps in firming and dividing [2]. In present day bread dough dividers, a system called the volumetric system is used to form loaves of dough of approximate standard weight. In the volumetric system, the dough is forced into so-called scaling pockets at an approximate pressure off from twenty to forty pounds per square inch, at the same time shearing the dough on five sides of the cube of a dough piece, the object being to forcibly eject the gaseous bubbles from the dough so that the varying expansion factors will be eliminated and a standard material weight of loaf can be obtained [4]. There are finely and accurately machined separating plates to divide the dough into equal pieces, In between these

plates there consists of cutting blades which cuts the dough on compression.

II. RELATED STUDY

The assessment of product quality through texture analysis is an essential tool for both bread products development and production. L. S. Young [1] described the terms used in texture analysis of the intermediate product (dough) and the final baked product and included the practical relevance of testing methods to these products. The principles connected with the measurement of the rheology of the dough for the processing steps, e.g. mixing, moulding, etc., and examples of the instrumentation used were illustrated. For the final baked product the texture of the crust and crumb structure along with freshness, volume and appearance are all important criteria by which the product was judged. The tests and instruments used for these tasks were described. The application of texture analysis to dough and bread was also explained. Finally future trends in potential instrumentation and measurement techniques were discussed. Igor Burstyn et.al [2] conducted a study to measure full-shift exposure to inhalable dust in bakeries and defined the determinants of full-shift exposure. A regression model explained 79% of the variability in exposure. The model indicated that tasks such as weighing, pouring and

operating dough-brakers and reversible sheeters increased the exposure, while packing, catching and decorating decreased the exposure. Bread and bun production lines were associated with increased full-shift inhalable dust exposure, while cake production and substitution of dusting with the use of divider oil were associated with decreased exposure. Production tasks and characteristics are strong predictors of personal full-shift exposures to flour dust among bakers; these can be altered to reduce exposure levels. Sheeting is a common method for processing developed doughs, the elasticity of which governs dough's sheetability as dough springs back exiting rollers. To characterize dough sheetability, a study was conducted by M.J.Patel et. [3] al, testing 18 different doughs made from six different flours. Each dough was sheeted using an instrumented sheeting machine and data for exit sheet thickness and roll forces were captured under a range of sheeting conditions. The true rheological properties of doughs were measured and used to calibrate the ABBM constitutive model for dough. Numerical simulations of sheeting operations were conducted; the R² coefficients between measured and predicted sheet thicknesses and roll forces (vertical and horizontal) were nearly all >0.9. Relaxation times were derived from dough model parameters and revealed that flour quality for dough elasticity should be assessed by examining moisture effects on dough relaxation time. Panagiotis H. Tsarouhas [4] described the classification methodology over a 2-year period of the primary failure modes in categories based on failure data of bread production line. He estimated the probabilities of these categories applying the chi-square goodness of fit test, and calculated their joint probabilities of mass function at workstation and line level. Then, he presented numerical examples in order to predict the causes and frequencies of breakdowns for workstations and for the entire bread production line that will occur in the future. The methodology was meant to guide bread and bakery product manufacturers, improving the operation of the production lines. Since bioactivity of β -glucan has been linked with its physicochemical properties, Tamer H. Gamel [6] investigated the effects of straight-, sponge- and sour-dough bread making processes on physicochemical characteristics of β -glucan in whole wheat/oat bread. The presence of β -glucan-degrading enzymes in the whole wheat flour used in this study were found to depolymerize β -glucan at a rate of 0.054 min⁻¹, causing a significant reduction in β -glucan molecular weight

(Mw) during dough process. Sour- and sponge-doughs had lower rates of β -glucan depolymerization, resulting in breads with medium to high β -glucan Mw range (600–1087 kg/mol) compared to straight-dough method. Dough pH, titratable acidity and fermentation plus proofing time showed significant impacts on β -glucan Mw and viscosity, but not on solubility. Acetic and propionic acids were present in all doughs, whereas lactic acid was only found in sour-dough. The effect of fiber addition on the distribution and mobility of protons in biscuits was studied by M.R.Serial et. al [7] using low resolution time domain nuclear magnetic resonance (TD-NMR). The proportion of flour was reduced in order to incorporate inulin and oat fiber. NMR temperature dependent experiments are carried out in order to gain insight on the processes occurring in biscuit baking. Proton populations were identified measuring spin-spin relaxation times (T₂). The major change in the relaxation profiles upon incorporation of fibers corresponds to mobile water molecules, which appear to be related to dough spreading behaviour and biscuit quality. Biscuit samples baked in a commercial oven were studied by two dimensional spin-lattice/spin-spin (T₁-T₂) relaxation maps. The T₁/T₂ ratio was used as an indicator of the population mobility, where changes in the mobility of water in contact with flour components as starch, proteins and pentosans were observed.

III. METHODOLOGY

Figure 1 show the methodology involved in design and fabrication of hydraulic dough divider. It begins with the definition of the problem where the objective is decided. Literature survey includes the collection of related data that supports the current modification of the design. Building the model depends on the design calculation and the selection of the material [5]. Each component is constructed and assembled. Next phase is the testing phase where the numbers of trials are taken and the results are validated with the already existing system. Required modifications are made in the system in order to rectify the errors and optimize the results.

For the selection of cylinder, it is necessary to know the total weight that the cylinder has to lift and the pressure needed. So the necessary parts of the machine which has to be lifted by the cylinder have to be made [6]. Once the dead weight and the load are built, the selection of cylinder (diameter) could be carried out. Equation (1)

shows the relationship between pressure, load and the diameter.

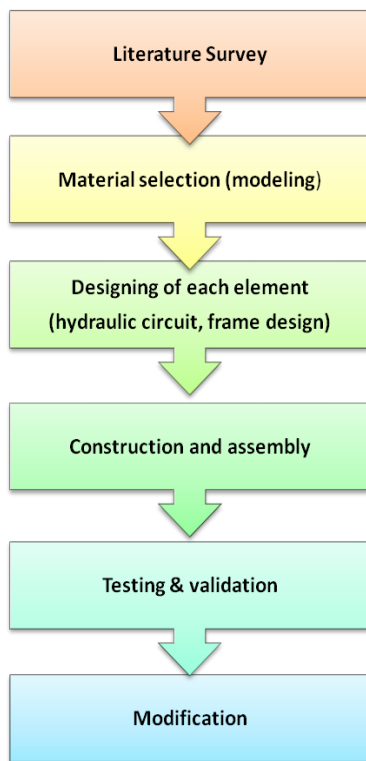


Figure 1: Methodology in design and fabrication of hydraulic dough divider

$$P = mg / (\pi d^2 / 4) \dots \dots \dots (1)$$

The two stage telescopic cylinder is more easy and reliable method for doing two staged operation which is used in this machine. The main reason for the selection of this type of cylinder is that, 1st stage is connected to the die that compresses the dough and the 2nd stage is connected to the cutting blades which cuts the dough on compression. Therefore both the operation is done using single cylinder at a single stroke of action.

IV. CONSTRUCTION AND WORKING

The design of whole machine consists of parts like frame, cylinder base, dividing plate, cutting plate, direction control valve etc. Initially construction is carried based on initial design and trial and error method is adopted at few points until an optimum result is reached. Some are the parts of Hydraulic dough divider are explained as below. Figure 2 shows the frame made of MS material (I beam) and is covered with GS sheets of 1mm thickness. Some of the machines used to fabricate frame are Arc Welding Machine, Power

Grinder, and Sawing Machine etc. Figure 3 shows the top cover of the dough divider and it is made of MS material and it is 10 mm in thickness. Dividing plate or die shown in figure 4 made of MS sheet of 4 mm thickness. Figure 5 shows the cutting plates which divides the dough into equal number of parts. It is made up of stainless steel material and of 2mm thickness. Figure 6 shows the hydraulic cylinder / 2 stage double acting telescope cylinders. 1st stage actuating pressure plates followed by 2nd stage actuating cutting blades. It is controlled by 4/2 direction control valve. Directional control valves shown in figure 7 are one of the most fundamental parts in hydraulic machinery as well and pneumatic machinery. They allow fluid flow into different paths from one or more sources. They usually consist of a spool inside a cylinder which is mechanically or electrically controlled. The movement of the spool restricts or permits the flow, thus it controls the fluid flow. Figure 9 shows the hydraulic power pack which is a standalone unit with no assembly required other than filling the hydraulic reservoir with fluid. The unit should be located as close as possible to the valve(s) it will operate. All the parts are assembled together which is shown in the figure 10. The hydraulic circuit shown in figure 11 is designed for the machine using the software named fluid SIM-H. From the circuit, the fluid is taken from the tank (T) with the help of a hydraulic pump which is driven by an AC motor (M). Then it is sent to the cylinder via 4/2 control valves. When the lever is not actuated the fluid circulates within the tank and the pump. When the lever is actuated the fluid enters through B to cylinder, moving it upwards. Again when the lever actuates the fluid returns from A back to the tank moving the cylinder downwards.



Figure 2: Frame



Figure 3: Top Cover



Figure 4 (a): Dividing Plate top view

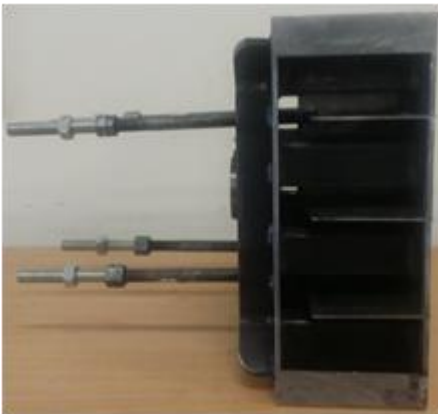


Figure 4 (b): Dividing Plate side view

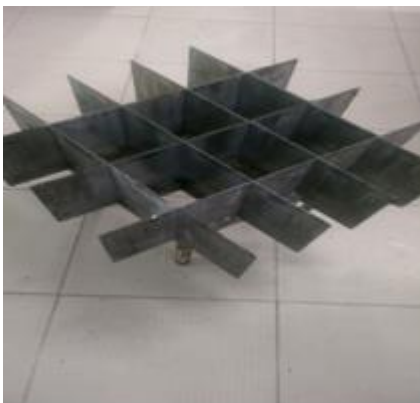


Figure 5: Cutting Plate

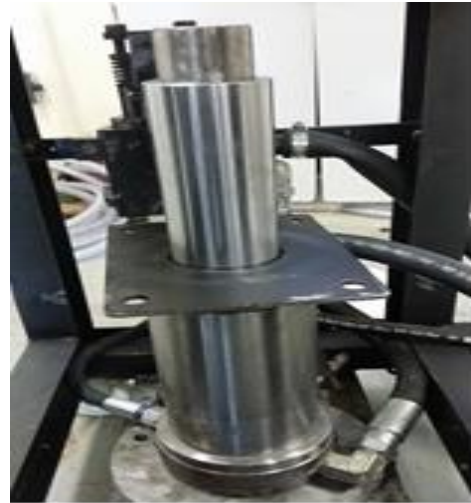


Figure 6: Hydraulic Cylinder



Figure 7: Directional control valve

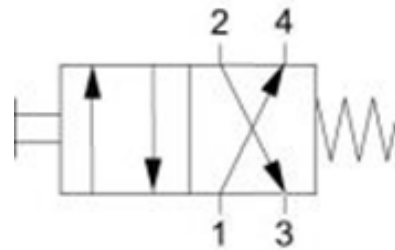


Figure 8: 4/2 Valve



Figure 9: Hydraulic power pack



Figure 10: Complete Assembly

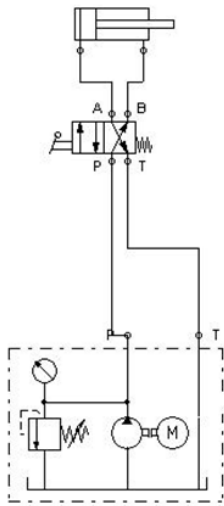


Figure 11: Hydraulic circuit using fluid SIM-H

Figure 2 shows the frame made of MS material (I beam) and is covered with GS sheets of 1mm thickness. Some of the machines used to fabricate frame are Arc Welding Machine, Power Grinder, and Sawing Machine etc. Figure 3 shows the top cover of the dough divider and it is made of MS material and it is 10 mm in thickness. Dividing plate or die shown in figure 4 made of MS sheet of 4 mm thickness. Figure 5 shows the cutting plates which divides the dough into equal number of parts. It is made up of stainless steel material and of 2mm thickness. Figure 6 shows the hydraulic cylinder / 2nd stage double acting telescope cylinders, 1st stage actuating pressure plates followed by 2nd stage actuating cutting blades. It is controlled by 4/2 direction control valve. Directional control valves shown in figure 7 are one of the most fundamental parts in hydraulic

machinery as well and pneumatic machinery. They allow fluid flow into different paths from one or more sources. They usually consist of a spool inside a cylinder which is mechanically or electrically controlled. The movement of the spool restricts or permits the flow, thus it controls the fluid flow. Figure 9 shows the hydraulic power pack which is a standalone unit with no assembly required other than filling the hydraulic reservoir with fluid. The unit should be located as close as possible to the valve(s) it will operate. All the parts are assembled together which is shown in the figure 10. The hydraulic circuit shown in figure 11 is designed for the machine using the software named fluid SIM-H. From the circuit, the fluid is taken from the tank (T) with the help of a hydraulic pump which is driven by an AC motor (M). Then it is sent to the cylinder via 4/2 control valves. When the lever is not actuated the fluid circulates within the tank and the pump. When the lever is actuated the fluid enters through B to cylinder, moving it upwards. Again when the lever actuates the fluid returns from A back to the tank moving the cylinder downwards.

V. RESULTS AND VALIDATION

By using equation 1 and substituting the pressure and weight of the dough, a standard telescopic cylinder is selected with the dimensions mentioned in the table 1. There are stages used to actuate both dividing and cutting plate.

TABLE I
SPECIFICATION OF SELECTED CYLINDER

Sl. No	Name	Outer diameter (mm)	Inner diameter (mm)
1	Jack	150	110
2	1 st Stage Cylinder	110	70
3	2 nd Stage Cylinder	70	30

Frame of the entire system is made of I section beam (40 mm X 80 mm X 3mm) and the entire dimension of the frame is (720 mm X 410 mm X 480 mm). It is covered by the top cover which is 10 mm in thickness and has a dimension of (400 mm X 450 mm). The dividing plate or the die has the overall dimension of (115 mm X 77.5 mm) it is supported by the square tubes. The cutting

blades have a dimension of (350 mm X 310 mm X 140 mm).

Selection of an induction motor is an AC electric motor in which the electric current in the rotor needed to produce torque is obtained by electromagnetic induction from the magnetic field of the stator winding. An induction motor therefore does not require mechanical commutation, separate-excitation or self-excitation for all or part of the energy transferred from stator to rotor, as in universal, DC and large synchronous motors. An induction motor's rotor can be either wound type or squirrel-cage type.

TABLE 2
SPECIFICATION OF MOTOR

Details	Units	Values
Power Supply Frequency	Hz	50
Frame Size	mm	200
Ingress Protection	IP	55
Number of Poles		2,4 and 6
Power	kW	18.5

All the dimensions and specification mentioned satisfies a smooth operation of hydraulic system which is designed. The weight of the dough which is applied is balanced and been lifted to obtain desired number of dough divisions. Therefore the entire design is safe, cost effective and compact [5].

VI. CONCLUSION

In this work a prototype model of the hydraulic dough divider was designed fabricated with the measurements with respect to the real-time system. A two stage telescopic hydraulic cylinder will first actuate the die and compress the dough. Once it compress to the maximum level, the 2nd stage of cylinder gets actuated and the blades cuts the dough. The final product achieved will be 12 pieces of dough having equal weight. It is the replacement of the traditional method which is less time consuming compared to the manual methods. Appropriate design and validation using CAD software's will boost the system to obtain optimum results. Significant changes can be made to this work, as it has used a hydraulic cylinder in the machine there is chance of oil leakage and it could be unhygienic. As long as making of food product is concerned, proper food grade materials are strictly to be used. Here the die has been made with MS sheet, which is not an appropriate food

grade material. So it could be changed to aluminium or Teflon plastics. Pneumatic cylinder can be preferred than the hydraulic cylinder, since compressed air is used which will result in faster action and also more hygienic. Stainless Steel can be used instead of the Mild Steel which is suitable for food grade Products, even though it is bit expensive. Size of the system can be increased in order to increase the production of dough. Also by using thermal mechanism the divided dough can be converted into a finished product.

VII. NOMENCLATURE

P= Pressure generated, N/m^2

m= mass of the dough, kg

g= acceleration due to gravity, m/s^2

d= bore diameter, m

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Prognostication of Concrete Characteristics with Coconut Shell as Coarse Aggregate Partial Percentile Replacement

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ABSTRACT

In this constructed environment, the rising cost of building construction materials is the issue of great concern. The prices of building materials are rising day by day. The coarse aggregates are the main ingredients of concrete. In this paper, the utilization of coconut shell as a replacement for coarse aggregate has been discussed based on the results obtained from comprehensive experimental results. The construction industry totally relies on cement, sand and aggregates for the production of concrete. Properties of concrete with coconut shells (CS) as aggregate partial percentile replacement were studied. Control concrete with normal aggregate and CS concrete with 10 - 50% coarse aggregate replacement were prepared with constant water – binder ratio of 0.45. For all mixes, workability, density, water absorption, compressive strength flexural strength and tensile strength were determined at 7, 14 and 28 days. The results showed a steady decline in the workability. The density results for concrete cube and beam specimens shows general decrease in physical property due to CS replacement. The water absorption tests showed that the percentage water absorption increases with increase in the percentage replacement level of coarse aggregate with CS. The compressive, flexural and tensile strength of CS concrete were found to be lower than normal concrete

Keywords: Coconut Shell (CS), Partial, Percentile, Aggregates, Water-Binder Ratio, Concrete

I. INTRODUCTION

Infrastructure development across the world created demand for construction materials. Concrete is the premier civil engineering construction material. Concrete manufacturing involve consumption of ingredients like cement, aggregates, water and admixture(s). Among all the ingredients, aggregates form the major part. Two billion tons of aggregate are produced each year in the United States. Production is expected to increase to more than 2.5 billion tons per year by the year 2020 [1]. Similarly, the consumption of the primary aggregate was 110 million tonnes in the UK in year 1960 [2] and reached nearly 275 million tonnes by 2006 [3]. Utilization of natural aggregate in such a rate leads to a question about the preservation of natural aggregates sources. In addition, operations associated

with aggregate extraction and processing are the principal causes of environmental concerns [4]. In light of this, in the contemporary civil engineering construction, using alternative materials in place of natural aggregate in concrete production makes concrete as sustainable and environmentally friendly construction material.

Diverse alternative waste materials and industrial by products such as fly ash, bottom ash, recycled aggregates, foundry sand, china clay sand, crumb rubber, glass were replaced with natural aggregate and were investigated for the properties of concretes [5-10]. Apart from above mentioned waste materials and industrial by products, few studies identified that coconut shells, the agricultural by product can also be used as aggregate in concrete [11,12].

The use of coconut shell as coarse aggregate in concrete has never been a usual practice among the average citizens, particularly in areas where light weight concrete is required for non-load bearing walls, non-structural floors, and strip footings. It is evident that the coarse aggregate usually take about 50% of the overall self weight of concrete. The cost of materials for construction is increasing every day because of intense demand, scarcity of raw materials, and paying high bills for energy. From the viewpoint of energy saving and conservation of natural resources, the exploitation of alternative construction materials is now a global concern.

II. METHODS AND MATERIAL

Experimental Procedure

2.1 Material Used

Concrete specimens

The cube size of 150x150x150mm will be used to conduct the compressive strength test. On the other hand, a beam of 330x100x100mm will be used to conduct the flexural strength test. A sample of specimen which contains 0% Coconut shell is also used as control sample. A total of 108 specimens will be prepared.

Cement

Ordinary Portland Cement (OPC) from a single source will be used throughout. Portland cement can be defined as hydraulic cement that hardens by the interaction between its properties and that of water which forms a water resisting compound when it receives its final set.

Coarse aggregate

Aggregate has a significant influence on the compressive strength of concrete, crushed coarse aggregate produces a concrete with higher strength than one with uncrushed coarse aggregate (smooth and rounded aggregate). Crushed gravel of 10mm size will be used as coarse aggregate with a density, relative density and absorption value of 2375kg/m³, 2.7 and 0.5% respectively.

Fine aggregate

Fine aggregate refers to aggregate particles lower than 4.75mm but larger 75mm. Fine aggregate act as filler in concrete, fine aggregate is usually known as sand and it most complies with coarse, medium or fine grading requirement. The fine aggregate will be air dried to obtain saturated surface dry condition to avoid compromising water cement ratio. In this research, river sand is used and sieve analysis will is conducted to prior to obtain fine aggregate passing through 600 µm sieve.

Water

The chemical reaction between water and cement is very significant to achieve a cementing property. Hydration is the chemical reaction between the compounds of cement and water yield products that achieve the cementing property after hardening. Therefore it is necessary to that the water used is not polluted or contain any substance that may affect the reaction between the two components, so tap water will be used in this study.

Coconut Shell (CS)

For the purpose of this research, the Coconut shells were obtained from a local coconut field located in Seremban, Malaysia. They were sun dried for 1 month before being crushed manually. The crushed materials were later being transported to the laboratory where they are washed and allowed to dry under ambient temperature for another 1 month. The particle sizes of the coconut shell range from 10 to 14 mm.

2.2 Mixed Design

Almost all the available mix design methods are based on experimental relationships, charts and graphs developed from a wide experimental investigation. Basically, they understand the same assumptions communicated in the previous section and only minor differences exist in different mix design methods in the process of selecting the mix proportions. The conditions of concrete mix design are generally influenced by the usual experience with regards to the structural design conditions, durability and placing conditions.

The mix design method in this research is comprehended based on the Department of Environmental (DOE) United Kingdom. Selecting the best proportions of cement, fine and coarse aggregate and water to produce concrete having specified properties is a primary problem in designing concrete mix. Hence, the design mix is very essential in achieving the design characteristic strength. Table 1 shows the mix proportions and Figure 1, shows the process of DOE mix design method.

Table 1: Mix Proportions

Quantity	Cement (kg/m ³)	Water (kg/m ³)	Fine Aggregate (kg/m ³)	Coarse Aggregate (kg/m ³)	Coconut shell (kg)
Per m ³	511.11	230	653.7	980.34	-
Control 0.00338m ³	1.73	0.78	2.21	3.31	-
10% CCS	1.73	0.78	2.21	2.98	0.331
20% CCS	1.73	0.78	2.21	2.65	0.662
30% CCS	1.73	0.78	2.21	2.32	0.993
40% CCS	1.73	0.78	2.21	1.99	1.324
50% CCS	1.73	0.78	2.21	1.655	1.655

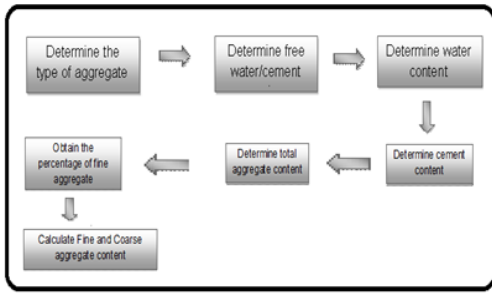


Figure 1: Processes for DOE method

III. RESULTS AND DISCUSSION

3.1 Slump Test

Fresh concrete is defined as workable when the concrete can be transported, placed, compacted and finished easily and without segregation, slump tests were conducted for concrete with granite aggregate and 10%, 20%, 30%, 40% and 50% coconut shell aggregate replaced in granite-concrete to determine the comparable workability. In this study, 3 batches of all concrete types were tested on the workability before the fresh concrete specimens were casted in the moulds. Table 2 presents the test results for the average slump of control granite-concrete and all coconut shell concrete.

Table 2: Slump test

Concrete Class	Composition with CCS replacement	Batch NO	Slump (mm)	Average slump (mm)
1	0%	A	67	66
		B	65	
		C	66	
2	10%	A	52	52
		B	53	
		C	52	
3	20%	A	48	47
		B	46	
		C	47	
4	30%	A	41	40
		B	39	
		C	40	
5	40%	A	35	36
		B	37	
		C	36	
6	50%	A	29	29
		B	28	
		C	30	

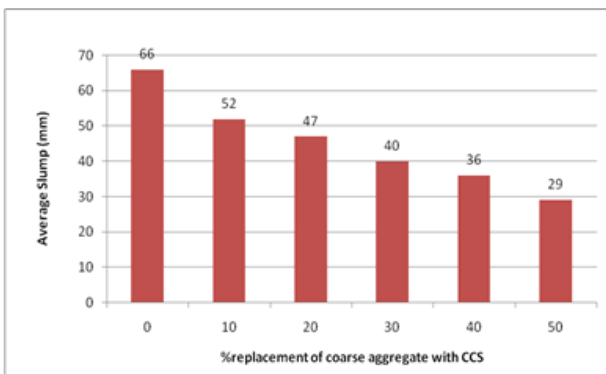


Figure 2: Results of Slump Test

Figure 2 shows average results for coconut shell concrete percentage from the slump test, the design slump was 30 to 60mm. In this investigation, the results show that as the percentage of the shell increases the workability of the concrete reduces, this may be due to the water absorption capacity of coconut shell. Although, the decrease in slump with coconut shell replacement did not exceed the acceptable designed slump. This is consistent with results reported by Olanipekun et al., (2006).

3.2 Compaction Factor Test

The compacting factor is proposed in BS 1881: Part 103: 1993 and ACI 211. 3-75 (Revised 1987). The compacting factor test results are shown in table 3 below.

Table 3 Compacting Factor test results

%Replacement with CCS	Compacting Factor
0%	0.95
10%	0.92
20%	0.872
30%	0.869
40%	0.791
50%	0.78

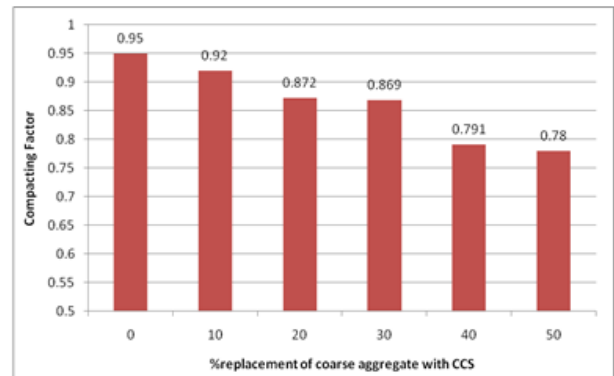


Figure 3: Compacting factor test results

3.3 Density Test

The density test was performed on cubes and rectangular beam specimens at 28 curing days of curing. The measured mass of moist concrete types showed variation of mass in respect with CS percentages replacement in granite-concrete. However, the moist concretes were dried in the oven and re-weighed. In this study, one sample of concrete type was used to calculate the densities of each specimen. The density results for cube and beam specimens are shown in the table 4 below respectively.

Table 4: Density result for concrete cubes & beams

Density result for concrete cubes					Density result for concrete beams				
CCS (%)	Weight (kg)	Volume (m ³)	Density (kg/m ³)	AVR-Density (kg/m ³)	CCS (%)	Weight (kg)	Volume (m ³)	Density (kg/m ³)	AVR-Density (kg/m ³)
0	8.40	0.0034	2550	2550	0	7.2	0.004	1800	1811.7
	8.70		2580			7.39		1832.5	
	8.55		2533			7.31		1802.3	
10	7.75	0.0034	2300	2250	10	6.9	0.004	1725	1734.2
	7.3		2200			7.68		1785	
	7.55		2340			6.85		1712.5	
20	6.80	0.0034	2000	2000.2	20	6.74	0.004	1670	1680.8
	6.75		2014.7			6.68		1670	
	6.85		1983.3			6.73		1682.5	
30	6.43	0.0034	1891.2	1857	30	6.5	0.004	1625	1602.5
	6.13		1802.6			6.32		1580	
	6.10		1823.5			6.41		1602.5	
40	5.90	0.0034	1671.6	1602.9	40	7	0.004	1520	1530
	5.31		1561.8			6.09		1507.5	
	5.54		1639.4			6.21		1552.5	
50	4.80	0.0034	1411.8	1445.1	50	5.8	0.004	1450	1465.8
	4.92		1447.1			5.77		1442.5	
	5.02		1476.5			6.02		1505	

Table 4, shows the average densities for the 28 days-cured specimens prepared for cubes and beams for compressive strength and flexural strength testing. From the table it can be seen that density reduces by the addition of CS aggregates. The minimum densities are found in the 40% and 50% of CS replacement. It is evident that all values falls well within the range of lightweight concrete.

3.4 Water Absorption Test

The cubic samples were tested for water absorption capacity at 28 days of curing. In the first place, the dry masses of concrete samples were saturated in the water basin for the period of 28 days specified in the methodology. After, the saturated concrete samples were again reweighed. Subsequently, the saturated mass was subtracted from dry mass of samples to determine the mass of water absorption and thus, percentage of water absorption relative to dry mass. Table 5 shows the percentages of water absorption by sample of cubic specimen.

Table 5: Water absorption test results on cube concrete samples

Concrete Class	Composition with CCS percentage	Dry mass of sample (g)	Saturated mass of sample (g)	Mass of Absorbed water (g)	% of absorbed water relative to dry mass
A	0%	6460	6530	70	1%
B	10%	6460	6620	160	3%
C	20%	4670	4950	280	6%
D	30%	4420	4780	360	8%
E	40%	4180	4680	500	12%
F	50%	5250	6150	900	17%

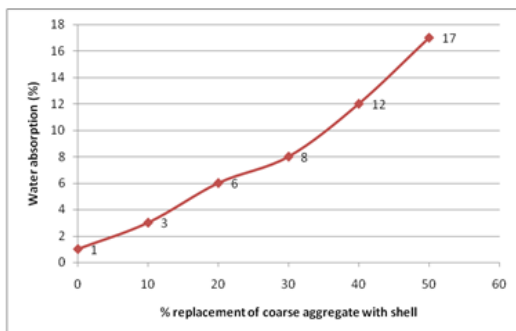


Figure 4: Water absorption amount with CS replacement

Figure 4 shows the water absorption amount for different percentage of CS replacement. The water absorption tests showed that the percentage water absorption increases with increase in the percentage replacement level of coarse aggregate with CS. 50% of CS replacement shows the highest water absorption followed by 40%, 30%, 20% and lastly 10% of CS. This is because the higher percentage of CS applied in each mixture increases the total voids in the concrete mix. This will result to higher water absorption capacity since samples are capable of absorbing more water when more voids are distributed. According to figure 4, 50% of CS exhibit 17% of water absorption while 40%, 30%, 20%, 10% and 0% gives the amount of 12%, 8%, 6%, 3% and 1% of water absorption respectively.

3.5 Compressive Strength

The most valuable property in concrete is the concrete compressive strength because it gives the overall definition of the quality concrete strength that relates to the hydrated cement paste. Basically, the specimens were being tests for three selected curing periods namely: 7, 14, 28 days, detail test results are shown in table 6.

Table 6: Compressive strength of concrete specimens at 7, 14, and 28 days of curing

Concrete Class	Composition with CS replacement	Average compressive strength (MPa)		
		7days	14days	28days
A	0%	24.15	30	39
B	10%	21	25.2	33
C	20%	18.22	22.5	28.22
D	30%	15.20	19	24.52
E	40%	13.18	17.03	21
F	50%	11.4	15	18.4

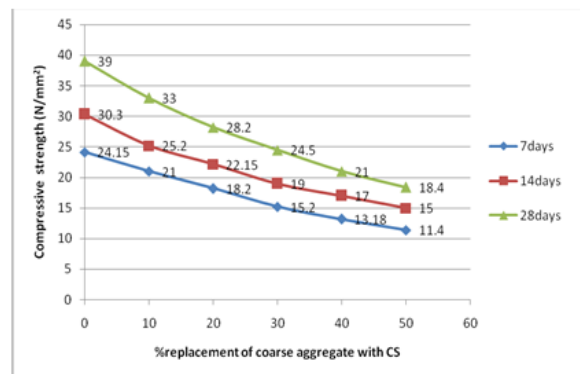


Figure 5: Compressive strength of CS concrete

The average test results of the compressive strength in their specified curing periods of 7, 14 and 28 days and percentage replacement of CS were summarized as shown in Table 6. Similarly, the results were also presented in graphical form in Figure 5. The results showed that the compressive strength of the concrete decreased as the percentage of the shells increased in the

mix ratio (Figure 5). It was observed that the concrete compressive strength of the cube specimens increases with increasing age. The results further showed that grades 20 and 15 lightweight concretes can be obtained if the percentage replacement levels of the conventional coarse aggregate with CS do not exceed and 50%.

3.6 Flexural Strength

Flexural strength can be described as the capacity of a beam or even a slab of concrete to resist failure due to bending. This flexural strength is also known as Modulus of Rupture. The effect of concrete with various percentage of coconut shell (CS) on flexural strength is shown on table 7. The flexural strength was tested on 7, 14 and 28 days of curing. The results showed that the flexural strength of the concrete decreased as the percentage of the CS increased in the mix ratio. It was observed that the concrete flexural strength of the beam specimens increases with increasing age.

Table 7: Flexural strength of concrete specimens at 7, 14, and 28 days of curing

Concrete Class	Composition with CCS replacement	Average flexural strength (N/mm ²)		
		7days	14days	28days
A	0%	6.23	7.12	8.19
B	10%	6.11	7.03	7.89
C	20%	5.86	6.75	7.66
D	30%	5.68	6.63	7.46
E	40%	5.60	6.45	7.30
F	50%	5.46	6.20	7.14

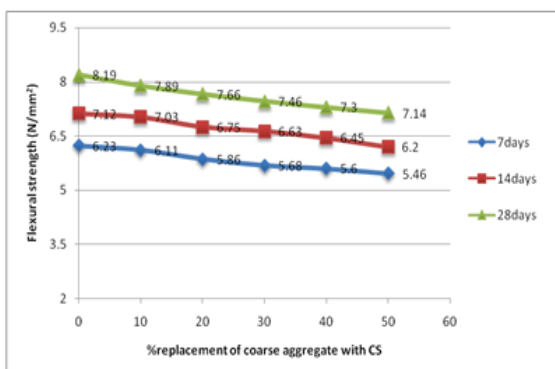


Figure 6: Flexural strengths of CS concrete

Figure 6, shows a graphical representation of reduction in flexural strength for different CS percentage. The results showed that the flexural strength of the concrete decreased as the percentage of the CS increased in the mix ratio. It was observed that the concrete flexural strength of the beam specimens increases with increasing age.

3.6 Tensile Strength

The split tensile strength of the concrete specimens was determined at 7, 14 and 28 days following BS EN 12390 part 6 2009.

Table 8: Tensile strength of concrete specimens at 7, 14, and 28 days of curing

Concrete Class	Composition with CCS replacement	Average tensile strength (N/mm ²)		
		7 days	14 days	28 days
A	0%	2.24	3.05	3.98
B	10%	2.22	2.55	3.35
C	20%	2.04	2.24	2.8
D	30%	1.73	1.96	2.45
E	40%	1.42	1.73	2.15
F	50%	1.22	1.54	1.86

The average test results of the split tensile strength in their specified curing periods of 7, 14 and 28 days and percentage replacement of CS were summarized as shown in Table 8.

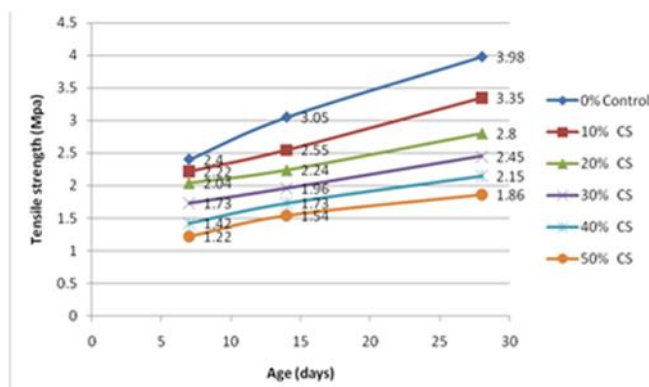


Figure 7: Tensile strengths variation with different percentages of CS

Similarly, the results were also presented in graphical form shown in Figure 7. The results showed that the tensile strength of the concrete decreased as the percentage of the CS increased in the mixes. It was observed that the concrete tensile strength of the cylindrical specimens increases with increasing age.

IV. CONCLUSION

Extensive research was carried out on control concrete with normal aggregate and CS partial percentile replacement on aggregate for concrete with 10 - 50% coarse aggregate replacement were prepared with constant water – binder ratio of 0.45. For all mixes, workability, density, water absorption, compressive strength flexural strength and tensile strength were determined at 7, 14 and 28 days. The following

conclusions can be derived from the present investigation:

The results showed a steady decline in the workability. The 0.45, water cement ratio which was kept constant all through the mix made the workability lower. The workability actually reduces as there is an increase in the amount of CS added to the mix. Due to the absence of super plasticizers the workability of the concrete was on the lower side.

The density results for concrete cube and beam specimens shows general decrease in physical property due to CS replacement. Though, the reduction was not equal for cube and beam samples for same percentage of CS replacement of coconut shell in concrete.

The water absorption tests showed that the percentage water absorption increases with increase in the percentage replacement level of coarse aggregate with CS. 50% of CS replacement shows the highest water absorption followed by 40%, 30%, 20% and lastly 10% of CS.

The compressive strengths of CS concrete were found to be lower than normal concrete by 5–55% after 7 days, 9–50% after 14 days and by 12–52% after 28 days, depending on the curing environment. Their values were within the normal range for structural lightweight concrete

Flexural strength of concrete specimens decreases with increase in the percentage replacements of coarse aggregate with CS for all curing days. 10% CS level was identified as the optimum replacement percentage because its exhibits the highest flexural strength

The tensile test results show less performance in tensile strength with CS proportional replacements in concrete. For the extent of strength achieved proved that normal concrete were much better than the CS concrete. Here, the decrease in tensile strength is directly proportional to the percentage replacement of granite with CS.

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Focal Insight in Software Engineering towards Improvisation - Software Industry

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ABSTRACT

A major and so far unmet challenge in software engineering is to achieve and act upon a clear and sound understanding of the relationship between formal mechanisms in the development process. The challenge is salient in the development of cyber-physical systems, in which the computer interacts with the human and physical world to ensure a behaviour there that satisfies the requirements of the system's owner. The nature of the computer as a formally defined symbol-processing engine invites a formal mathematical approach to software development. Contrary considerations militate against excessive reliance on formalism. The non-formal nature of the human and physical world, the complexity of system function, and the need for human comprehension at every level demand application of non-formal and intuitional knowledge, of insight and technique rather than calculation. The challenge, then, is to determine how these two facets of the development process formalism and intuition can work together most productively. This short essay describes some origins and aspects of the challenge and offers a perspective for addressing it.

Keywords: Approximation, Behaviour, Correctness, Description, Formalism, Interpretation, Intuition, Problem World, Requirement, Structure.

I. INTRODUCTION

This is to pay attention to the reality of software engineering practice and to the multitude of intuitive and informal insights that have been offered to clarify its challenges and support its improvement example, addressing a specific challenge in software development practice: the proper relationship between formal mechanism and software engineering practices. Focal insight is the faculty of recognition, understanding and action in the world on the basis of experience, insight and knowledge, with little or no appeal to conscious reasoning. The strength of intuition is that it is unbounded: in exercising our intuition we are not restricted to a limited set of observations and considerations decided a priori, but we draw whatever presents itself to us from the situation in hand. When we read an intuitive description the

words are not opaque: we are looking at the subject matter through the medium of the description. This is how human verbal and nonverbal communication works: as we hear or we read words, I experience or enact through them, in my imagination, what you are saying about the world. Some extreme examples of human intuition dispense with conscious use of language altogether. Studying how fire-fighters decide how to tackle a fire leads one researcher to define intuition as "the way we translate our experiences into judgments and decisions ... by using patterns to recognize what's going on in a situation." Another researcher [Rochlin97] describes how operators in military, air traffic control, and other critical environments rely on maintaining an integrated cognitive map drawn from diverse inputs: they call it 'having the bubble'. The map allows them to maintain and act on a single picture of the overall situation and

operational status without conscious description, analysis or reasoning. Formalism, by contrast, relies entirely on conscious description, analysis and reasoning. Its use is not an innate human faculty, but a skill that must be learned. Formalism is an intellectual artefact that evolved from the development of mathematics in ancient civilisations. Its essence is abstraction. Arithmetic and geometry emerged from practical needs: counting shepherds' flocks, measuring farmers' land, paying taxes, and laying out the structures of large buildings. The Greeks saw that mathematics had an intrinsic intellectual interest. Numbers, planes, points and lines could be completely separated from their practical utility. Plato's rule that no-one ignorant of geometry should enter his Academy in Athens was not an expression of welcome to land surveyors or estate agents: it expressed the conviction that knowledge of the material world was inferior to knowledge of mathematics. Only in the abstract world of mathematics could the conclusions of reasoning be proved correct beyond all doubt. In modern times some mathematicians have expressed the essentially abstract nature of formalism uncompromisingly. In an address [Weyl40] at the University of Pennsylvania, the German mathematician Hermann Weyl said: "We now come to the decisive step of mathematical abstraction: we forget about what the symbols stand for. [The mathematician] need not be idle; there are many operations he may carry out with these symbols, without ever having to look at the things they stand for." Weyl's doctoral advisor was David Hilbert, whom he reported [Weyl44] as saying:

"It must be possible to replace in all geometric statements the words point, line, plane, by table, chair, mug." For Weyl and Hilbert, the symbols used in a formal description are arbitrarily chosen: any reference to the material world is a mischievous and misleading irrelevance. Extreme forms of pure intuition or pure formalism are unlikely to appear in any practical enterprise, and certainly not in software development. In practice, formalism is more like applied than like pure mathematics:

application to the material world is never very far away, and intuition plays a significant part. In practice, intuition finds expression in semi-formal documents and discourse: some lightweight formal notions may be introduced to avoid obvious potential confusions, and sound reasoning is recognised—though not always achieved as a desirable goal. How the two should be balanced and combined, both in the large and in the small, is still an open question.

Some Software History

Two streams may be distinguished in the evolving modern practice of software development since it began in the 1940s. One may be called the formal stream. Programs are regarded as mathematical objects: their properties and behaviour can be analysed formally and predictions of the results of execution can be formally proved or disproved. The other stream may be called the intuitive stream. Programs are regarded as structures inviting human comprehension: the results of their execution can be predicted—not always reliably—by an intuitive process of mental enactment combined with some informal reasoning. Both streams have a long history. A talk by Alan Turing in 1949 [Turing49] used assertions over program variables to construct a formal proof of correctness of a small program to compute the factorial function. Techniques of program structuring, devised and justified by intuition, came to prominence in the 1960s with the control structures of Algol 60 [Naur60], Conway's invention of coroutines [Conway63], and the class concept of Simula67 [Dahl72]. Dijkstra's advocacy of restricted control flow patterns in the famous GO TO letter [Dijkstra68] rested on their virtue of minimising the conceptual gap between the static program text and its dynamic execution: the program would be more comprehensible. In further developments in structured programming the two streams came together. A structured program text was not only easier to understand: the nested structure of localised contexts allowed a structured proof of correctness based on formal reasoning. At

this stage the academic and research communities made an implicit choice with far-reaching consequences. Some of the intellectual leaders of those communities were encouraged by the success and promise of formal mathematical techniques to focus their attention and efforts on that stream. They relaxed, and eventually forsook, their interest in the intuitive aspects of program design and structure. For those researchers themselves the choice was fruitful: study of the more formal aspects of computing stimulated a rich flow of results in that particular branch of logic and mathematics. For the field of software development as a whole this effective separation of the formal and intuitive streams was a major loss. The formal stream flowed on, diverging further and further from the concerns and practices of realistic software development projects. The intuitive stream, too, flowed on, but in increasing isolation. Systems became richer and more complex, and the computer's role in them became increasingly one of intimate interaction with the human and physical world. Software engineering came to be less concerned with purely symbolic computation and more concerned with the material world and with the economic and operational purposes of the system of which software was now only a part. Development projects responded increasingly to economic and managerial imperatives and trends rather than to intellectual or scientific disciplines. In recent decades advocates of formal methods have made admirable efforts to reconnect the two streams to their mutual advantage; but the very necessity of these efforts is an indictment of the present state of software development practice and theory as a whole. Formalism and intuition are still too often seen as competing adversaries. Some formalists believe that their work offers powerful solutions that practitioners have wilfully ignored. Some practitioners believe that formalists have simply ignored the real problems and difficulties of software engineering. The purpose of this essay is to offer a little relationship counselling to the parties, and to address the implicit challenge: How can we combine the undoubted benefits of formal

techniques with the more intuitive and informal aspects that have always been an integral part of the practice of traditional branches of engineering?

Software Engineering

Structured programming was ideally suited to what we may call pure programming. The archetypical expository examples of pure programming are calculating the greatest common divisor of two integers, sorting an array of integers, solving the travelling salesman problem, or computing the convex hull of a set of points in 3-space. These problems proved surprisingly fertile in stimulating insights into program design technique, but they were all limited in a crucial way: they required only computation of symbolic output results from symbolic input data. The developer investigates the problem world, identifies a symbolic computational problem that can usefully be solved by computer, and constructs a program to solve it. The user captures the input data for each desired program execution and presents it as input to the machine. The resulting output is then taken by the same or another user and applied in some way to guide action in the problem world. The process is shown in the upper part of Figure 1.

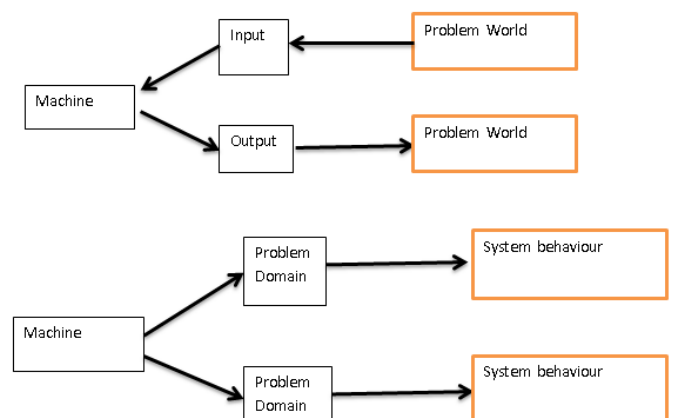


Figure 1: A Pure Program and a Software Engineered Cyber-Physical System

A realistic program of this kind may be designed to solve a general mathematical problem—for example, to solve a set of partial differential equations. It may or may not embody some more specialised theory of the problem world. For

example, an early use of electronic computing was to print tables of calculated trajectories for artillery under test at the Aberdeen Proving grounds in Maryland USA [Dickinson67]. The programs may have explicitly embodied a substantial ballistic theory, or they may have been programmed only to solve general systems of partial differential equations. In either case, the machine executing a pure program is isolated from the problem world by the operators who prepare and present the machine's inputs and collect and use its outputs. By contrast, the lower part of Figure 1 shows a cyber-physical system, whose development is a task, not of pure programming but of software engineering. In such a system the machine—the computing part—is introduced into a material problem world to serve specific purposes. The problem world consists of interconnected problem domains. Some of these domains are physical parts of the world such as mechatronic devices, other computer systems, parts of the built environment, parts of the natural world, and objects such as credit cards that encode lexical information in physical form. Additionally, some other problem domains are human beings participating in the system behaviour, interacting with each other and with the other domains, in both active and passive roles as users, operators, patients, subjects, passengers, drivers, and so on. All of these problem domains have their own given properties and behaviours. The function of the machine is to ensure a certain desired behaviour in this world, by monitoring and controlling the parts of the world to which it is directly interfaced.

The desired behaviour in the world is not limited to these directly interfaced parts, but also embraces other more remote parts which are monitored and controlled through their interactions with other, neighbouring, parts and thus, indirectly, with the machine. The purpose of this desired behaviour is to satisfy the needs of the system's stakeholders. Some stakeholders, such as operators, patients and users, are not mere observers but also participate as problem domains in the system behaviour. Others,

such as safety regulators and business managers, observe the system behaviour only from a distance. All stakeholders legitimately expect the system behaviour, seen in particular projections from their individual perspectives, to satisfy their needs and purposes.

II. METHODS AND MATERIAL

The Development Task

The behaviour of a cyber-physical system is governed by the interacting behaviours of the machine and the problem domains. Within the limits of the hardware and operating system, the machine's behaviour can be freely defined by the software developed for the system. The behaviour of each problem domain is constrained by its given properties; superimposed on these is the effect of its interactions with other parts of the system. To achieve the desired overall system behaviour the machine must both respect and exploit the given properties and behaviours of all the problem domains. The overall system behaviour must satisfy the needs of the stakeholders. It is a mistake to suppose that this behaviour is understood in advance by the stakeholders, either individually or collectively, and is waiting only to be discovered and documented. The stakeholders do have various needs and desires, but they may be only dimly perceived. A major part of the development task—explicitly recognised in the past twenty years as requirements engineering—is designing behaviour projections that will satisfy the needs of each stakeholder, and combining these projected behaviours into a design for the overall system behaviour. Each desired projected behaviour, and the complete system behaviour that somehow combines them all, must be feasible: that is, it must be achievable by the machine, suitably programmed and interacting with the problem domains. The development task, then, has many facets and parts. The properties of each problem domain must be studied, described and analysed; the many projections of the desired system behaviour must be designed, described and presented to the stakeholders for their critical approval; the combination of these projections must itself be designed; and the behaviour of the machine must be designed and specified at its interface to the problem world. The resulting system is a complex artifact. Before examining the sources and nature of its

complexity we will first look briefly at the ubiquitous intellectual activity of software engineering: describing a material reality and reasoning about its properties and behaviour.

Describing and Reasoning

Figure 2 outlines the general process of forming a description and reasoning about it to draw useful conclusions about the machine or the problem world, expressed in a modified or new description.

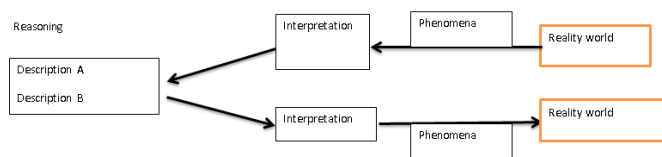


Figure 2: Describing a Material Reality and Reasoning about it

Description A is constructed first. Phenomena of the reality, relevant to the concern in hand, are selected and named, the mapping between names and phenomena being given by the interpretation. The meaning of the description—what it says about the world—depends on the interpretation and on the language in which the description is expressed? Given description A, it is then possible to reason about the world on the basis of that description, deducing a conclusion in the form of description B. This conclusion has a meaning in the reality, which can be understood by reading the derived description in the light of the interpretation. This simplified account allows us to recognise the difference between formal and non-formal description and reasoning. In a formal setting the chosen language of description is a formal language, rigorously specified. The selected phenomena must then be regarded as elements of types supported by the language. For example: in the language of propositional calculus each relevant phenomenon must be an atomic uninterpreted truth-functional proposition; in the language of predicate calculus it must be a predicate, a function, or an individual. The grammar of the language also includes a small set of connectives, such as logical operators, allowing meaningful statements to be made in the language and combined in various ways. Descriptions are assembled from these elements according to rigid syntactic rules. The advantage purchased by this linguistic rigidity is a formal calculus of reliable reasoning. All or part of the initial description can be

treated as a premiss from which conclusions can be derived and proved with mathematical certainty. The diagram applies equally well to the structure of intuitive or informal description and reasoning. An informal description must be expressed in some language. The language has symbols, and the symbols have some interpretation—that is, they denote some phenomena of the described reality. Yet the content, character and virtues of the intuitive process are quite different from the formal. Symbol choices are very significant in informal description, especially if the descriptions are expressed in natural language: they remind us to look across from the description to the reality it describes and to check continually whether the description remains valid. The logic of informal description is unconstrained: it is nearly true to say that in a rich natural language like English we can say anything whatsoever. We can even define and use new linguistic features within one description. The price for this linguistic freedom is some imprecision in description, and unreliability in both the process and the results of reasoning. Nonetheless, intuition and informality are not merely degraded and incompetent cousins of formalism. Imprecision and unreliability bring major compensating benefits. In practice the activity of describing and reasoning is rarely perfectly formal or perfectly informal. Rejecting Hilbert’s maxim, most formalists usually choose symbols intended to remind the reader of the phenomena they denote in the reality; and many intuitive practitioners use natural language description with careful definitions of the meanings of names, or include embedded formal notations such as finite state machines where greater precision seems necessary.

Formal mechanism and System Complexities

Cyber-physical systems exhibit complexity in more than one dimension. The functional complexity of a realistic system is immediately obvious. Typically a system has many functional features whose purposes are not harmonious or even consistent. The individual features may be intrinsically complex, and the complexity of the whole system is greatly increased by their interactions. Some features may be mutually exclusive in time, but during system operation multiple features may be simultaneously active. Further, many systems are required to operate essentially continuously, scarcely ever reaching a quiescent state in which the system can be removed from service, isolated from the rest of the

world, and returned to a well understood initial state before resuming operation. So the system may be required to achieve smooth transitions between different functional behaviours adjacent in time. For an avionics system, for example, there are transitions from taking-off to climbing, from landing to taxiing, and so on; and a lift control system must maintain user safety and reasonable convenience in the transition from normal lift service to fire-fighter operation. One effect of this functional complexity is that there are few or no invariant properties of the required system behaviour. For example, it might be thought that in a system to control the movement of railway trains over a region of track a safety invariant must hold: no two trains must ever be present in the same track segment. But in reality this cannot be a required invariant: it would make it impossible to assemble a train from two trains, or for a breakdown train to deal with the aftermath of a collision or to rescue a locomotive that has lost tractive power. An access control system might seem to demand that no person is ever present in a room for which they have no access authorisation. But this property would restrict escape routes from the building in case of fire, and in that context would be forbidden by fire regulations. In a lift control system an apparent safety invariant stipulates that the lift car doors are never open unless the lift is in home position at a floor. But a fire-fighter who is in the lift at a high floor must not be prevented from descending even if the doors refuse to close. The given properties and behaviours of a problem domain—those that it possesses independently of the behaviour of the machine—exhibit a similar dynamic complexity. The given properties and behaviours are determined by four factors, at least two of which are dynamic. A fifth factor determines which properties are of interest at any time. The first determining factor is scientific law—for example, the laws of physics. At the granularity relevant to most software engineering these laws are constant and well understood. The second factor is what we may call the constitution of the domain. This is its shape and material, and the designed, evolved or otherwise determined configuration of its constituent parts. For example, within the bounds set by physics, a person's body weight, physical strength and reaction speed are determined by human physiology in general and the individual's physiology in particular. The maximum acceleration of a lift car rising in its shaft is determined not only by the laws of physics but also by the design of the motor, the power supply and the lift car and

counterweight. This second factor, constitution, is more or less constant for each particular problem domain, and is open to study and analysis. A third, time-varying, factor is the condition of the domain. Engineered devices degrade over time, especially if they are not properly maintained or subjected to misuse or to excessive loads. A human operator becomes tired in an extended session of participation in the system; and, in the contrary direction, an operator's speed and skill may increase with practice over a number of similar sessions. A fourth factor is variation of the environment over time. Carefully engineered devices assume an acceptable operating environment, specifying such conditions as wind speed, ambient temperature, air purity and atmospheric pressure. Human behaviour, too, depends on such environmental conditions. If the environment changes the domain may exhibit changed properties. Broadly, we may say that the first two of these four factors—scientific law and domain constitution—can be investigated and analysed at system design time. The third and fourth—condition and environment—vary during system operation. The fifth factor, domain role, is of a different kind. At any particular time, a problem domain has a large set of potentially observable properties subject to the first four factors, but only a small subset are significant for the system behaviour. The domain itself participates only in some of the system's functions, and in those it plays only a limited role exhibiting only a subset of its given properties. For example, the aerodynamic properties of a car body are highly significant while it is being driven at high speed on a motorway, but irrelevant to its desired behaviour in automatically assisted parking, in the aftermath of a collision, or while undergoing maintenance in the workshop. These considerations may be summarised by saying that the rarity of required invariants of system behaviour is paralleled by the rarity of invariants of problem domain properties.

Contexts of Domains and Behaviours

There is an important interplay between the variation of domain properties and the variation of the active set of system functional behaviours. For each domain the properties of current significance varies according to its role in each system behaviour of the currently active set. They vary also with changes in the environment, and some of those changes will naturally demand different system behaviours. For example, a power failure in the

lift control system seriously affects the properties of the mechatronic equipment, which is now running on emergency power supplies of limited capacity; at the same time it also requires transition to a special parking behaviour in which passengers are brought safely to the nearest available floor. The most obvious examples of this interplay of domain properties and system behaviour are found in fault-tolerance. In the lift control system, to provide normal lift service the machine must directly control the motor power and direction, and monitor the floor sensors to detect the arrival and departure of the lift car at each floor. This behaviour is possible only if the relevant problem domains of the lift equipment are in healthy condition: this is therefore a local assumption, on which the behaviour will rely [Hayes+03]. It then becomes necessary to develop another system behaviour whose specific purpose is to monitor the health of the lift equipment by observing its run-time behaviour. These are therefore at least three distinct system functional behaviours: one to provide normal lift service; a second to detect and perhaps diagnose equipment faults; and at least one other to provide the appropriate behaviour in the presence of a fault. The domain properties of the equipment on which they rely are quite different: one relies on fault-free behaviour; the second relies on the estimated probabilities of different equipment faults and on their consequences in observable phenomena; the third relies on the residual functionality of the faulty equipment. This restriction of each projection of system behaviour to a particular context in which particular assumptions hold is only a finer-grain version of the inevitable restriction on the whole system's operating conditions. No system, however critical, can aspire to operate dependably in every circumstance that is logically or physically possible. Tall buildings are designed to withstand high wind speeds, but only up to a limit of what is reasonably plausible in each building's particular location. Passenger aircraft are designed to fly in the earth's atmosphere, but not in air of unlimited turbulence or in a high density of volcanic ash. Even when we choose to extend the proposed operational conditions to allow graceful degradation of system function we must still accept some limitations. We can aim only to choose reasonable limits on the circumstances our system will be designed to handle, and to design with adequate reliability within those limits. The resolutions of functional and domain complexity come together in the assumed context of each projected functional behaviour. Each projected

functional behaviour can then be represented as shown in the lower part of Figure 1. In each projection the impediments to successful application of appropriate formalism have been greatly diminished. How and why this is so is discussed in the following section.

Structure, Invention and Proof

The great French physicist and mathematician Henri Poincaré wrote [Poincaré08]: "For the pure geometer himself, this faculty [intuition] is necessary; it is by logic one demonstrates, by intuition one invents. To know how to criticize is good, to know how to create is better. You know how to recognize if a combination is correct; what a predicament if you have not the art of choosing among all the possible combinations. Logic tells us that on such and such a way we are sure not to meet any obstacle; it does not say which way leads to the end. For that it is necessary to see the end from afar, and the faculty which teaches us to see is intuition. Without it the geometer would be like a writer who should be versed in grammar but had no ideas." Poincaré is speaking of mathematics, but what he says applies no less to software engineering. It is worth understanding what he says. The key point is the distinction between demonstration or proof on one side, and invention or discovery on the other side. The primary role of formalism is proof. Before engaging in proof we must know what we wish to prove and the exact context and subject matter for which we wish to prove it. Then we are able to choose an appropriate formal language for our description, knowing that its supported types can represent the relevant phenomena of the reality, and that its logic allows the kind of reasoning on which we are embarking. In inventing and discovering, on the other hand, we do not know exactly what we wish to invent or discover: if we did we would already have it in our hand. In Poincaré's words, it is necessary to see the end from afar, and the faculty that teaches us to see is intuition. By this we do not mean that we should leap foolishly to a wild guess, impatient of careful thought and reasoning. Rather, invention and discovery are learning processes of a particular kind, in which we need to explore a space of possibilities, sketching our thoughts and perceptions at each resting place that seems promising. For this kind of intellectual activity we need freedom to record our perceptions while they are inchoate, imprecise and even inconsistent. We need a loose structuring of our descriptions and reasoning in which we can reconsider

III. CONCLUSION

any step without invalidating every other part of what we have done so far. We need to be able to add modal statements about time or obligation to a description that so far contains nothing alien to classical logic. We need to be able to offer temporary accommodation to counterexamples to ensure that they will not be forgotten, without undermining or erasing the imperfectly general but still valuable observation or conclusion that they disprove. Formalism militates strongly against these purposes. Even if we eschew Hilbert's insistence on extreme mathematical abstraction, the very formality of the chosen language focuses our attention on its abstract logical content and distracts us from attending to the reality described. We are compelled to choose the descriptive language at the outset, when we know least about the terrain to be explored and the flora and fauna we will find there. Worse, a formalism encourages the construction of a single mathematical structure whose virtue is founded on its internal consistency. A single counterexample or a discovered contradiction is a complete disproof: from the contradiction every truth and every falsehood follows without distinction, and the whole edifice becomes discredited. By contrast, an informal process of discovering properties of the problem world and of the stakeholders' requirements allows the invention of instances of a conceptual structure such as the assemblage of system behaviours sketched in the preceding section. Within such a structure it is possible to separate distinct projections of the system behaviour. Each such projection rests on explicit assumptions of problem domain properties in the context for which the behaviour is designed, and is accompanied by an informal design of the relevant projection of the machine behaviour relying on those assumptions. Within each of these limited projections formalism can then play its most effective role. The operational context, the problem domain properties, and the desired functionality are restricted: within those restrictions, uniform and relatively simple assumptions can be captured in axioms and a well-chosen formalisation can achieve a good approximation to the problem world reality. The informal design explains how the projected system behaviour is to be achieved, and this explanation can then be made precise and subjected to formal analysis to detect any logical errors. Formalism is deployed locally within each part of the structure. The structure itself, and the substance of its parts, are the product of an intuitive and informal approach.

To a committed formalist, advocacy of intuition in software engineering may seem a heretical denial of the value of formalism and rigour. Not so. The point is that formalism has its proper place. Its place is not in the early stages of exploration and learning, where it is premature and restrictive, but in the later stages, where we need to validate our informal discoveries, designs and inferences by submitting them to the rigour of formal proof. Its place is not in the processes of conceiving, designing and forming large structures, but in the later stage of constructing and checking the smaller parts for which those structures provide their carefully defined and restricted contexts, and the relationships among those parts. The essential point is that at every level informal and intelligent use of intuition must precede application of formalism. It must shape the large structure of the whole set of development artifacts; and within that structure it must guide the process of learning, understanding, inventing and documenting the given and desired properties and behaviours of the problem domains. Only then can these descriptions be profitably formalised and their formal consequences verified.

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A Microcontroller Framework for PC Based Electrical Appliance Control System

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ABSTRACT

Personal computers are increasingly becoming the platform of choice to design and implement control algorithms because it is simple to write, modify and update software programs that implement control algorithms. In this paper, the personal computer is used to control the electrical appliances which includes turning high power alternating current (AC) loads such as lights, fans, heaters etc ON or OFF. To successfully integrate the interface box with the machine (laptop), an interface device is used within the PC that can perform the necessary tasks. The interface box can be controlled by the computer by connecting to the USB port and developed a program in C-sharp(C#) programming language. The program will demonstrate the basic idea of how to control devices and monitor events. With the program, the computer can turn electric devices ON/OFF while disregarding the manual control system. Moreover, the people who are physically disabled in homes and work places are able to control the home appliances by interacting with the interface of the developed appliance. It is a necessity to employ the service of Home Appliances Control as it is more effective, efficient and stress-free.

Keywords: Personal Computers, Home Control Appliance, Distribution Fuse Board (DFB), Graphical User Interface (GUI), Interface Box, Internal Module, Enumeration, Local Area Network (LAN).

I. INTRODUCTION

A Personal computer (PC) based home control appliance is the use of control systems at homes, in the offices and in industries to reduce human efforts. Home control appliances have greatly decreased the need for human sensory and mental equipments and play an important role in the world economy and in daily experience. It is more efficient and stress-free (Coyle et al 2007).

Home and office appliances, including television, VCRs, stereo equipment, refrigerators, washing machines, thermostat, light switches, telephones, copiers and factory equipment, have embedded computers and often come with remote controls. However, the trend has been that as appliances get more computerized with more features, their user interfaces get harder to use (Dickey et al 2012).

PCs are commonly used with better input-output capability than the average home appliance, such as

high-resolution screens, text-entry technologies and speech capability. PCs are likely to maintain this advantage over appliances, because improved hardware is a key differentiator between PC and is often marketed as an incentive to upgrade to a new PC. All PC has the ability to communicate over the Local Area Network (LAN) and most have built-in short range communication capabilities, such as Bluetooth, that could allow them to communicate with and control appliance in their surrounding environment. PC laptops are also personal devices, which allow them to provide interface that are personalized (Koyuncu 1995, Nunes and Delgado 2000, Sriskanthan and Tan 2002).

1.1 The brain of the system

The brain of the system is actually a small computer whose job is to close the switch that activates the switches that powers sensing devices when ON or OFF. Home based PC differs mainly in Distribution Fuse Board (DFB) and how various home appliances are wired in to the brain. The brain and the DFB features

may be wired into the control room, but they usually have a back-up power source as well. The architecture of the PC home based appliances control system is shown in Figure 1.

The system consists of two units (Swamy et al 2002, Nichols and Myers, 2006):

1. Control unit: The control unit is based on the use of standard personal computer with Graphical User Interface (GUI) software to control the electrical appliances.
2. Interface unit: The interface unit is for interfacing the high power loads with the control unit.

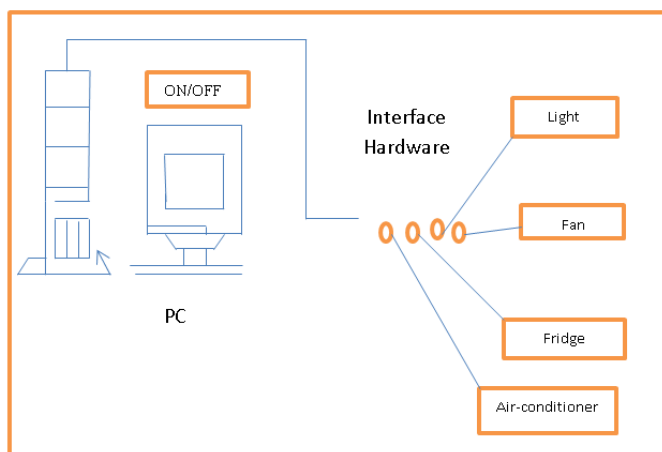


Figure 1: Architecture of the PC home based appliances control

1.2. Hardware Design of the Interface Box

The design of the interface box that is used to connect high power load to the computer is discussed here.

Internal module

The internal circuitry of the interface box can be divided into three main categories namely: relay driver circuit, relay and +6 V DC power supply.

Computer Interfacing

The Universal Bus (USB) is one of the most common interfaces used in electronic consumer product today, including PCS, cameras, GPS devices, MP3 players, modems, printers and scanners, to mention a few. These are data lines, control lines and status lines. The USB is a high-speed serial interface that can provide power to device connected to it (Kim et al 2010, Lin and Brogerg 2002, Neng-Shiiang et al, 2002). A USB bus supports up to 127 devices (limited by the 7-bit address field noting

that address 0 is not used as it has a special purpose) connected through a four-wire serial cable of three to five meters long. Many USB devices can be connected to the same bus with hubs, which can have 4, 8, or even 16 ports. A device can be plugged into a hub which is plugged into another hub and so on. The maximum number of tiers permitted is six. According to the specification, the maximum distance of a device from its host is about thirty meters, accomplished by using five hubs. For longer-distance bus communications, other methods such as use of Ethernet are recommended.

The USB bus specification comes in two versions: the version USB 1.1, supporting 11Mbps, while the version, USB 2.0 supports up to 480Mbps. The USB specification defines three data speeds (Al-Ali and Al-Rousan 2004, Kobatake et al 1989):

- i. Low speed ---- 1.5Mb/sec.
- ii. Full speed----- 12Mb/sec.
- iii. High speed ---- 480Mb/sec.

The maximum power available to an external device is limited to about 100mA at 5.0V. USB is a four-wire interface implemented using a four-core shielded cable. Two types of connectors are specified and used, Table 1 shows typical USB connectors and Table 2 shows the pin-out of the USB connectors. The signal wire colors are specified. The specification also defines a mini-B connector, mainly used in smaller portable electronic devices such as cameras and other handheld devices. This connector has a fifth pin called ID, though this pin is not used. The pin assignment and wire colors of a mini-B connector are given. Two of the pins, Data + and Data -, form a twisted pair and differential data signals and some single-ended data states.

Table 1: USB pin configuration

Pin no	Name	Color
1	+5.0V	Red
2	Data-	White
3	Data+	Green
4	Ground	Black

Table 2: USB pin assignment

Pin no	Name	Color
1	+5.0V	Red
2	-Data	White
3	+Data	Green
4	Not Used	-----
5	Ground	Black

Enumeration

When a device is plugged into a USB bus, it becomes known to the host through a process called enumeration. The steps of enumeration are (Anamal and Kamruzzaman 2006, Casimiro et al 2004):

- i. When a device is plugged in, the host becomes aware of it because one of the data line voltages (Dp or D) becomes logic high.
- ii. The host sends a USB reset signal to the device to place the device in a known state. The reset device responds to address 0.
- iii. The host sends a request on address 0 to the device to find out its maximum packet size using a Get Descriptor command.
- iv. The device responds by sending a small portion of the device descriptor.
- v. The host sends a USB reset again.
- vi. The host assigns a unique address to the device and sends a Set Address request to the device.

II. METHODS AND MATERIAL

The design demonstrates a system that allows one to control home appliance and turns ON or OFF any appliance that is connected to a computer. The appliances are connected to the computer via a microcontroller. The power supply for each appliance is through an electromechanical relay. A number of relays are used depending on the number of appliances to be controlled. All the relays are controlled by a microcontroller. The microcontroller is connected to the computer via a USB to RS232 Converter. The diagram below in Figure 2 shows the block diagram of the system.

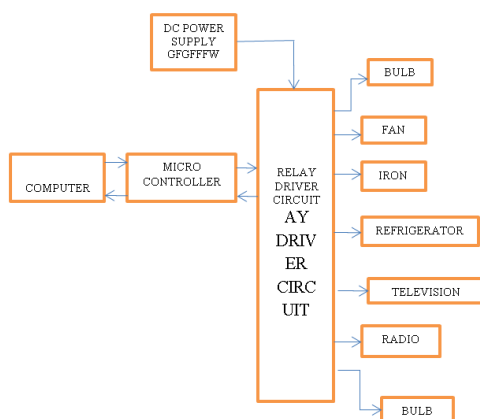


Figure.2: Block Diagram of the designed system

2.1. Approach to Development of the Framework

The basis of the hardware design is mainly the PIC16F876A microcontroller using micro C pro compiler. Two circuit diagrams were developed. These are:

- i. Power supply regulation circuit
- ii. Main component circuit

2.1.1 Power Supply Regulation Circuit

The a.c. power supply to the circuit has to be regulated to a reasonable amount for the workability and durability of the circuit components. The power supply regulation circuit is shown in Figure 3. The power supply regulation process is accomplished by following the four stages listed below:

- i Transformer
- ii Rectification
- iii Filtering
- iv Voltage regulation

Transformer

The a.c. supply gives out 220V or above and the supply is stepped down by the transformer to a reasonable amount of 12V which is needed for the operation of the circuit.

Rectification

There is the need for the conversion of the a.c. voltage to d.c. voltage. Diodes help in this conversion process. However, in the conversion process the voltage drop across the diode which is greater than 1V is added to the already stepped down 12V and making the total voltage in the rectification to be 13V or greater.

Filtering

The capacitor removes or filters the ripples generated and produced alongside the rectification process.

Voltage Regulation

Voltage regulator are devices that produce constant d.c. voltage regardless of the variation in the input load. Two voltage regulators are used in this stage. These are:

- i LM7812 voltage regulator
- ii LM7805 voltage regulator

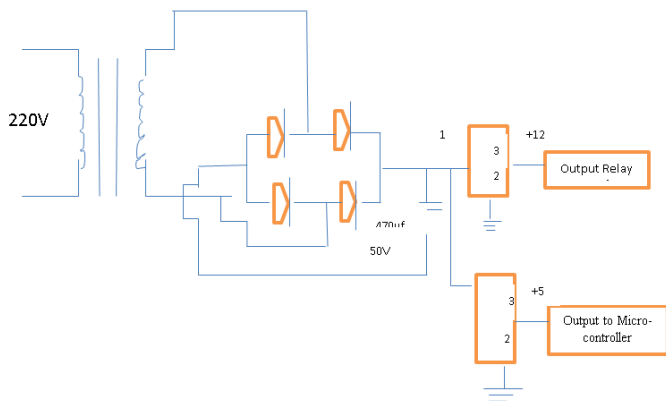


Figure 3: Power supply regulation circuit

2.1.2 Main component Circuit Analysis

The USB cable is fed to the DB-9 which is actually a serial connector. This serial connector allows for bi-directional communication between the system and the hardware (I.e it sends signals to and receives signals from the PC.) The DB-9 though stabbed at pin 5 is fed to the MAX232 which is the level converter.

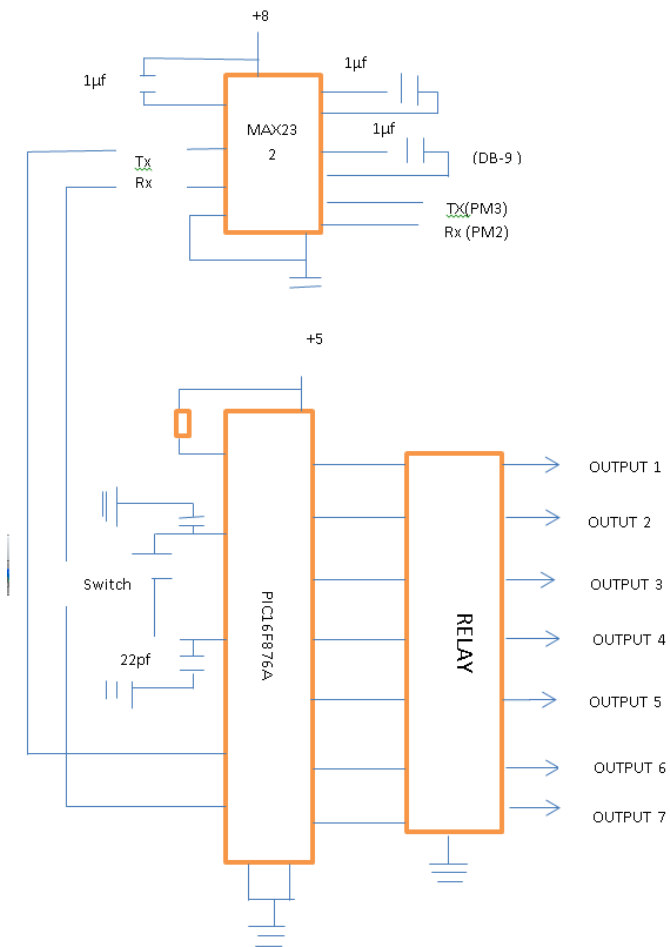


Figure 4: Main component circuit analysis

The level converter does and undoes the signal by generating a total of 12V supply and reversing it to 5V d.c. supply. It is fed to the PIC16F876A microcontroller from the level converter. A d.c. voltage of 5V is needed for the operation of the PIC. It processes the signal according to instruction. Attached to the microcontroller is the clock pulse which generates clock frequency for the microcontroller. The clock pulse is the heart of the microcontroller as the microcontroller fails to work in the absence of those clock frequencies.

A d.c voltage of 12V is needed for the operation of the relay. A total of seven relays were used as each relay demands a transistor for amplification. One kilo ohms resistor was also introduced to restrict and oppose the amount of current that flows to the base of the transistor. The signal is finally executed as the relay opens up to socket to be controlled. The main component circuit analysis is shown in Figure 4.

2.2 Software Interface

The layout of the software used for controlling various home appliances is shown in Figure 5 .As an experimental basis, the following layouts are present in the software interface:

- i Seven rooms with their corresponding ON and OFF buttons.
- ii Selection of communication port
- iii All ON button
- iv All OFF button
- v ROM status interface which consists of check status and clear report.

At first, a port number is set in the Selection Com Port field of the layout to activate connection between computer and microcontroller. If the connection is successful, then it is possible to control the appliances from the computer. Each device can be controlled either as an ON or OFF mode by pressing ON or OFF button on the layout. The “check status” reports the state (ON or OFF) of the electrical control 1 appliances by displaying information that the appliance is ON. The clear report command gets rid of the information reported in the room status interface. Although, only seven rooms have been shown, but any number of devices can be controlled from a computer with a slight modification in the designed system. The software layout interface is shown in Figure 5.

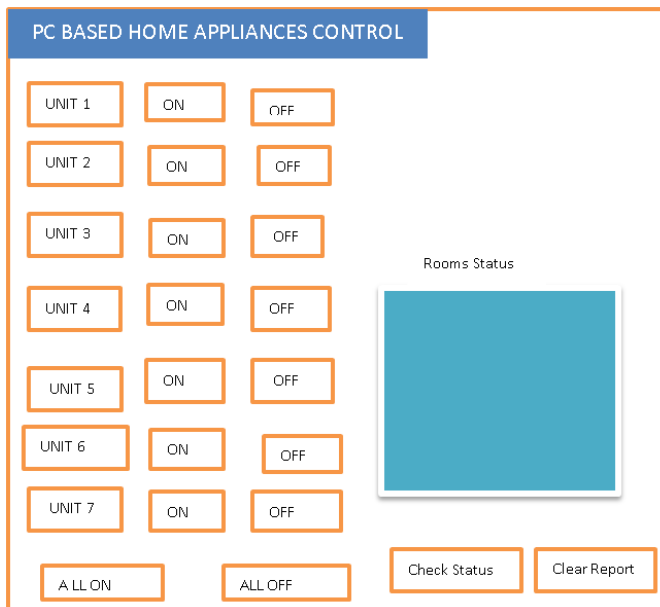


Figure 5: Software Interface layout

2.3. PIC-GUI Communication

The hardware uses RS232 converter to communicate with the software. Contained in the RS232 converter is the RS232 library which has RX (receiver) and TX (transmitter) for both transmissions and reception of signals. The software in the other end has serial port library which is one of the controls in c-sharp library. It is thus programmed to enable transmission and reception of signals.

Once the “COM port” is selected in the software, a link is opened up for communication between the hardware and the software which will last for microseconds. Through, there is a propagation delay which allows for execution of commands or instruction before transmission of another signal. For every button clicked in the graphical user interface. The serial port library uses its TX to transmit the signal to the hardware. The signal is received by the hardware via its RX, processed according to instruction and opens up the relay of the required unit and therefore switches ON its socket

The hardware on the reverse end uses its TX to transmit signal (indicating the reception of the sent signal by the program) to the software. The software receives the signal via its RX and thus acknowledges it by displaying the message about the state (ON or OFF) of the required unit on the room status interface. The flow chart showing PIC-GUI communication is shown in Figure 6.

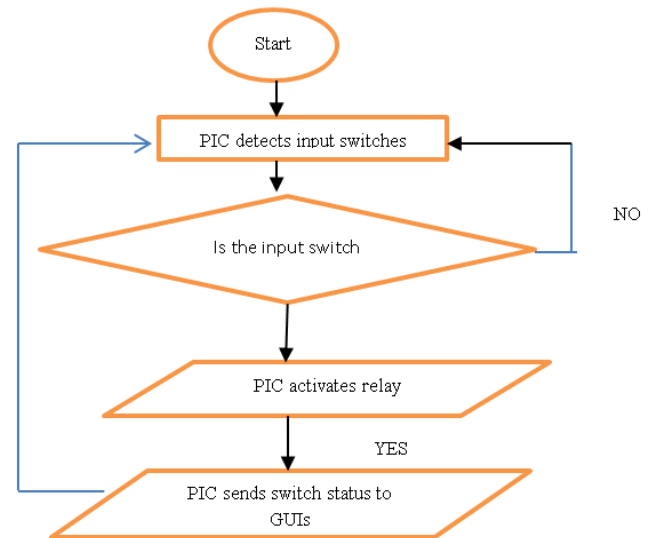


Figure 6: Flow chart showing PIC- GUI communication

Choice of Programming Language

The application program used in this research paper is C-Sharp.

Reasons for the choice of programming language

- i It is very convenient to use (i.e it has improved Graphical User Interface)
- ii It has controls that one can pick and drop.
- iii It is easier to communicate with the PIC microcontroller.

III. RESULTS AND DISCUSSION

Description of Flow Process

Initially, all the switches are in the state. When the ON button is clicked in the software interface to turn ON the desired device, the software converts the ON command into hex code, then sends the value to USB port address. It sends logic 1 (3.5-5V) to the microcontroller through RS232 converter. The microcontroller then sends a 1 to the transistor. It will activate the transistor used to energise the relay. There is an inductor (a wire coil), when energized with an electric pulse, will generate a magnetic field. The second part of the relay is a system of metallic arms, which makes up the physical contact of the switch. When the replay is ON, or an electric pulse is sent to the relay, the swing or switching arm of the relay moves to another contact of the relay. The arm moves as the generated magnetic field pulls the swinging arm towards the inductor (or wire coil), the a.c. circuit is completed and the electrical appliance is turned ON.

When the OFF button is clicked to turn off a device, the software converts the OFF command into hex code, then sends the value to USB port address. It sends logic 0 (0-1.5V) to the microcontroller through the RS232 converter. Then the microcontroller sends a 0 to the transistor. It will deactivate the transistor used to energize the relay. The arm of the relay swings back to another position, which makes the path of the current flow open and hence electrical appliance is turned OFF. The terminal input of each appliance is wired across, then sends the value to USB port address. It sends logic 0 (0-1.5V) to the microcontroller through the RS232 converter. Then the microcontroller sends a 0 to the transistor. It will deactivate the transistor used to energize the relay, thus the power to the appliance is switched ON or OFF depending on whether the relay is active or not. The diagram of the flow chart design system is as shown in Figure 7.

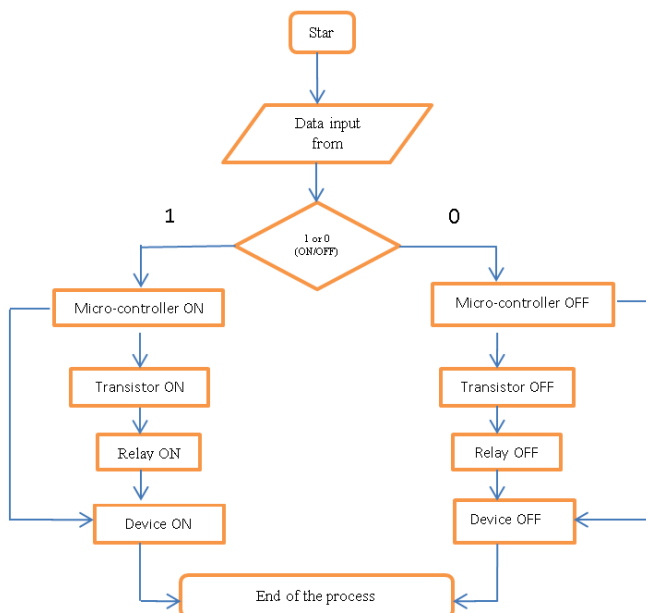


Figure 7: The flow chart of the designed system

IV. CONCLUSION

The user's choice is clicked in the developed window application through the PC and signal travels via the USB cable to the corresponding connection. Based on this command, the required appliance is triggered. It can be used at homes, street light management, hotels, power management, high voltage grid control and in industries.

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Structural Analysis of Cu Doped TiO₂ Nanoparticles using Williamson-Hall Method

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ABSTRACT

Pure and doped Ti_{1-x}Cu_xO₂ nanoparticle is synthesized by co-precipitation technique successfully with nominal composite of x=0.0,0.01,0.02 and 0.03 at room temperature. The precursors were further calcined at 500 to 600°C for 6hrs in furnace which results in the formation of different TiO₂ phase compositions. The structural analysis carried out by XRD (Bruker D8 Cu-Kα1). X-ray peak broadening analysis was used to evaluate the crystalline sizes, the lattice parameters, number of unit cell per particle, c/a ratio and Volume of unit cell. The Williamson Hall analysis is used to find grain size and Strain of prepared TiO₂ nano particles. Crystalline TiO₂ with a Tetragonal Anatase phase is confirmed by XRD results. The grain size of pure and Cu doped samples were found in the range of 10nm to 18nm. All the physical parameters of anatase tetragonal TiO₂ nanoparticles were calculated more precisely using modified W-H plot a uniform deformation model (UDM). The results calculated were approximately similar with standard values.

Keyword: TiO₂; Co-precipitation; Particle Size; W-H analysis

I. INTRODUCTION

In the recent day's research activities, semiconductor plays an important roll across the world. As the properties of semiconductors are very much dependent of particle size, hence it is considered as important part of material science and technology [1]. Titanium dioxide is the very popular semiconductor due to its wide band gap (3.3 eV), excellent chemical stability, large exciton binding energy. Titanium dioxide is immensely useful in various applications like gas sensors, solar cell, photocatalytic degradation and photo luminescence etc. The crystal morphology and particle size plays vital role in these applications which have attracted most researchers to synthesis nano-crystalline TiO₂ in recent years. There are various techniques adopted by the researchers to synthesis TiO₂ nanoparticles such as sol-gel, co-precipitation and hydrothermal etc. The co-precipitation is an alternative, cheap and simple method for preparation of nanostructure TiO₂[2]. Ulrich

Gesenhueset.al. represented that the properties of TiO₂ depends on various internal and external parameters like: dopants, concentrations of surface hydroxyls, electric surface charges accumulated from different rates of consumption of e⁻ and h⁺ outside the particle or from acid base reactions of the surface, adsorption of the molecules, etc.[3] Investigations of the influence of dopants on the properties of TiO₂ provide huge space for the researchers.

The crystalline size and lattice strain are mainly extracted from the peak width technique. The light scattering technique, scanning electron microscopy and transmission electron microscopy analysis are the most commonly used techniques for the measurement of particle size. The technique to measure lattice strain is X-ray peak broadening [4-5].

In the present work the lattice parameters, number of unit cell per particle, c/a ratio and Volume of unit cell

are reported. Further we reported a comparative study of particle size of pure and Cu doped TiO₂ nanoparticles and the strain due to lattice deformation obtained by Uniform Deformation Model (UDM) and Scherer model.

II. METHODS AND MATERIAL

2.1 Material preparation

Titanium tetra isopropoxide (TTIP) and Copper Acetate reagents of analytical grade without further purification were used to prepare pure and Cu doped TiO₂ nanoparticles. To prepare pure and Cu doped TiO₂, TTIP was dissolved into distilled water for 1M solution with continuous stirring for half an hour. Another solution of copper acetate in distilled water was prepared separately for appropriate doping concentration. The solution of copper acetate further added drop wise into TTIP solution for half an hour and the solution was kept for rigorous stirring for 2 hours. The obtained precipitate was filtered and washed with water for several times and found white precipitate. The 30ml H₂O₂ was further mixed with white precipitate and got transparent orange solution. This solution was further diluted with distilled water and color changed from orange to yellow. The solution was kept for 2 days for aging and followed by filtering and washing for several times. Then precipitate was dried in air at 100°C and calcined at 500 to 600°C for 6 hours to obtain Cu doped TiO₂ nanoparticles (x = 0.01, 0.02 and 0.03).

2.2 Characterization

The X-ray diffraction data of synthesized pure and Cu doped TiO₂ samples were recorded on Bruker D8 Advance Diffractometer with Cu-Kα1 radiation (λ=1.5418 Å) and collected over the range 20° < 2θ < 80° at room temperature.

III. RESULTS AND DISCUSSION

3.1 XRD analysis

The XRD graphs of Ti_{1-x}Cu_xO nanoparticles with concentration x = 0.0, 0.01, 0.02 and 0.03 are shown in figure 1. The XRD analysis were determined by X-ray diffractometer (Bruker D8 Advance Diffractometer) with CuKα radiations (λ = 1.5418 Å) in the 2θ range of 20° to 80° at room temperature. The dominant peak is

obtained at 2θ = 25.387 corresponding to (101) plane of TiO₂. Rest of the peaks are at 2θ = 37.889, 48.143, 54.131, 55.081, 68.947, 70.365 corresponds to (004), (200), (105), (211), (116) and (220) respectively. These peaks confirm that the prepared TiO₂ is an anatase tetragonal crystal structure and agree with JCPDS data (73-1764). Further it is observed that in pure TiO₂ samples some peaks of rutile structure are present (2θ = 27.479 and 36.166 corresponds to (110) and (101) respectively is matching with JCPDS data (84-1284)). It may be due to the annealing temperature was at 500°C to 600°C. Yan Hua Peng et al reported that at 600°C temperature mixture of anatase and rutile phase are present [6]. As the Cu concentration increases rutile peaks reduce. It may be due to the active surface area increases by increasing copper concentration and by increasing active surface area rutile converts into anatase phase [7].

The anatase tetragonal lattice parameters such as the distance between adjacent planes in the miller indices 'd' (calculated from Bragg's equation nλ=2d sinθ) and lattice constant 'a' and 'c' calculated from Lattice Geometry equation as shown in equation 1 and 2 [8]. The lattice parameters of pure and Cu doped TiO₂ nanoparticles are summarized in table 1.

$$d^2 = \frac{\lambda^2}{4\sin^2\theta} \Rightarrow \frac{1}{d^2} = \frac{4\sin^2\theta}{\lambda^2} \text{----- (1)}$$

$$\frac{1}{d^2} = \frac{h^2+k^2}{a^2} + \frac{l^2}{c^2} \text{----- (2)}$$

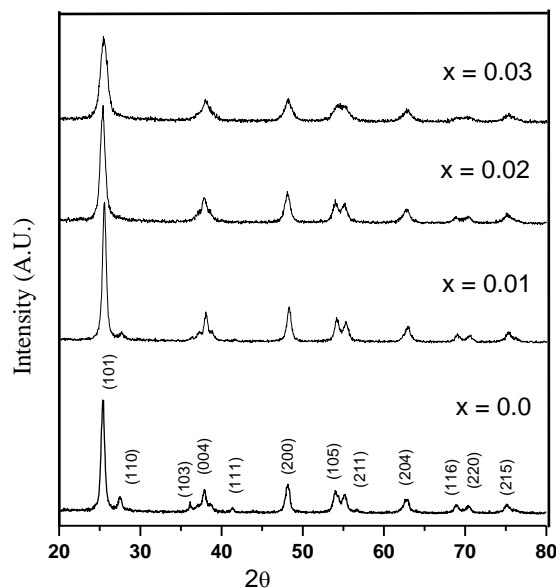


Figure 1: XRD pattern of Ti_{1-x}Cu_xO₂ samples with concentration x = 0.0, 0.01, 0.02 and 0.03.

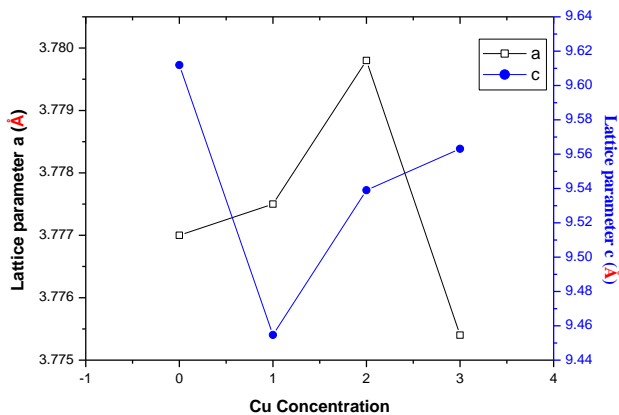


Figure 2: Lattice parameters ‘a’ and ‘c’ versus Cu concentration.

The figure 2 shows the plot between lattice parameters ‘a’ and ‘c’ versus Cu concentration. From the plot it is observed that the lattice parameter ‘c’ decreases rapidly upto 1%, then increase upto 2% and then slowly increases. At the same time the lattice parameter ‘a’ slowly increases upto 1%, then rapidly increases upto 2% and then decreases rapidly. The reason behind this we have discussed in our previous article [11]. This may be due to the Cu can exist in Cu^{1+} , Cu^{2+} and Cu^{3+} ions having ionic radii 0.77\AA , 0.73\AA & 0.54\AA respectively and Ti can exist in Ti^{2+} , Ti^{3+} and Ti^{4+} ions having ionic radii 0.86\AA , 0.67\AA , & 0.69\AA respectively. There are random difference between ionic radii of Cu and Ti. The volume of unit cell can be determined by using well known formula

$$V = a^2c \text{----- (3)}$$

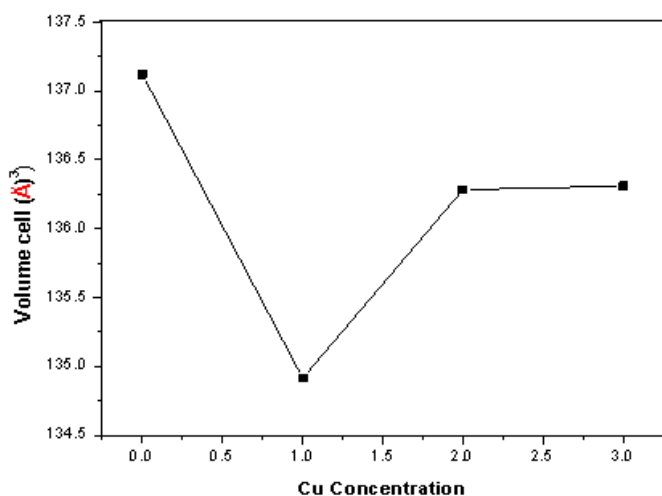


Figure 3: Volume of unit cell versus Cu concentration.

The Volume of unit cell versus Cu concentration is shown in figure 3. It is observed that the volume of unit cell decreases rapidly upto 1% of dopant concentration and then suddenly increases upto 2% and then slightly increase. This random variation of volume of unit cell may lead due to the anisotropic nature of TiO_2 .

The number of unit cell in particle is calculated by using formula given below [9]:

$$N = \frac{4}{3\pi^2} \frac{D}{2V} \text{----- (4)}$$

Where D is particle size and V is volume of the unit cell.

The number of unit cell in particle for pure and Cu doped TiO_2 are listed in table 1.

Table 1: Lattice Parameters of $\text{Ti}_{1-x}\text{Cu}_x\text{O}_2$ samples with concentration $x = 0.0, 0.01, 0.02$ and 0.03 .

Cu Conc. (x)	$d_{(hkl)}$ at $2\theta = 25.4$	Lattice parameter in (Å)		c/a ratio	No. of unit cell per particle	Volume in (Å) ³
		a	c			
0.00	3.505 569	3.77 70	9.61 19	2.54 49	6.524 2	137.1 208
0.01	3.495 683	3.77 75	9.45 47	2.50 29	6.600 5	134.9 139
0.02	3.513 055	3.77 98	9.53 90	2.52 37	8.837 3	136.2 826
0.03	3.503 126	3.77 54	9.56 31	2.53 30	12.25 66	136.3 090

3.2 Particle size and strain

3.2.1 Debye Scherer method

The particle size and lattice strain of the pure and Cu doped TiO_2 sample were calculated by the x-ray line broadening technique using Debye Scherer equation below:

$$D = \frac{k\lambda}{\beta \cos \theta} \quad \text{----- (5)}$$

Where D is the particle size in nanometer, λ is the wavelength of the radiation ($\lambda = 1.5418\text{\AA}$), k is a constant (0.94), β is the peak width at half maximum (FWHM) in radian and θ is the peak position. The particle size (D) and strain were calculated for the major XRD peak (101) using the Scherer's formula (5). The particle size and strain were calculated for pure and Cu doped TiO₂ samples are listed in Table 2.

3.2.2 Williamson Hall method

In order to understand the peak broadening with lattice strains, various peaks appeared in the XRD pattern were used. The Stokes and Wilson [12] formula given in equation (6) were used to calculate the strain induced broadening of the Bragg's diffraction peak.

$$\varepsilon = \frac{\beta_{hkl}}{4 \tan \theta} \quad \text{----- (6)}$$

In addition of Scherer equation and equation (6) results in following equations [8]:

$$\beta_{hkl} = \beta_s + \beta_D \quad \text{----- (7)}$$

$$\beta_{hkl} = \frac{k\lambda}{D \cos \theta} + 4\varepsilon \tan \theta \quad \text{----- (8)}$$

Rearranging the equation (8) gives:

$$\beta_{hkl} \cos \theta = \left(\frac{k\lambda}{D}\right) + 4\varepsilon \sin \theta \quad \text{----- (9)}$$

The W-H plot of $\beta_{hkl} \cos \theta$ versus $4 \sin \theta$ for Ti_{1-x}Cu_xO samples with concentration x = 0.0, 0.01, 0.02 and 0.03 are shown in figure 4 (a, b, c and d). It is well known that, in the absence of strain in broadening of peak, the $\beta_{hkl} \cos \theta$ versus $4 \sin \theta$ plot is expected to be a horizontal line parallel to the $4 \sin \theta$ axis and in the presence of strain in broadening of peak, it should have a non – zero slope. The obtained values of grain size and strain induced in the broadening of the peak are tabulated in table 2. It is observed that the strain values are varying randomly. This may be due to the increment in number of unit cell per particle as a result of substitution of Cu¹⁺, Cu²⁺ and Cu³⁺ ions in Ti site.

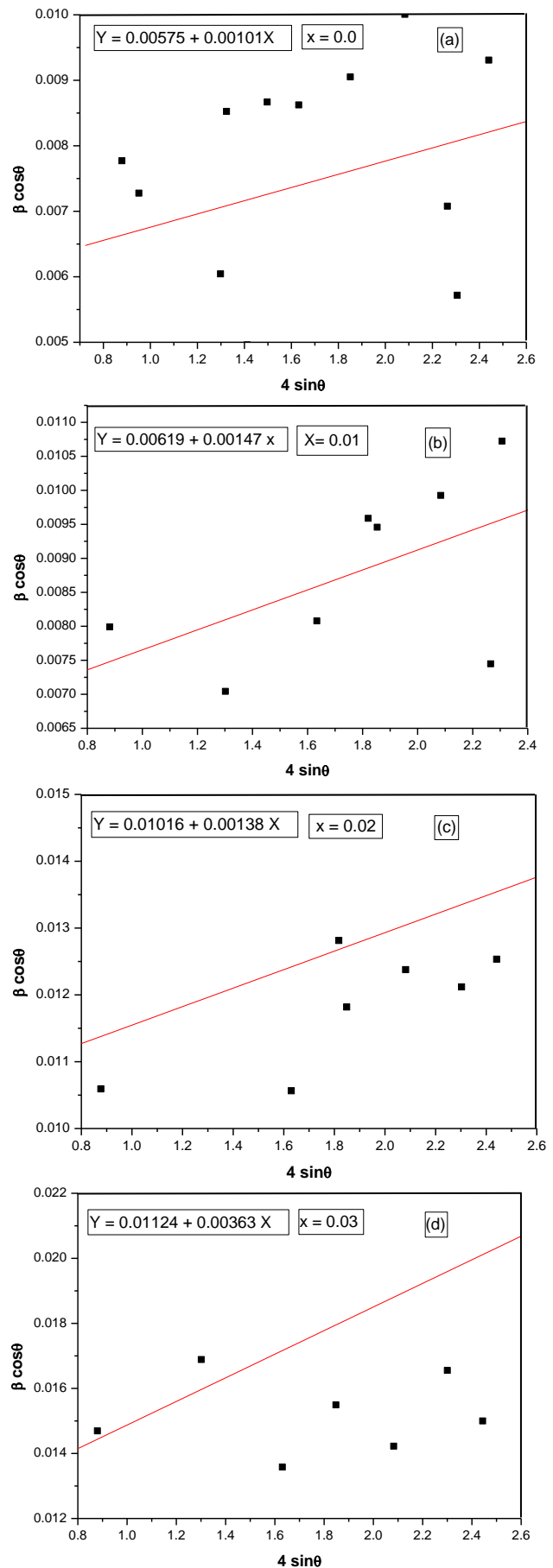


Figure 4: The W-H plot of $\beta_{hkl} \cos \theta$ versus $4 \sin \theta$ for Ti_{1-x}Cu_xO₂ samples.

Table 2: Geometric parameters of $Ti_{1-x}Cu_xO_2$ samples with concentration $x = 0.0, 0.01, 0.02$ and 0.03 .

Cu Concentration (x)	Scherer Method D (nm)	Williamson Hall Method	
		D (nm)	$\epsilon \times 10^{-3}$
0.00	17.84	25.20	0.00101
0.01	17.35	23.41	0.00147
0.02	13.09	14.26	0.00138
0.03	9.44	12.34	0.00363

IV. CONCLUSION

It is summarizing that using the co-precipitation method we have successfully synthesized pure and Cu doped ($x = 0.0, 0.01, 0.02$ and 0.03) TiO_2 nanoparticles at room temperature. This method is simple, economic, catalyst free and nontoxic which makes it suitable for various applications. From the XRD analysis it is confirmed that all the samples are good crystalline in nature tetragonal anatase TiO_2 . The lattice parameters calculated are matching with standard values which agree with JCPDS data (73-1764). The grain size and lattice strain calculated by both the techniques are nearly same.

V. ACKNOWLEDGMENT

The author would like to thank UGC DAE Indore for the support of XRD characterization.

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Implementation of Image Segmentation using Watershed Transformation

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ABSTRACT

Image segmentation is the process of segmenting the image into various segments that could be used for the further applications such as : Image understanding model, Robotics, Image analysis, Medical diagnosis, etc. Image segmentation is the process of partitioning an image into multiple segments, so as to change the representation of an image into something that is more meaningful and easier to analyse. Segmentation technique, basically convert the complex image into the simple image.

Keywords: Edge Detection, Digital Image Processing, Image Segmentation

I. INTRODUCTION

Images are considered as one of the most important medium of conveying information, in the field of computer vision, by understanding images the information extracted from them can be used for other tasks for example: navigation of robots, extracting malign tissues from body scans, detection of cancerous cells, and identification of an airport from remote sensing data. Now there is a need of a method, with the help of which, we can understand images and extract information or objects, image segmentation fulfil above requirements. Thus, image segmentation is the first step in image analysis. Sometime image denoising is done before the segmentation to avoid from the false contour selection for segmentation to segment the image without loss of information for medical. Image segmentation refers to the process of partitioning a digital image into multiple segments i.e. set of pixels, pixels in a region are similar according to some homogeneity criteria such as colour, intensity or texture, so as to locate and identify objects and boundaries in an image [1]. Diagnosing purpose is a challenging job.

II. METHODS AND MATERIAL

Image segmentation means assigning a label to each pixel in the image such that pixels with same labels share common visual characteristics. It makes an image easier to analyse in the image processing tasks. There are many different techniques available to perform image segmentation. Our motive is to implement almost the same concept as we humans try to implement, while understanding the image which we visualize. In human vision, the complex image is immediately segmented into the simple objects on the basis of color, texture, patterns, shapes, etc. This same thing is constructed with the help of the image segmentation techniques in the computer vision system. We could segment the digital image on the basis of these features, so that the task of understanding of image could be done in a simple and humanly way. On the basis of these defined features, there are several image segmentation techniques which would provide the segmented results. Image segmentation refers to the process of partitioning a digital image into multiple segments i. e. set of pixels, pixels in a region are similar according to some homogeneity criteria such as color, intensity or texture, so as to locate and identify objects and boundaries in an

image [1]. The choice of a segmentation technique over another and the level of segmentation are decided by the particular type of image and characteristics of the problem being considered.

Image Segmentation Techniques basically; there are two categories of segmentation techniques: Edge-Based, Region - Based Segmentation, based on the discontinuities or similarities.

Detecting Discontinuity It means to partition an image based on abrupt changes in intensity [1], this includes image segmentation algorithms like edge detection.

Detecting Similarity It means to partition an image into regions that are similar according to a set of predefined criterion.

2.1 Watershed Transform

The Watershed Transform is a unique technique for segmenting digital images that uses a type of region growing method based on an image gradient. The concept of Watershed Transform is based on visualizing an image in three dimensions: two spatial coordinates versus gray levels. In such a "topographic" interpretation, we consider three types of points: A. Points belonging to a regional minimum. B. Points at which a drop of water, if placed at the location of any of those points, would fall with certainty to a single minimum. C. Points at which water would be equally likely to fall to more than one such minimum. For a particular regional minimum, the set of points satisfying condition (B) is called the catchment basin or watershed of that minimum. The points satisfying condition (C) form crest lines on the topographic surface and are termed divide lines or watershed lines. The principal objective of segmentation algorithms based on these concepts is to find the watershed lines.

2.2.1 Advantages of Watershed Transform

The Watershed Transform effectively combine elements from both the discontinuity and similarity based methods. Since its original development with grey-scale images, the Watershed Transform has been extended to a computationally efficient form (using FIFO queues) and applied to colour images. The main advantages of the Watershed method over other previously developed segmentation methods are

- A. The resulting boundaries form closed and connected regions. Traditional edge based techniques most often form disconnected boundaries that need post-processing to produce closed regions.
- B. The boundaries of the resulting regions always correspond to contours which appear in the image as obvious contours of objects. This is in contrast to split and merge methods where the first splitting is often a simple regular sectioning of the image leading sometimes too unstable results.
- C. The union of all the regions forms the entire image region.

2.2 Watershed Implementation Methods

There are mainly three methods to implement watershed. They are listed below:

- Distance Transform Approach
- Gradient method
- Marker Controlled Approach

The watershed transformation is performed on a gradient image g extracted from the original image however the problem with the conventional intensity gradient is it is not able to detect the interfaces between homogeneously textured image regions. This is because the gradient image highlights the variations within the textures rather than showing the change between textured regions, as shown in Figure 4 below. A Texture Gradient is therefore required to detect the texture boundaries

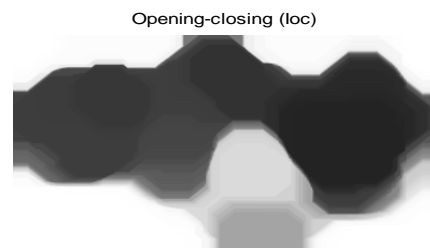
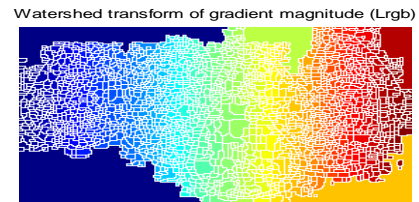
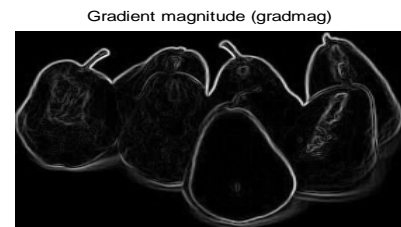
III. RESULTS AND DISCUSSION

The various steps involved in marker controlled watershed segmentation are shown below.

- Step 1. The first step is to read the combined Texture and Intensity Gradient.
- Step 2. Next step is to compute the Foreground Markers. These are connected blobs of pixels within each of the objects in the image. Variety of procedures could be applied to find the Foreground Markers. In the present work morphological techniques called "opening- by reconstruction" and "closing-by-reconstruction" are used to "clean" up the image. These operations will create flat maxima inside each object. Opening-by-reconstruction is erosion followed by a morphological reconstruction

whereas closing-by-reconstruction is dilation followed by morphological reconstruction. These operations will remove small blemishes without affecting the overall shapes of the objects. Good Foreground Markers can be obtained by computing the regional maxima of the resulting Gradient Image.

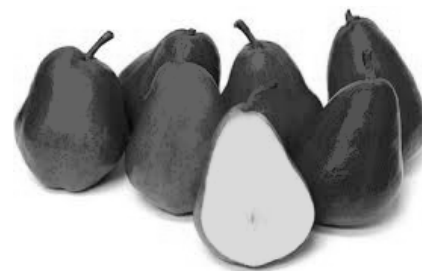
- Step 3. Some of the mostly-covered and shadowed objects will not be marked in the previous step, which means that these objects will not be segmented properly in the end result. Also, the Foreground Markers in some objects go right up to the objects' edge. Hence it is necessary to clean the edges of the marker blobs and then shrink them a bit. This can be done by a closing followed by erosion. This procedure tends to leave some stray isolated pixels that must be removed.
- Step 4. Next the background locations need to be marked. In the cleaned-up image, the dark pixels belong to the background, so thresholding is a suitable operation to start with.
- Step 5. The background pixels will be in black, but ideally the background markers shouldn't be too close to the edges of the objects that are being segmented. So the next step is to "thin" the background by computing the "skeleton by influence zones", or SKIZ, of the foreground. This can be done by computing the watershed transform of the distance transform of threshold image, and then looking for the watershed ridge lines of the result.
- Step 6. The next step is to modify the Gradient Image so that it has regional minima only in certain desired locations i.e. at the Foreground and Background Marker pixels.
- Step 7. The final step is to give this Modified Gradient Image as input to the Watershed Transform Algorithm.



Regional maxima of opening-closing by reconstruction (fgm)



Opening-by-reconstruction (lobr)



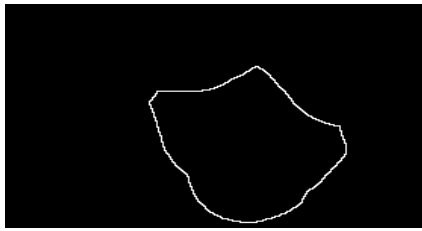
Opening-closing by reconstruction (lobrcbr)



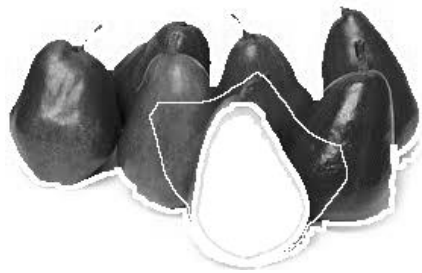
Thresholded opening-closing by reconstruction (bw)



Watershed ridge lines (bgm)



Markers and object boundaries superimposed on original image (I4)



Colored watershed label matrix (Lrgb)



IV. CONCLUSIONS

It has been show that good segmentation results can be achieved. Watershed algorithm is a powerful and fairly efficient tool for image segmentation, even for overlapping or adjacent rocks. These tools, when combined with the process of mark selection, permit an effective approach for practical image segmentation. The success of this combined procedure is however, dependent upon the process of mark selection. In order to avoid an over segmentation, we propose to adapt the topological gradient method.

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Three Stage Cascaded Multilevel Inverter using Pulse Width Modulation Technique

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ABSTRACT

In the last few years, the necessity of increasing the power quality enhancement in industry has sustained the continuous development of multilevel- inverters due to high efficiency with low switching frequency control method. The inverter is a semiconductor device which is used to convert the fixed DC voltage into symmetrical AC voltage without changing the magnitude. To improve the power quality (AC) from the inverter output by performing the power conversion in small voltage steps resulted in lower harmonics. The output voltage on the AC side can take several discrete levels of equal magnitude. The harmonic content of this output voltage waveform is greatly reduced, if compared with a two level voltage wave form (inverter). This method is called as multilevel inverter. Multi-level power inverters employ power semiconductor switches in the inverter to select one or more of multi dc voltage source to create staircase voltage waveform at the inverter output. In the multilevel inverter the output voltage is in the form of stepped waveform, so that the harmonics will be reduced and thereby increase the voltage gain and power quality of the output AC from the MLI.

Keywords: Multilevel Inverter-CMLI,DMLI-PWM-H BRIDGE-INVERTER

I. INTRODUCTION

Several topologies for multilevel inverters have been proposed over the years the most popular being the diode clamped, flying capacitor and cascaded H-bridge structures. One aspect which sets the cascaded H-bridge apart from other multilevel inverters is the capability of utilizing different DC voltages on the individual H-bridge cell which results in splitting the power conversion amongst higher-voltage lower-frequency and lower-voltage higher frequency inverters. An alternate method of cascading inverters involves series connection of two three phase inverters through the neutral point of the load.

An advantage of this approach is that isolated sources are not required for each phase. It should be noted that cascaded inverter system can be considered from a number of different viewpoints. Considering the

cascaded inverter to be one unit, it can be seen that a higher number of voltage levels are available for a given number of semiconductor devices. Capacitors batteries and or renewable energy voltage sources can be used as a DC voltage sources.

-commerce has become one of the vital parts of the modern life. Online payment is the supportive application for the payment of money for the products we buy. For the past years online security breach created a major problem and lots of money had been stolen. The proposed document deals by securing the payment through iris recognition [1]. This method also adds the method of using visual cryptography for securing the user credentials. This visual cryptography method was formerly invented by Moni Naor and Adi Shamir in 1994[6].

II. METHODS AND MATERIAL

A. Stages of Multilevel Inverter

The three stages of CMLI are high-voltage stage, medium voltage stage and low voltage stage. The high, medium and low voltage stages are made of three-level inverters constructed using cascaded H-bridge. This method is used to avoid the undesirable high switching frequency for all the voltage stages despite the fact that the inverter's dc sources are selected to maximize the inverter levels by eliminating redundant voltage state.

B. Multilevel Inverter Topologies

i Introduction

The multilevel voltage source inverter is recently applied in much industrial application such as AC power supplies, static VAR compensators, drive systems, etc, one of the significant advantages of multilevel configuration is the harmonic reduction in the output waveform without increasing switching frequency of decreasing the inverter power output. The output voltage waveform of a multilevel inverter is composed of the number of levels of voltages, typically obtained from capacitors voltage sources. As the number of levels reach infinity the output THD approaches zero. The number of the achievable voltages levels, is limited by voltage unbalance problems, voltage clamping requirement, circuit layout and packaging constraints.

ii Types of Multilevel Inverter

There are three types of multilevel inverter namely Diode-Clamped Multilevel Inverter, Flying-Capacitor Multilevel Inverter and Cascaded-Inverters with Separated Dc Sources. Multilevel inverters include an array of power semiconductors and capacitor voltage sources, the output of which generates voltages with stepped waveforms with less distortion, less high switching frequency, higher efficiency, lower voltage devices and better electro-magnetic compatibility. The commutation of the switches permits the addition of semiconductors must withstand only reduced voltages.

• Diode-Clamped Multilevel Inverter (DCMLI)

The Diode-Clamped Multilevel Inverter uses capacitors in series to divide up the Dc bus voltage into a set of voltage levels. To produce m level of the phase voltage, an m level diode-clamp inverter need m – 1 capacitors on the DC bus. A single phase five-level diode-clamped inverter is shown in Fig.3.1.

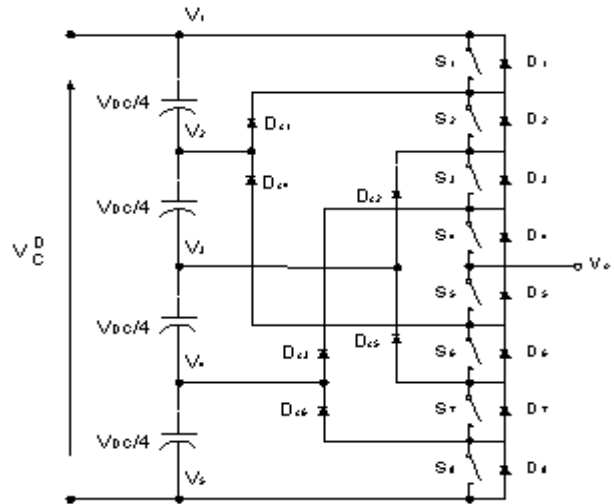


Figure 1: Diode-Clamped Multilevel Inverter (DCMLI)

Table 1 shows the phase voltage level and their corresponding switch states. When the switch is on the output voltage becomes one otherwise the value becomes zero. Table 1 shows the switching pattern of Diode clamped Multi- Level Inverter and the output phase voltage for the corresponding switching states when the switch S_1 and S_8 is ON, the output phase voltage is produced by the voltage of V_1 and V_5 .

Table 1: Switching Pattern of DCMLI

POWER INDEX VALUE	OUTPUT PHASE VOLTAGE (V_o)				
	V_1	V_2	V_3	V_4	V_5
S_1	1	0	0	0	0
S_2	1	1	0	0	0
S_3	1	1	1	0	0
S_4	1	1	1	1	0
S_5	0	1	1	1	1
S_6	0	0	1	1	1
S_7	0	0	0	1	1
S_8	0	0	0	0	1

Flying Capacitor Multilevel Inverter

Capable Of Solving Capacitor Voltage Unbalance Problem And Excessive Diode Count Requirement In Dcmi .Employs Separate Capacitors Pre Charged To $[(N1-1)/(N1-1) \times Vdc]$, $[(N1-2)/(N1-1) \times Vdc]$... $\{[(N1-(N1-1))/(N1-1) \times Vdc]\}$. Size Of Voltage Increment Between Two Capacitors Defines Size Of Voltage Steps In Icmi Output Voltage Waveform.A Flying Capacitor Multilevel Inverter In Fig 2 Uses A Ladder Structure Of Dc Side Capacitor Where The Voltage On Each Capacitor Differs From That Of The Next Capacitor

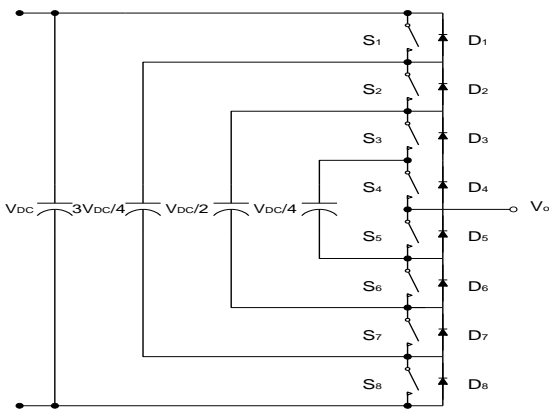


Figure 2: Flying Capacitor Multilevel Inverter (FcmlI)

To Generate M-Level Staircase Output Voltage, M1 Capacitors In The D Bus Are Needed. Each Phase-Leg Has An Identical Structure. The Size Of The Voltage Increment Between Two Capacitors Determines The Size Of The Voltage Levels In The Output Waveform.

Table 2: Switching Pattern of FCMLI

OUTPUT V_{Ao}	SWITCH STATE							
	Sa1	Sa2	S_{a1}^{m-1}	S_{a1}^m	S_{a2}^{m-1}	S_{a2}^m	S_{a1}^{m-1}	S_{a1}^m
$V_3=V_{dc}$	1	1	1	1	0	0	0	0
$V_4=3V_{dc}/4$	1	1	1	0	1	0	0	0
$V_3=V_{dc}/2$	1	1	0	0	1	1	0	0
$V_2=V_{dc}/4$	1	0	0	0	1	1	1	0
$V_1=0$	0	0	0	0	1	1	1	1

Table 2 Shows The Phase Voltage Level And Their Corresponding Switch States. From Table 3.2, State 1 Represents That The Switch Is On And State 0 Represents The Switch Is Off.

Cascaded Multilevel Inverter

The general function of this multilevel inverter is the same as that of the other two previous inverters. This multilevel inverter using cascaded inverter with SDCSs synthesis a desired voltage from several independent sources DC voltages which may be obtained from batteries, fuel cells, all solar cells. of different level inverters are connected in series.

A. Circuit Diagram

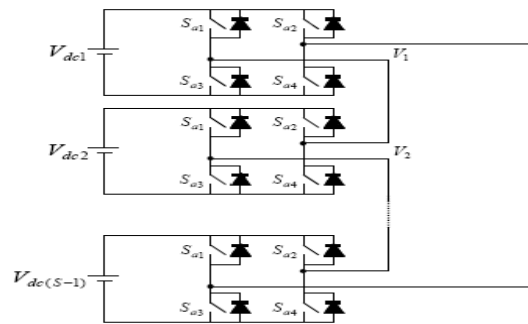


Figure 3. Cascaded Multilevel Inverter (CMLI)

B. Operating Modes

Fig.4 shows the synthesized phase voltage waveform of a five-level cascaded inverter with four SDCSs. The phase output voltage is synthesized by the sum of four inverter outputs, $U_{an} = U_{a1} + U_{a2} + U_{a3} + U_{a4}$. Each inverter level can generate three different voltage outputs, $+ Vdc$, 0 , and $- Vdc$ by connecting the de source to the ac output side by different combinations of the four switches, S1, S2, S3 and S4. Using the top level as the example, turning on S1 and S4 yields $U_{a4} = Vdc$. Turning on S2 and S3 yields $U_{a4} = Vdc$. Turing off all witches yields $U_4 = 0$. Similarly, the ac output voltage at each level can be obtained in the same manner.

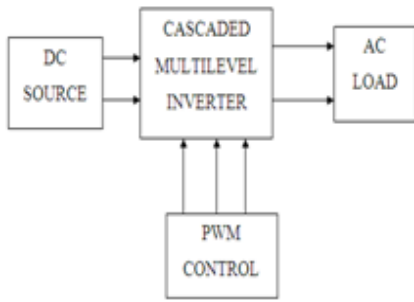


Figure 4: Block Diagram

III. RESULTS AND DISCUSSION

TYPES OF MODULATION TECHNIQUES

4.1: INRODUCTION

The inverter output can be changed and controlled according to the desired level by the triggering pulse given to the gate terminal in the inverter. This controlling method is obtained by a method called as modulation technique. There are several types of PWM modulation techniques for controlling the inverter output by changing the pulses given to the gate from the PWM modulation technique. The pulses from the PWM output are obtained by comparing the carrier based signal and sampling signal. So this pulse is used as a triggering pulse for the gate terminal of the power devices which is used to ON and OFF the power devices.

The various pulse width modulation techniques for controlling the multilevel inverter topologies are step modulation, sinusoidal PWM, space vector modulation, selective harmonic PWM, modified sinusoidal PWM and multiple pulses PWM. Among this space vector PWM is now used in research and development areas but its algorithm is very complex having many number trigonometric functions, so this has less preference to use in the practical implementation.

4.2: PRINCIPLE OF SPWM

In the proposed system the pulse width modulation taken for the controlling of inverter output is the sinusoidal pulse width modulation and it has variation of ON and OFF delay time for switching the power devices without any short circuit. This short circuit occurrence during the switching of

power device is carried by the dead time regeneration. So the output of inverter circuit is controlled by the gate triggering pulses given by the pulse width modulation technique.

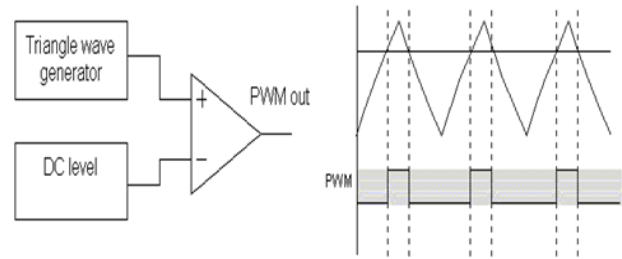


Figure 5: Principle of SPWM

4.3: SINUSOIDAL PWM

Modulation index (m_i):

$$M_i = \frac{\text{Amplitude of the mod waveform}}{\text{Amplitude of the carrier waveform}}$$

Amplitude of the carrier waveform

Here the sine waveform is taken as the sampling waveform or modulating waveform and the triangular waveform is taken as the carrier waveform. Now by comparing these two waveforms of sine wave and triangular wave the gate pulses are generated by using comparator. Now the gate pulse generated are having various ON and OFF time which is given to the IGBT or MOSFET power devices to controlling the output voltage.

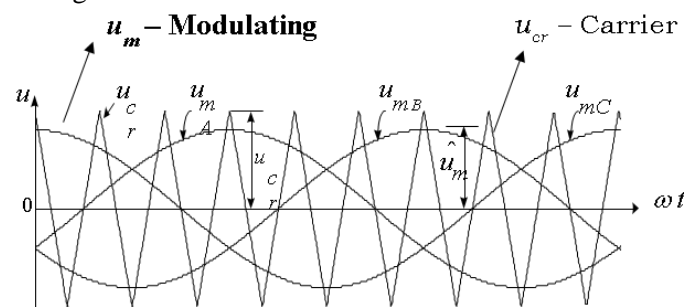


Figure 6: Modulating and Carrier Waves

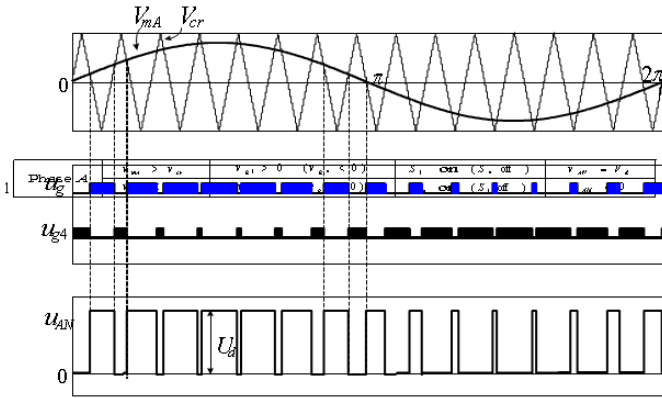


Figure 7: Principle of Sinusoidal Pulse

Here the principle of sinusoidal pwm is predicted. here by varying the modulation index we can change the output voltage by means of varying the ON and OFF pulses.

MATLAB MODEL FOR 27 LEVELS CMLI

Fig 7.3 shows MATLAB model of model three stage cascaded multilevel inverter with modulation control. This model contains DC source voltages, gate pulse circuit, power switches like IGBT's.

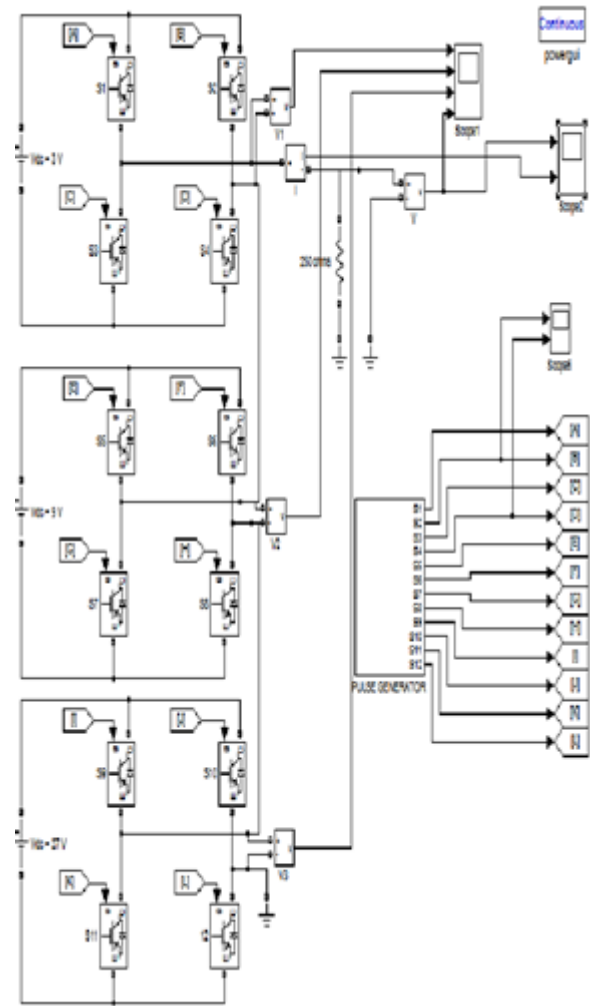


Figure 7.2: Simulink Models of 27 Levels CMLI

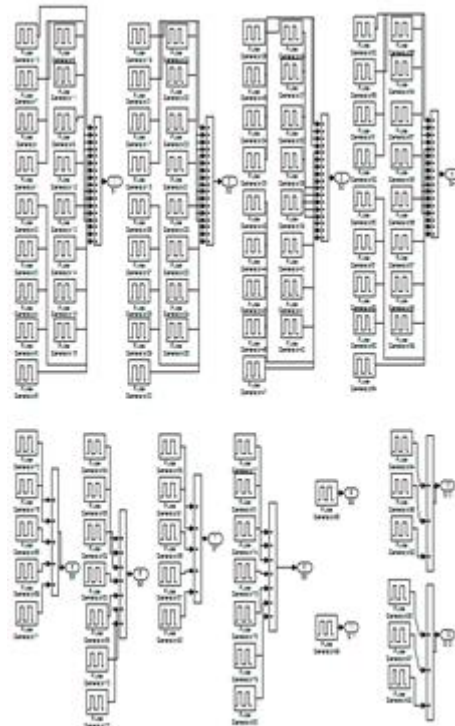


Figure 7.2: Sub System of SPWM Generating Simulating Block

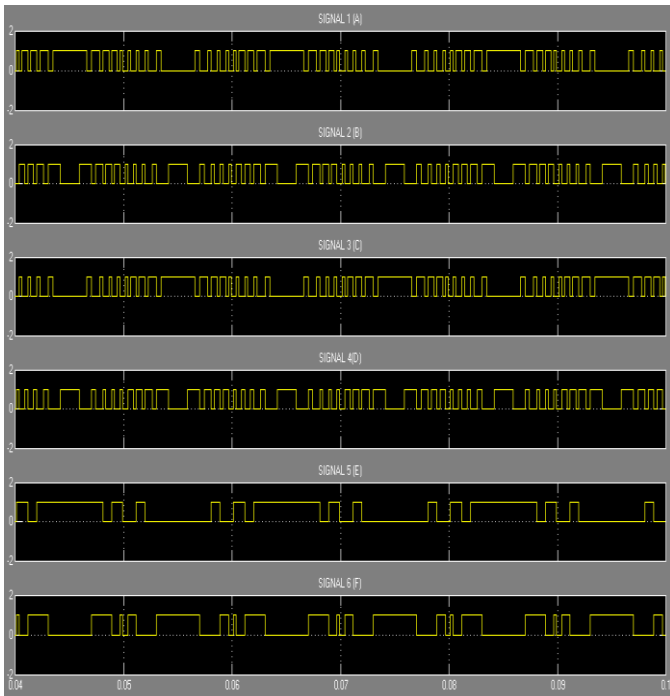


Figure 7.3: SPWM- P1, P2, P3, P4, P5, P6 PULSES

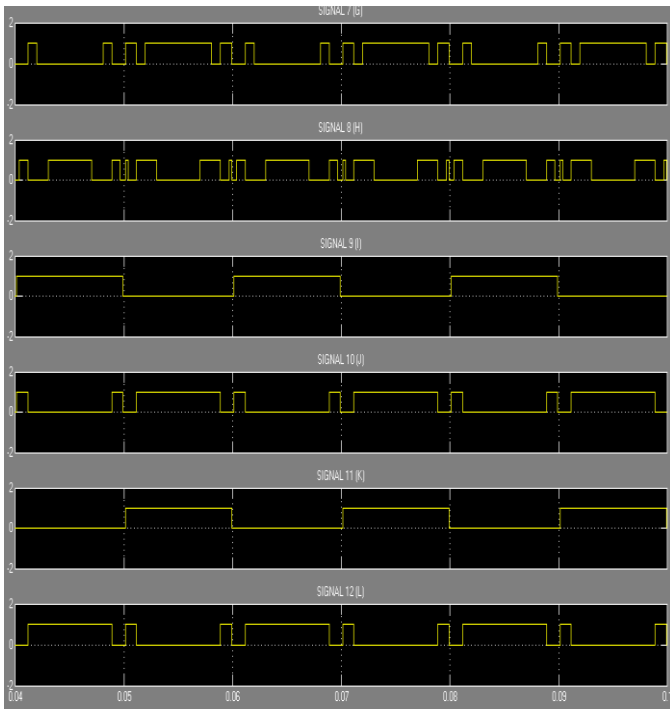


Figure 7.4: SPWM- P7, P8, P9, P10, P11, P12 pulses

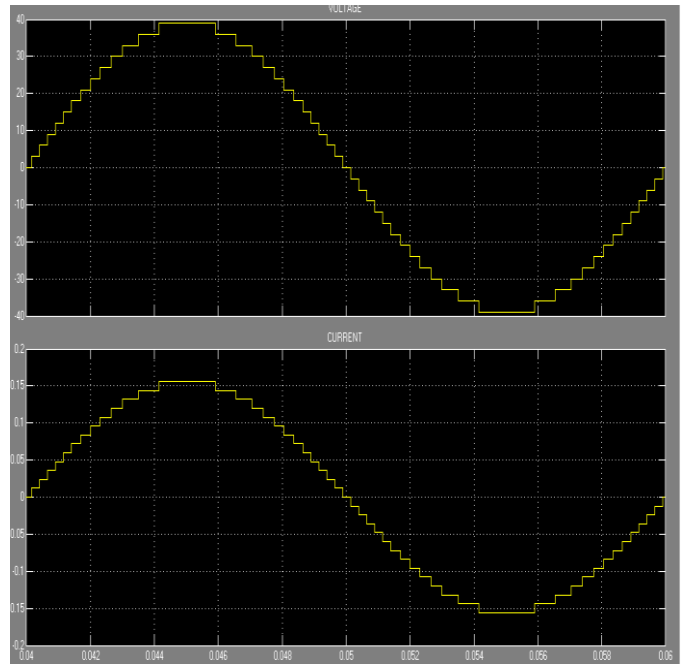


Figure 7.5: output of 21 levels CMLI

IV. Conclusion

The disturbances in power electronics equipment are often periodic and rich in higher harmonics. They have been frequencies and are often above the bandwidth of regulators used to control fundamental components. Therefore the ‘regular’ control can only partially reduce their effects on the distortion of control variables. The three stage cascade multilevel inverter with number of DC sources is illustrated and the gate triggering pulse is given by the SPWM technique. Here the inverter power device circuit used is IGBT device and it has the better switching frequency and gate control compared to all other semiconductor inverter devices such as power MOSFET, SCR, TRIAC etc., This pulse width modulation (PWM) control techniques enables us to obtain better harmonic reduction characteristics of the output AC stepped voltage with 21 levels under the utilization ratio of different modulation, and achieve optical control of output waveform by different modulation ratio. Finally, we obtained the output AC voltage waveform and their frequency spectrums. Besides that, it realized better multilevel output and achieved desired results.

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Policy Based Management in Autonomic Network Management

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ABSTRACT

Policy-based management could be a terribly effective methodology to guard sensitive info. However, the over claim of privileges is widespread in rising applications, together with mobile applications and social network services, as a result of the applications' users concerned in policy administration have very little information of policy-based management. The over claim will be leveraged by malicious applications, then result in serious privacy leakages and loss. To resolve this issue, this paper proposes a completely unique policy administration mechanism, mentioned as cooperative policy administration CPA, to change the policy administration. In CPA, a policy administrator will talk to different similar policies to line up their own policies to guard privacy and different sensitive info. This paper formally defines controller and proposes its social control framework. What is more, to get similar policies additional effectively, that is that the key step of controller, a text mining-based similarity live methodology is conferred. We tend to valuate controller with the info of mechanical man applications and demonstrate that the text mining-based similarity live methodology is more practical in getting similar policies than the previous category-based methodology.

Keywords: Collaborative Policy Administration, Policy-Based Management, Mobile Applications, Android, Social Network Services

I. INTRODUCTION

The technique of policy-based management is wide wont to manage complicated and large-scale network systems. The normal framework of policy-based management consists of 4 core elements, policy call purpose (PDP), policy social control purpose (PEP), policy administration purpose (PAP), and policy repository (PR). A well-trained policy administrator or cluster can specify, verify policies in PAP, and deploy the policies in PR. once a system runs; PDP can retrieve applicable policies from PR and build selections. spirit takes massive of the choice, like satisfying the request wherever a topic desires to open a file (authorization action), or launching a feller to record system context (obligation action).The over claim of privileges, wherever a not well-trained administrator assigns a lot of privileges than those that ar ordinarily needed by a topic, is AN more and more major problem, particularly once

the strategy of policy-based management is applied to rising application situations, like mobile applications and social network services . for example, throughout the method of mechanical man application development, 3 roles ar sometimes concerned within the policy administration: Application Developers declare that permissions the applying can request; Application Marketers verify whether or not the applying is legitimate by AN automatic tool; Application Users decide whether or not to approve the permission requests. These 3 roles ar sometimes performed by those that aren't well trained in policy-based management. That is, the developers sometimes declare a lot of permissions than necessary as a result of they're inclined to create the event of applications easier, or perhaps interpret technical documents the marketers sometimes tend to permit a lot of applications no matter the malicious permission requests; and therefore the application users might not recognize what the requested permissions

mean, so approving all requests as a result of they're desperate to use the applying. a similar issue exists in social network services, wherever a user is asked to grant access to non-public knowledge to third-party applications . This challenge to policy administration is more and more serious attributable to the explosion of those applications. Among all smartphones shipped throughout the second quarter. Mechanical man OS smartphones had the most important world market share (68.1 percent). Moreover, social network services became one in all the foremost common internet applications within the world the policy administration continues to be major problem within the policy-based management of those rising applications. As a result, we should always strengthen the policy administration mechanism in these application situations. This paper proposes cooperative policy administration (CPA). The essential plan of CPA is that applications with similar functionalities shall have similar policies which will be such and deployed. Thus, to specify or verify policies, CPA can examine policies already such by different similar applications and perform cooperative recommendation. The degree of similarity is going to be calculated by predefined algorithms that may be a category-based formula, a text mining-based formula, and so on.

II. SYSTEM ARCHITECTURE

We tend to propose a completely unique method—collaborative policy administration, to assist not well-trained users, even novices to specify and verify policies in fig one. We tend to outline the formal model of CPA. During this model, 2 main functions in policy administration square {measure} outlined supported similarity measure ways, which can choose similar policies as a refinement basis to help directors to style or verify their target policies. We tend to propose a text mining-based similarity live technique to assist policy directors to get similar policies. Per the analysis, the projected technique is more practical than the category-based mostly similarity live technique that is a lot of wide utilized in different literatures. We tend to gift an social control framework and implement a paradigm of CPA. The framework supports 2 styles of user interfaces and provides functions of cooperative policy style and cooperative policy verification.

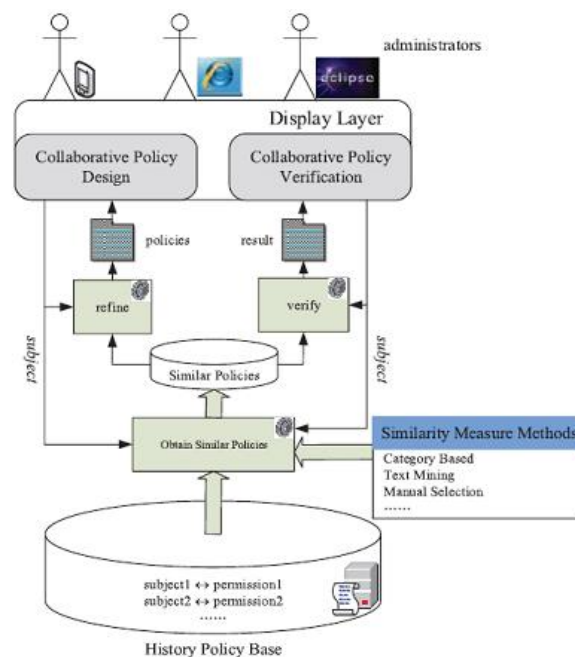


Figure 1: System Architecture

III. EXISTING SYSTEM

The traditional framework of policy-based management consists of 4 core parts policy call purpose (PDP), policy social control purpose (PEP), policy administration purpose (PAP), and policy repository (PR). A well-trained policy administrator or cluster can specify, verify policies in PAP, and deploy the policies in PR. once a system runs; PDP can retrieve applicable policies from PR and create selections. Liveliness takes charge of the choice, like satisfying the request wherever a topic needs to open a file (authorization action), or launching a lumberjack to record system context (obligation action). The over claim of privileges, wherever a not well-trained administrator assigns additional privileges than those that ar unremarkably needed by a topic, is associate degree progressively major problem, particularly once the strategy of policy-based management is applied to rising application eventualities, like mobile applications and social network services.

IV. PROPOSED SYSTEM

This paper proposes cooperative policy administration (CPA). The essential plan of comptroller is that applications with similar functionalities shall have similar policies that may be such that and deployed. Thus, to specify or verify policies, comptroller can

examine policies already such that by alternative similar applications and perform cooperative recommendation. The degree of similarity are calculated by predefined algorithms, that may well be a category-based rule, a text mining-based rule, novel technique, social control framework and implement an example of comptroller. The framework supports 2 varieties of user interfaces and provides functions of cooperative policy style and cooperative policy verification.

V. METHODOLOGY

The CPA: social control framework as is shown in Fig. 1, a policy administrator will leverage the framework to administer policies via a phone, applications programme, or development tool. In Fig. 1, the direction of arrows is that the direction of key information flows. The history policy base and similarity live strategies are 2 key parts within the social control framework. To enforce comptroller, the administrator ought to prepare a comfortable range of policies initially. What is more, cooperative policy style and cooperative policy verification are the 2 key functions provided by the framework, consistent with the definitions delineate in Section three. These 2 functions rely on the history policy base and similarity live strategies. Once getting the similar policies, the 2 functions decision a refinement rule and a verification rule severally. Finally, cooperative policy style and cooperative policy verification can show the results to the administrator on varied user interfaces, for instance, a phone, applications programme, or development tool.

5.1 Cooperative Policy Style

Here, Admins refers to any or all concerned policy directors, including, e.g., developers, marketers, and finish users within the robot framework. Policy administrator Admins will get a refined policy set PSref consistent with a refinement perform. We have a tendency to style the policy victimisation the system like a brand new user will register and logins and transfer any file. The user will style the policy in it. That's the policy is also like transfer possibility on the market or not, shopper details read choices specified choices.

5.2 Cooperative Policy Verification

A policy administrator Admins will get a verification result. Vary Result for a target policy set PS target, that contains all polices allotted to a target subject SUBJS, consistent with a verification perform. A policy administrator will leverage the framework to administer policies via a phone, applications programme, or development tool. The direction of arrows is that the direction of key information flows. The history policy base and similarity live strategies are 2 key parts within the social control framework. To enforce comptroller, the administrator ought to prepare a comfortable range of policies initially. What is more, cooperative policy style and cooperative policy verification are the 2 key functions provided by the framework. These 2 functions rely on the history policy base and similarity live strategies. Once getting the similar policies, the 2 functions decision a refinement rule and a verification rule severally. Finally, cooperative policy style and cooperative policy verification can show the results to the administrator on varied user interfaces, e.g., a phone, applications programme, or development tool.

VI. CONCLUSION

In this paper, we have a tendency to think of a brand new variety of potential attackers in cooperative information business a coalition of information suppliers, known as m-adversary. To forestall privacy speech act by any m-adversary we have a tendency to show that guaranteeing m-privacy is enough. We have a tendency to bestowed heuristic algorithms exploiting equivalence cluster monotonicity of privacy constraints and adaptive ordering techniques for with efficiency checking m-privacy. We have a tendency to introduce conjointly a provider-aware anonymization rule with adaptive m-privacy checking ways to confirm high utility and m-privacy of anonymized information. Our experiments confirmed that our approach achieves higher or comparable utility than existing algorithms whereas making certain m-privacy with efficiency. There are several remaining analysis queries. Process a correct privacy fitness score for various privacy constraints is one amongst them. It conjointly remains an issue to deal with and model he information [the info the information suppliers once data are distributed in a very vertical or ad-hoc fashion. it might be conjointly attention-grabbing to

verify if our strategies are often tailored to different kinds of information like set-valued data.

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Relevance Fuzzy Type Search in Extensible Markup Language in Database

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ABSTRACT

In an ancient keyword-search system over XML information, a user composes a keyword question, submits it to the system, and retrieves relevant answers. Within the case wherever the user has restricted data regarding the info, usually the user feels “left within the dark” once issue queries, and must use a try-and-see approach for locating data. During this paper, we tend to study fuzzy type-ahead search in XML information, a replacement information-access paradigm within which the system searches XML information on the fly because the user varieties in question keywords. It permits users to explore information as they sort, even within the presence of minor errors of their keywords. Our projected methodology has the subsequent features: 1) Search as you type: It extends Auto complete by supporting queries with multiple keywords in XML information. 2) Fuzzy: It will realize high-quality answers that have keywords matching question keywords or so. 3) Efficient: Our effective index structures and looking out algorithms are able to do awfully high interactive speed. We tend to study analysis challenges during this new search framework. We tend to propose effective index structures and top-k algorithms to attain a high interactive speed. We tend to examine effective ranking functions and early termination techniques to increasingly establish the top-k relevant answers. we've got enforced our methodology on real information sets, and also the experimental results show that our methodology achieves high search potency and result quality abstract should summarize the content of the paper. Try to keep the abstract below 150 words. Do not have references or displayed equations in the abstract. It is imperative that the margins and style described below be adhered to carefully. This will enable us to maintain uniformity in the final printed copies of the Journal. Papers not made according these guidelines will not be published although its content has been accepted for publication. Paper form is a necessary condition for its publication, as well as its content.

Keywords: XML Information, Keyword Search, Type-Ahead Search, Fuzzy Search, Efficient

I. INTRODUCTION

A major rising issue, however, seems to be performance related: current KBS systems have unpredictable run time. specifically, certainly queries it takes too long to turn out answers, and for others the system could even fail to come (e.g., once exhausting memory) and for several others the same top-k results for the question has lesser connection once matched up with question initiators needs. that's as results of the implementations are entirely relying keyword primarily based mechanisms solely. Exploring different styles of IR ways is a stimulating space of analysis. Finally, we have a tendency to gift some preliminary experiments over real-world information to demonstrate the

practicableness of this projected answer approach. Therefore, we have a tendency to take into account a search engine model for demonstrational practicableness programme is that the well-liked term for associate info retrieval (IR) system? Whereas researchers and developers take a broader read of IR systems, shoppers think about them a lot of in terms of what they require the systems to try to to - specifically search the online, or associate computer network. Truly shoppers would extremely like a finding engine, instead of a look engine. The World Wide net (WWW) has been growing chop-chop within the past decades. A lot of and a lot of info is changing into out there electronically on the online. The tremendous volume of net documents poses challenges to the performance and quantifiability of net search

engines. Duplicate is associate inherent downside that search engines ought to cope with several identical or near-identical results would seem within the search results if search engines don't solve this downside effectively. Such duplicates can considerably decrease the perceived connection of search engines. Therefore, automatic duplicate detection could be a crucial technique for search engines to attain connection. For demonstrational practicableness associated validity of this project we have a tendency to take into account an implementation of a web programme primarily based instance driven by Top-K initiators.

II. SYSTEM ARCHITECTURE

In this paper, we have a tendency to study the matter of fuzzy type-ahead search in XML knowledge. We have a tendency to projected effective index structures, economical algorithms, and novel improvement techniques to more and more and expeditiously establish the top-k answers. we have a tendency to examined the LCA-based methodology to interactively establish the anticipated answers. we've developed a minimal-cost-tree-based search methodology to expeditiously and more and more establish the foremost relevant answers. We have a tendency to project a heap-based methodology to avoid constructing union lists on the fly. We have a tendency to devise a forward-index structure to more improve search performance. We've enforced our methodology, and also the experimental results show that our methodology achieves high search potency and result quality. The system architecture is given fig1.

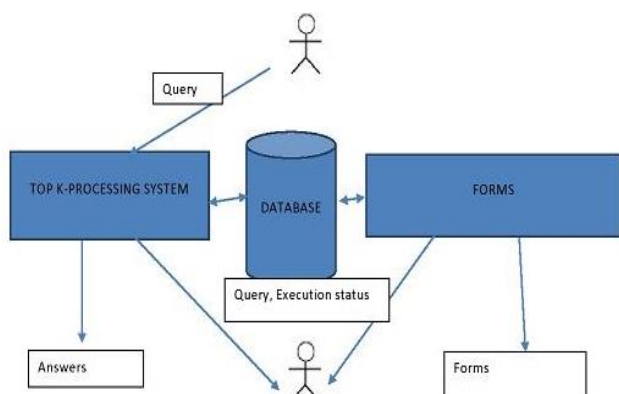


Figure 1: System Architecture

III. EXISTING SYSTEM

An Efficient question retrieval systems square measure enforced for RDBMS systems solely and not for XML primarily based systems. Uses keyword-search system over XML knowledge. A user composes a keyword question, submits it to the system, and retrieves relevant answers. this is often referred to as try-and-see approach wherever user's restricted data regarding the information forces them to be content with restricted question results. The try-and-see approach systems do not support users dilated data domains. Question results square measure influenced by minor errors in keywords. Thus a higher an improved system is needed that supports users dilated data domains and additionally robust to minor errors in keywords.

IV. PROPOSED SYSTEM

Proposes fuzzy type-ahead search over XML information. even supposing this idea is nothing new for RDBMS based mostly systems, this is often a replacement information-access paradigm for XML based mostly systems. Here, the system searches XML information on the fly as the usersorts in question keywords. advantages of the planned system include the subsequent motorcar complete options Supports Fuzzy Search over XML information. Effective index structures and looking out algorithms over XMLdrives top-k results. Uses the subsequent algorithms and techniques LCA-based (Lowest Common Ancestors) or MCT-based (minimum connecting trees) fuzzy type-ahead search algorithms. Ranking Minimal-Cost Trees techniques for top-k results. Produces high search potency and result quality over XML information storages.

V. METHODOLOGY

5.1 Graph Method For Keyword-Based

While Management Systems Provide A Comprehensive Answer To Information Storage, They Need Deep Information Of The Schema, As Well As The Information Manipulation Language, So As To Perform Effective Retrieval. Since These Needs Create A Drawback To Lay Or Occasional Users, Many Strategies Incorporate Keyword Search (KS) Into Relative Databases. Keyword Relationship Graphs Square

Measure Used For Computing The Similarity Between Every Information And A Sunflower State Question, So That, Throughout Question Process, Solely The Most Promising Databases Square Measure Searched. An In Depth Experimental Analysis Demonstrates That G-KS Outperforms This State-19of-The-Art Technique On All Aspects, As Well As Exactness, Recall, Efficiency, Area Overhead And Adaptability Of Accommodating Completely Different Linguistics.

5.2 Keyword Relationship Graphs

A Keyword Relationship Graph (KRG). The KRG For The Instance Information. A Node Corresponds To A Term And Encompasses A Weight, That Reflects Its Significance Relative To Alternative Terms In The Information. Each Distance Price Within The Graph Is Related To A Weight Four That Measures The Importance Of The Association. As Opposition M-KS That Considers Solely Frequency Data, G-KS Utilizes IR-Inspired Measures To Assign Weights. Discuss The Computation Of Weights For Nodes And Edges, Severally. Presents A Technique For Com- Pressing The KRG. Table One Summarizes The Frequent Symbols Used Throughout This Paper For Straightforward Reference. A Method That Selects The Top-K Databases For Process A Relative Keyword Search Question. G-KS Summarizes Every Information As A Keyword Relationship Graph, Wherever Nodes Correspond To Terms, And Edges Capture Distance Relationships. Each Nodes And Edges Square Measure Weighted According To Progressive IR Techniques In Order To Support A Selection Of Evaluation Functions. Based Mostly On The KRG, G-KS Applies AN Tangled Rule To Establish And Eliminate Non-Promising Databases. As Opposition The Previous Work That's Based Mostly Solely On Binary Relationship Between Terms, G-KS Considers All Question Keywords As An Entire So As To Minimize The Variety Of False Positives. AN In Depth Experimental Analysis Confirms The Prevalence Of G-KS In Terms Of Effectiveness, Efficiency, Process And Pre-Processing Overhead.

5.3 Efficient LCA based Keyword Search

Keyword search in XML documents supported the notion of lowest common ancestors (LCAs) and modifications of it have recently gained analysis interest.

In this paper we tend to propose Associate in nursing economical algorithmic rule referred to as Indexed Stack to seek out answers to keyword queries supported Rank's linguistics to LCA. we tend to analytically and through an experiment measure the Indexed Stack algorithmic rule and the core algorithmic rule. The results show that the Indexed Stack algorithmic rule outperforms in terms of each CPU and I/O prices alternative algorithms by orders of magnitude once the question contains at least one low frequency key- word on with high frequency keywords. Keyword search in XML documents supported the notion of lowest common ancestors within the labeled trees sculptural once the XML documents has recently gained analysis interest within the info community. One necessary feature of keyword search is that it permits users to go looking info while not having to understand a posh command language or previous data concerning the structure of the underlying information.

5.4 Towards Searching by Document

This work addresses a unique spatial keyword question known as the m-closest keywords (mCK) query. Given a information of spatial objects, every tuple is related to some descriptive data described in the type of keywords. The mCK question aims to seek out the spatially nearest tuples that match m user-specified keywords. Given a collection of keywords from a document, mCK question will be terribly helpful in retagging the document by examination the keywords to alternative retagged documents in very information.

5.5 Adaptive keyword search model

Although several previous studies of keyword search over text documents (e.g., HTML documents) are planned, all of them manufacture a listing of individual pages as results. Within the event that there are not any pages that contain all the keywords, they're going to come pages with a number of the input keywords hierarchical by connectedness. Though 2 or a lot of reticular pages contain all the keywords, the existing ways cannot integrate the pages into one relevant and significant answer.

VI. CONCLUSION

In this paper, we studied the problem of fuzzy type-ahead search in XML data. We proposed effective index structures, efficient algorithms, and novel optimization technique questions progressively and efficiently identify the top-k answers. We examined the LCA-based method to interactively identify the predicted answers. We have developed a minimal-cost-tree-based search method to efficiently and progressively identify the most relevant answers. We proposed a heap-based method to avoid constructing union lists on the fly. We devised a forward-index structure to further improve search performance. We have implemented our method, and the experimental results show that our method achieves high search efficiency and result quality.

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Competence-Based Training in Higher Education Institutions

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ABSTRACT

Keeping students engaged and motivated in higher institutions of learning is challenging, even for the most experienced professors. Although it is difficult to prescribe a “one-size-fits-all” approach, research shows that there are practices that will generally encourage students to be more engaged. These practices include moving away from rote learning and memorisation to providing more challenging, complex work; having different approached and encouraging cooperative learning. Competency-based training has been shown to provide a number of advantages in ensuring that the trainees are equipped with knowledge and skill in specific areas at workplace. In this paper, we advance and discuss descriptively a new approach for teaching microprocessor course unit using simulation software freely available on the Internet using project-based training that is well rooted in competency-based training. This approach allows students the opportunity to learn to use the microprocessor as a tool for solving engineering problems and not just for them to understand the architecture of the microprocessor. The approach consists of shifting the focus of the course from the microprocessor itself to learning the application the microprocessor is used for as a tool to solve practical engineering problems. Ideas to facilitate implementation of the approach are raised and we finally discuss some of the benefits to engineering education.

Keywords: Competency-Based Training; Project-Based Teaching; Competency Identification; Project Goals; Microprocessor

I. INTRODUCTION

Competency-based training approach originated from parallel developments in vocational training in many countries such as the national qualifications framework in New Zealand, the national training board in Australia, the national skills standards initiative in the United States and the national vocational qualifications (NVQs) in the United Kingdom.

The reason for this evolution in training may have been the need to make the national workforce more competitive in the global economy. The approaches outlined a set of standards each broken down into elements by which performance in the workplace could be assessed.

Competency-based training identifies basic essential elements which consist of functional analysis of the occupational roles, translation of these roles

(competencies) into outcomes, and assessment of trainees’ progress in these outcomes on the basis of demonstrated performance.

Progress is defined solely by the competencies achieved and not the underlying process or time served in formal educational settings. Assessments are based on a set of clearly defined outcomes so that all parties concerned (lecturers and students) can make reasonably objective judgements about whether or not each student has achieved them. Potential benefits of the approach include individualised flexible training and transparent standards, because almost all learners can learn equally well if they receive the kind of instructions they need.

In traditional educational system, the unit of progression is time and is teacher-centred. In competency-based training system, the unit of progression is mastery of specific knowledge and skills and is learner-centred. In competency-based training, we define; (i) skill as a task

or group of tasks performed to a specific level of competency or proficiency; (ii) competency as skills performed to a specific standard under specific conditions.

Creemers et al [1] concludes that competency-based training has tremendous potential for training for industry. A competent technologist is one who is able to perform a technological skill to a satisfactory standard.

In engineering and technology training, competency-based training is based upon the learner's ability to demonstrate attainment or mastery of engineering and/or technology skills performed under certain conditions to specific standards (the skills then becomes competencies).

Thomas and Patel [2] identify five essential elements of competency-based training system:

- i. Competencies to be achieved are carefully identified, verified and made known well in advance.
- ii. Criteria to be used in assessing achievement and the conditions under which achievement will be assessed are explicitly stated and made known in advance.
- iii. The teaching methods and schemes provide for the individual development and evaluation of each of the competencies specified.
- iv. Assessment of competency takes the participants knowledge and attitudes into account but requires actual performance of the competency as the primary source of evidence.
- v. Learners progress through the instructional program at their own rate by demonstrating the attainment of the specified competencies.

II. CHARACTERISTICS OF COMPETENCY-BASED LEARNING

Competency-based learning has the following characteristics [2]:

- Competencies are carefully selected,
- Essential knowledge is learnt to support the performance of skills,
- Detailed training materials are keyed to the competencies to be achieved and are designed to support the acquisition of knowledge and skills,

- Methods of instruction involve mastery learning, the premise that all participants can master the required knowledge or skill, provided sufficient time and appropriate training methods are used,
- Learners' knowledge and skills are assessed as they enter the program and those with satisfactory knowledge and skills may bypass training or competencies already attained,
- Learning should be self-paced,
- Flexible training approaches including large group methods, small group activities and individual study are essential components,
- A variety of support materials including print, audiovisual and simulations (models) keyed to the skills being mastered are used,
- Satisfactory completion of training is based on achievement of all specified competencies.

III. ADVANTAGES OF COMPETENCY-BASED LEARNING

Although competency-based approach appears especially useful in training situations where trainees have to attain a small number of specific and job-related competencies [3](Watson et al., 2002), the following advantages are realised in general:

- Learners achieve competencies required in the performance of their tasks,
- Learners build confidence as they succeed in mastering specific competencies,
- Learners receive a transcript or list of the competencies they have achieved,
- Training time is used more efficiently and effectively as the trainer is a facilitator of learning as opposed to a provider of information,
- More training time is devoted to working with participants individually or in small groups as opposed to presenting lectures,
- More training time is devoted to evaluating each participant's ability to perform essential job skills.

IV. COMPETENCY-BASED TRAINING IN PROJECT-BASED TEACHING

Research shows that there are practices that will generally encourage students to be more engaged. These practices include moving away from rote learning and

memorisation to providing more challenging and complex work.

Project-based instruction is a holistic instructional strategy rather than an add-on. Lecturers increasingly can teach groups of student who may have different learning styles and ability levels.

Project-based instruction builds on the student's individual strengths and allows them to explore their interests in the framework of defined tasks within the curriculum. The students plan, implement and evaluate their projects that have real-world applications beyond the classroom. This approach is rooted in competency-based training in which students learn by constructing new ideas or concepts based on their current and previous knowledge[4] (Karlin and Vianni, 2001).

Most important under this approach is that students find projects, motivating and challenging because they play an active role in choosing them, choosing the method of implementation and in the entire planning process [5](Barab et al., 2005).

V. OUTLINING PROJECT GOALS

It is important for clarity in the goals of the project so that it is planned and completed effectively within the stipulated time. The lecturer and the students should develop an outline that explains the project's essential elements and expectations for each project. The outline may take the following elements:

- i. *Situation of problem*: a sentence or two describing the problem that the project is trying to address.
- ii. *Project description and purpose*: a concise explanation of the project's ultimate purpose and how it addresses the situation or problem. E.g. students will research and do literature review about the topic in the project and devise ways to get solution.
- iii. *Performance specifications*: a list of criteria or quality standards the project work must meet.
- iv. *Rules*: Guidelines for carrying out the project including the timeline and short-term goals, such as milestones.
- v. *List of project participants with roles assigned*: Include project teammates and their roles
- vi. *Assessment*: How the students' performance will be evaluated. In project-based learning, the

learning process is being evaluated as well as the final product.

VI. CURRICULUM DESIGN

At present, the curriculum for Bachelor of Science in Electrical and Electronic Engineering at the Technical University of Mombasa at the fourth year of study includes the following engineering course units: Control Engineering I; Power Electronics II; Analogue Filters; Microprocessor I; Power Systems I; Electrical Machines IV; Signals & Communication II; Visual Display Systems I; Instrumentation; Control Engineering II; Microprocessor II; Power Systems II; Electrical Machines V; Illumination Engineering; Microwaves; Visual Display Systems II; and Integrated Circuits. Laboratories dedicated to this curriculum as required by the Kenya's Commission for University Education (CUE) and Engineers Board of Kenya (EBK) are being developed through identification of key competencies the students are expected to learn. Each laboratory exercises consist of a set of tasks for the student to undertake and all students undertake the same set of tasks in a given practical course unit.

In this paper we highlight the typical competencies for *Microprocessor I* course unit developed on the basis of the Intel 8085 Microprocessor. The exercises were broken down into competencies and skills on the topics as are described in the course unit as explained in the following section.

VII. METHODOLOGY : PROJECT-BASED TEACHING OF MICROPROCESSOR I

The broad definition of project-based learning given by [6] has been adopted: Project-based learning begins with an assignment to carry out one or more tasks that lead to the production of a final product—a design, a model, a device or a computer simulation. The culmination of the project is normally a typed and/or oral report summarizing the procedure used to produce the product and presenting the outcome.

Project-Based teaching of microprocessor presents the microprocessor as a viable tool for solving a wide range of industrial-type monitoring and control design problems in a way that is appealing and applicable to all engineering disciplines. The mechanism or vehicle

which was proposed to accomplish this goal is to build the course around a real-world and application problem. Designing the application would require knowledge of important functions of the microprocessor.

The idea is to follow a step-by-step approach for solving the problem using the microprocessor and to cover the inner workings of the microprocessor only as needed to solve the problem. In this way, the focus originates at the application itself and goes all the way to the details of the microprocessor which are required to be able to use the microprocessor to solve the problem.

Applications could be selected to match the students' background; in this way microprocessor classes become more universal and less restricted to electrical engineering students.

In this approach, the following competencies were identified that made teaching of microprocessor course interesting to students:

Competency 1: The students should demonstrate an understanding of the history of microprocessors and major recent computer developments by:

- i. Outlining the history of computers.
- ii. Explaining the role of computers in business, scientific usage, control systems, and the military.
- iii. Defining and explaining microprocessors, floppy disc memories, large scale integration and microprogramming.
- iv. Recognizing terminology used in technical literature and in industry.

Competency 2: The students should demonstrate an understanding of the fundamental hardware circuitry and architecture of modern digital computers by:

- i. Defining list of components and peripherals of a typical personal computer.
- ii. Explaining the function of each component: microprocessor, memory, and input/output (I/O) devices and their line of communication (buses).
- iii. Using assembly language and high level language and explaining the advantages of an assembly language over high level languages.

Competency 3: The students should demonstrate an understanding of the data flow inside the microprocessor by:

- i. Explaining the fetch and execute cycles.
- ii. Defining the microprocessor signals and their classifications
- iii. Explaining chip design terminology and functionality, including Small Scale Integration (SSI), Medium Scale Integration (MSI), large Scale Integration (LSI), bit, byte.
- iv. Explaining the terms ASCII, word, instruction, software, and hardware.
- v. Explaining the logic instructions, and recognizing the flags that are set or reset for given data conditions.

Competency 4: The students should demonstrate an understanding of the microprocessor architecture, microcomputer systems, and memory interfacing by:

- i. Defining the address bus, the data bus, and the control bus and explaining their functions in reference to the 8085 microprocessor.
- ii. Explaining the functions Reset, Interrupt, Wait, and Hold.
- iii. Explaining memory organization and memory map, and explaining how memory addresses are assigned to a memory chip.
- iv. Recognizing the functions of various pins of the 8085 microprocessor.
- v. Listing the various internal units that make up the 8085 architecture, and explaining their functions in decoding and executing an instruction.
- vi. Drawing the block diagram of an 8085-based microcomputer

Competency 5: The students should demonstrate an understanding of the basic software techniques, including both machine and assembly languages by:

- i. Explaining the functions of data transfer (copy) instructions and how the contents of the source register and the destination register are affected.
- ii. Explaining the functions of the machine control instructions HLT and NOP.
- iii. Writing a program in 8085 mnemonics to illustrate an application of data transfer instructions, and translating those mnemonics manually in their Hex codes

Competency 6: The students should demonstrate a basic understanding of the fundamental principles of digital computers and computer circuitry by:

- i. Identifying the basic components of digital computers, including, Input devices, Control element, Storage, Arithmetic element, Output devices.
- ii. Explaining the central processing units (CPU) operation and processes.
- iii. Demonstrating the use of software to examine the operation of the CPU.
- iv. Describe the BUS concepts and use.
- v. Identifying and applying addressing modes in assembly language programming.
- vi. Writing, assembling, executing, and debugging assembly language instructions
- vii. Identifying the various types of RAM and ROM memories and explaining how they interface to the microprocessor.
- viii. Interfacing input and output devices with the microprocessor

Competency 7: The students should demonstrate the ability to output data using different instructions by:

- i. Defining and using the instruction word.
- ii. Charting the flow of a basic assembly language program.
- iii. Hand assembling programs written in assembly language and relating the hand assembling to assembler action.
- iv. Exercising the use of transfer of control instructions in development of subroutines programs.

Competency 8: The students should demonstrate how to apply the basic rules of arithmetic for positional significance number systems to those systems normally used in the computer field by:

- i. Defining the characteristics of a positional significance number system with any radix.
- ii. Converting between binary, octal, decimal, and hexadecimal number systems.
- iii. Performing simple arithmetic operations in the binary and hexadecimal number systems.
- iv. Identifying the characteristics of common computer information codes.

Competency 9: The students should demonstrate understanding of the functions and inter-relationships of

the elements that comprise a microprocessor based computer by:

- i. Drawing the block diagram and describing the basic architecture of a microcomputer.
- ii. Identifying and giving functional descriptions of data, address, and control buses.
- iii. Describing the internal architecture of the 8085 microprocessor.
- iv. Explaining the function and operation of each register in the 8085 microprocessor.
- v. Describing the sequence of operations in the execution of a microprocessor instruction

Competency 10: The students should demonstrate how to use assembly language mnemonics to write programs and how to code assembly language instructions in binary by:

- i. Writing data-handling and arithmetic instructions.
- ii. Writing logic instructions.
- iii. Creating condition code testing and branching instructions
- iv. Programming registers and stacks operations.
- v. Programming communication between the computer and I/O devices.

VIII. USE OF SOFTWARE TO TEACH MICROPROCESSOR

The use of simulation software to teach microprocessor is an attempt to apply visual programming techniques to programming assembly language applications. We believe that this approach could lead to assembly language tools for helping students learn how to master this tedious and exacting activity, and for improving the productivity and accuracy of professional programmers.

The proposed approach may be suited for every course especially in electrical engineering curricula. Electrical engineers who are interested in designing controllers for a variety of applications will find this approach very beneficial as long as tasks are well identified for the design of the controllers for the recognized applications.

Our major recommendation for teaching Microprocessor course is through defined projects where the students are given in the beginning of the semester and they are guided in pursuing them to the end of the semester. This has been tested and found that the method provides students with opportunities to learn microprocessor at

greater length, with appropriate details. This also ensures that students gain a variety of ways of tackling programming problems in quest to solving engineering problems.

In the project-based teaching the students work jointly in groups meaning that students must learn to work together to take common decisions and figures out how to share and coordinate work among them [7]. The students learn through these study processes how to plan, manage and evaluate projects. Through this the students develop study competencies, which also must involve the ability to handle large amounts of information, which is within easy reach via the library, databases and the Internet.

This method of pedagogy makes it possible for students to turn into autonomous, but collaborative and critically thinking students. Education should not only focus on learning a specific course and reproduce what is taught by the lecturer. The real challenge is to open up for a personal meaningful process where new ways of thinking are made possible. Thus students may learn to embark into lecturer-defined projects and get involved in quite demanding but enriching practices.

While teaching can be confined to the lecturer's efforts towards effective learning, in competence-based learning on the other hand can occur without much effort on the part of the lecturer.

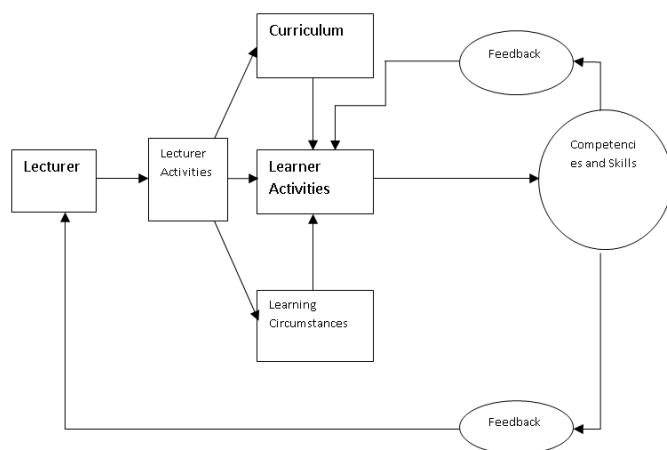


Figure 1: Lecturing-Learning Paradigm

From the learning paradigm as suggested by [8] in the Fig. 1, it can be seen that if all the linkages between the

student and the lecturer are severed, the student may still learn though less effectively, through his contact with the curriculum and the learning circumstances such as workshops and laboratories. Curriculum is progressively being seen by stakeholders as a dynamic framework guiding teaching and learning processes and as a steering mechanism for quality [9]. Curriculum relevance is a condition outcome, not only for improving the human capital potential of education and training graduates but also for retaining learners in education and training systems.

It should however be noted that an astute lecturer may influence to a greater extent the attainment of the competency aimed for in whichever course unit. Encouragement should be given to students to learn the competencies identified by their lecturers so that we can move away from the traditional educational system where the unit of progression is time and is lecturer-centred. With the adoption of competency-based training system, the unit of progression will therefore become mastery of specific knowledge and skills and is learner-centred.

Use of this method has shown remarkable improvements in student performance by:

1. exposing students earlier in the curriculum to real-world engineering applications versus the simpler applications which are currently used in microprocessor classes;
2. enhancing co-operative learning which is essential in engineering curricula;
3. satisfying students' practical knowledge by designing mini projects from the specifications given to them early in the semester;
4. facilitates efficient learning of software design techniques in microprocessor systems;
5. making it possible for the students to appreciate the working of the processor registers and memory as are hardware, in simulation form. The approach provides some visualization on the structure and way data is transformed during execution.

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An Improved Performance of Keyword Search Using Graph Structured Knowledge

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ABSTRACT

Keyword search is associate degree intuitive paradigm for looking joined knowledge sources on the online. We have a tendency to propose to route keywords solely to relevant sources to cut back the high value of process keyword search queries over all sources. We have a tendency to propose a unique methodology for computing top-k routing plans supported their potentials to contain results for a given keyword question. We have a tendency to use a keyword-element relationship outline that succinctly represents relationships between keywords and therefore the knowledge parts mentioning them. A structure evaluation mechanism is projected for computing the relevancy of routing plans supported scores at the amount of keywords, knowledge parts, component sets, and sub graphs that connect these parts. Experiments administrated mistreatment a hundred and fifty publically accessible sources on the online showed that valid plans (precision@1 of zero.92) that square measure extremely relevant (mean reciprocal rank of zero.89) are often computed in one second on the average on one laptop. Further, we have a tendency to show routing greatly helps to enhance the performance of keyword search, while not compromising its result quality.

Keywords: Keyword search, keyword question, keyword question routing, graph-structured knowledge, RDF

I. INTRODUCTION

The web isn't any longer solely a set of matter documents however conjointly an online of interlinked information sources (e.g., connected Data). One distinguished project that for the most part contributes to the present development is Linking Open information. Through this project, an outsized quantity of bequest information are reworked to RDF, connected with alternative sources, and revealed as connected information. Conjointly, connected information comprise many sources containing billions of RDF triples, that are connected by several links whereas totally different sorts of links are often established, those often revealed are same as links, that denote that 2 RDF resources represent constant real-world object. The system design is illustrated in Fig. 1. It's tough for the standard internet users to use this internet information by suggests that of structured queries victimization languages like SQL or SPARQL. To the present finish,

keyword search has evidenced to be intuitive. As opposition structured queries, no data of the search language, the schema or the underlying information are required. In info analysis, solutions are projected, which given a keyword question, retrieve the foremost relevant structured results, or simply, choose the only most relevant databases. However, these approaches are single-source solutions. They're circuitously applicable to the online of connected information, wherever results aren't finite by one supply however may cover many connected information sources. As opposition the supply choice drawback, that is that specialize in computing the foremost relevant sources, the matter here is to work out the foremost relevant mixtures of sources. The goal is to supply routing plans, which might be accustomed work out results from multiple sources. to the present finish, we offer the subsequent contributions: we tend to propose to analyse the matter of keyword question routing for keyword search over an outsized variety of structured and connected information sources. Routing

keywords solely to relevant sources can reduce the high price of finding out structured results that span multiple sources. To the simplest of our data, the work conferred during this paper represents the primary plan to address this drawback. Existing work uses keyword relationships (KR) collected severally for single databases. We tend to represent relationships between keywords also as those between information components. They're made for the whole assortment of connected sources, and then classified as components of a compact outline known as the set-level keyword-element relationship graph (KERG). Summarizing relationships is crucial for addressing the measurability demand of the connected information internet situation. IR-style ranking has been projected to include connectedness at the extent of keywords. To deal with the increased keyword ambiguity within the internet setting, we tend to use a structure connectedness model, wherever components to be thought of are keywords, entities mentioning these keywords, corresponding sets of entities, relationships between components of constant level, and inter-relationships between components of various levels.. We tend to enforce the approach and evaluated it during a real-world setting victimization quite one hundred fifty in public accessible information sets. The results show the pertinence of this approach: valid plans (precision@1 ¼ zero.92) that are extremely relevant to the user info would like (mean reciprocal rank (RR) ¼ zero.86) are often computed in one second on the average employing an artefact computer. Further, we tend to show that once routing is applied to AN existing keyword search system to prune sources, substantial performance gain are often achieved and provides an summary of existing work. The matter and resolution are sketched in Sections. The outline model is conferred in whereas Sections shows however it are often accustomed work out routing plans and Sections discusses the way to rank them. Analysis results are provided in Section before we tend to conclude in Sections. Exponentially with the quantity of sources and links between them. Yet, most of the results is also not necessary particularly once they aren't relevant to the user. An answer to keyword question routing will address these issues by pruning unfortunate sources and sanctioning users to pick mixtures that a lot of seemingly contain relevant results. For the routing drawback, we tend to don't have to be compelled to work out results capturing specific components at the

info level; however will specialize in the lot of coarse-grained level of sources.

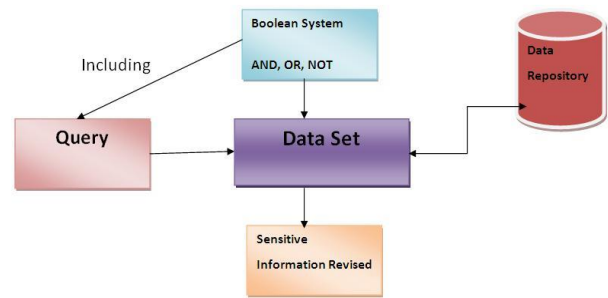


Figure 1: System Architecture

II. EXISTING SYSTEM

2.1. schema-based approaches

There are schema-based approaches implemented on top of off-the-shelf databases. A keyword query is processed by mapping keywords to elements of the database (called keyword elements). Then, using the schema, valid join sequences are derived, which are then employed to join (“connect”) the computed keyword elements to form so called candidate networks representing possible results to the keyword query.

2.2. Schema-agnostic approaches

Schema-agnostic approaches operate directly on the data. Structured results are computed by exploring the underlying data graph. The goal is to find structures in the data called Steiner trees (Steiner graphs in general), which connect keyword elements. Various kinds of algorithms have been proposed for the efficient exploration of keyword search results over data graphs, which might be very large. Examples are bidirectional search and dynamic programming. Existing work on keyword search relies on an element-level model (i.e., data graphs) to compute keyword query results.

DISADVANTAGES OF EXISTING SYSTEM:

The number of potential results may increase exponentially with the number of sources and links between them. Yet, most of the results may be not necessary especially when they are not relevant to the user. The routing problem, we need to compute results capturing specific elements at the data level. Routing keywords return the entire source which may or may not be the relevant sources.

III. PROPOSED SYSTEM

We propose to route keywords only to relevant sources to reduce the high cost of processing keyword search queries over all sources. We propose a novel method for computing top-k routing plans based on their potentials to contain results for a given keyword query. We employ a keyword-element relationship summary that compactly represents relationships between keywords and the data elements mentioning them. A multilevel scoring mechanism is proposed for computing the relevance of routing plans based on scores at the level of keywords, data elements, element sets, and subgraphs that connect these elements. We propose to investigate the problem of keyword query routing for keyword search over a large number of structured and Linked Data sources.

ADVANTAGES OF PROPOSED SYSTEM:

Routing keywords only to relevant sources can reduce the high cost of searching for structured results that span multiple sources. The routing plans, produced can be used to compute results from multiple sources.

IV. METHODOLOGY

We are going to develop a new approach which is useful for the android device users. Whenever user want to install app, before installing an app, user can get risk evaluation score, so that user can understand risk factor about a particular app. The following figure showing us to compare two PDF reader apps with risk evaluated score like low and high given in fig 2. By calculating accessing information from google play description for each app we are going to identify which features of user devices are accessing by an app. So that here we are going to generate a graph to take the comparison chart between apps accessing features of device. The following chart is the comparisons of apps with accessing features of user device.



Figure 2: Scenario

4.1 User can authenticate

For using of effective risk communication application user has to get authentication after giving user id, password and get activated by entering into his Gmail account.

4.2 User can search for apps by keyword

User has to provide the keyword for application which he wants to be search. On basing on the search keyword user can get app complete details by category wise.

4.3 Collecting information from google play

On the basis of search keyword the complete information from google play can be collected.

4.4 Using HTML parser to get data

Html parser is used to get the data of each and every application from google play.

4.5 Extracting App description

Here text processing mechanism is used to get the description of app.

4.6 Extracting App features

Here text processing mechanism is used to get the Feature of app.

4.7 Extracting App accessing permissions

This is used for accessing the permissions of the application from google.

4.8 Preparing Chart

Risk Chart is developed between the two applications so that it is very easy to find the risk score is given fig.3

4.9 Finding Risk Score

By using Risk graph comparisons we can find risk values, where risk values may be high or low. If risk value is high then it is suggestible for the users not to go for installing.

Chart showing the accessing features between apps.

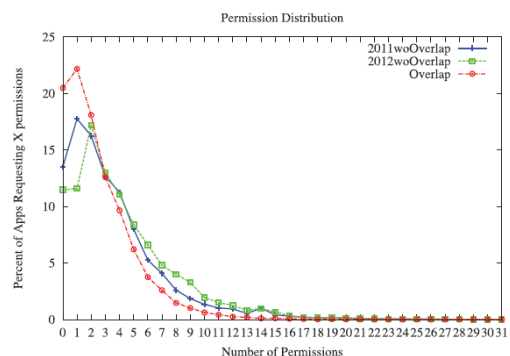


Figure 3: Risk Chart.

V. CONCLUSION

We have given an answer to the novel downside of keyword question routing. supported modelling the search house as a structure inter-relationship graph, we have a tendency to proposed an outline model that teams keyword and part relationships at the amount of sets, and developed a structure ranking theme to include relevancy at completely different dimensions. The experiments showed that the outline model succinctly preserves relevant data. Together with the planned ranking, valid plans (precision@1 $\frac{1}{4}$ 0:92) that are extremely relevant (mean reciprocal rank $\frac{1}{4}$ 0:86) may be computed in one's on the average. Further, we have a tendency to show that once routing is applied to associate existing keyword search system to prune sources, substantial performance gain will be achieved.

The thought of risk score functions to boost risk communication for robot apps, and determine the specified rate for an efficient risk rating operate. We have a tendency to hope that the chance score are displayed directly for a personal app as per the user selection, for this researchers ought to develop a lot of bunch data-mining algorithms that offer higher performance, responsibility and security.

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Comparison of P-Delta Effect on a Slender RCC Chimney by using Beam-Column Theory and STAAD PRO

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ABSTRACT

Chimneys are very tall and slender structures. As per ISIS 4998 (Part 1): 1992, major loads considered for analysis of chimneys are wind loads and earthquake load. Each of them is combined with dead load to get the most critical load for designing a chimney. This paper presents the analysis of a slender RCC chimney with a combination of dead load and wind load. Firstly beam column theory is applied on a tall slender chimney and general equations are developed for bending moment with and without the consideration of second order analysis. Validation of same is done by a typical problem of a tall chimney. Dead load of the structure is calculated by using frustum of a cone method. Wind load is calculated as per IS 875 (part3)-1987. Analysis is carried out by the combination of dead load and wind load. The dynamic effect is ignored. Bending moments are calculated manually by using beam column theory for first and second order analysis of chimney. These results are later compared with STAAD PRO results.

Keywords: RCC Chimney, Second order analysis, beam-column theory, P-delta effect.

I. INTRODUCTION

A chimney is a system for venting hot flue gases or smoke from a boiler, stove, furnace or fireplace to the outside atmosphere. They are typically almost vertical to ensure that the hot gases flow smoothly, drawing air into the combustion through the chimney effect. Tall RC chimneys are commonly used to discharge pollutants at higher elevation. They are typically almost vertical to ensure that the hot gases flow smoothly, drawing air into the combustion through the chimney effect. Chimneys are tall to increase their draw of air for combustion and to disperse the pollutants in flue gases over a greater area in order to reduce the pollutant concentrations in compliance with regulatory or other limits. Chimneys with height exceeding 150 m are considered as tall chimneys. However it is not only a matter of height but also the aspect ratio when it comes to classifying a chimney as tall. Today, Reinforced Concrete is the dominant material used for the construction of tall chimneys and for short chimneys precast concrete with or without pre stressing, Modern industrial chimneys consists of a concrete windshield with a number of steel

stacks on the inside. Chimneys can be classified as one of those structures for which use of concrete is eminently used. Tall reinforced concrete (RC) chimneys form an important component of major industries and power plants.

II. METHODS AND MATERIAL

A. Beam Column Theory

Timoshenko (1961) described theory of beam-column. Using this theory of Beam column, general equation is developed for analysis of chimney subjected to vertical & lateral load and moment at top.

In the elementary theory of bending, it is found that stresses and deflections in beam are directly proportional to the applied loads. This condition requires that the change in shape of the beam due to bending must not affect the action of the applied loads. For example, the beam in fig (2.1a) is subjected only lateral loads, such as

Q1 and Q2, the presence of small deflections δ_1 and δ_2 and slight changes in the vertical lines of action of the loads W_1 have only an insignificant effect on the moments and shear forces. Thus it is possible to make calculation for deflections, stresses, moments on the basis of initial configuration of the beam. Under this conditions, and also if Hook's law holds for the material, the deflections are proportional to the acting forces and the principle of superposition is valid i.e. the final deformations produced by the individual forces.

Conditions are entirely different when both uniaxial and lateral forces act simultaneously on the beam, as in fig (2.1b). The bending moments, shear forces, stresses and deflections in the beam will not be the proportional to the magnitude of the axial load. Furthermore there values will be dependent upon the magnitude of the deflection produced and will be sensitive to the even slight eccentricities in the application of the axial load. Beams subjected to the axial compression and simultaneously supporting lateral loads are known as beam-columns.

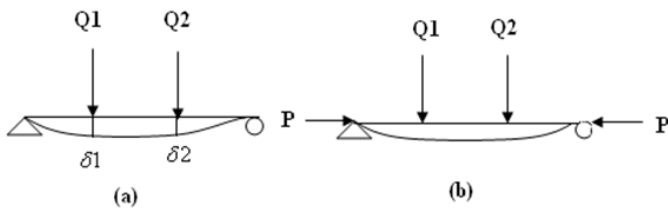
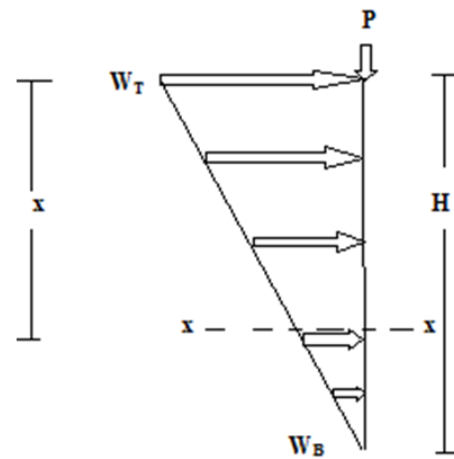


Figure 1: bending of Beam Column

The difference between the behaviour of short and slender columns is that, when slender columns are loaded even with axial loads, the lateral deflection (measured from the original centre line along its length) becomes appreciable where as in short columns this lateral deflection is very small and can be neglected. Hence slender columns, have to be designed for not only the external axial forces acting on them but also for the secondary moment produced by the lateral deflection.

B. Evaluation of Equations using Beam-Column Theory

First Order Analysis of Chimney:



W_T = Lateral load intensity at top of chimney
 W_B = Lateral load intensity at bottom of chimney
 H = height of chimney
 W_x = Lateral load intensity at general section 'x' on chimney

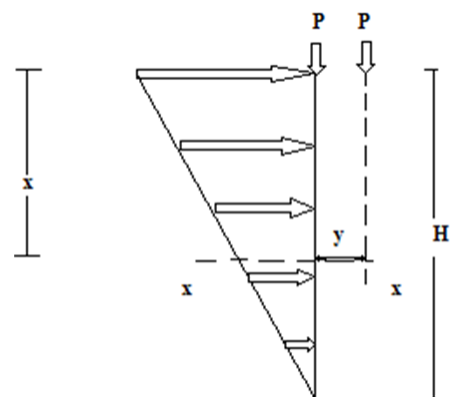
$$= W_T - \left[\frac{(W_T - W_B)x}{H} \right]$$

Let ' M_x ' be the bending moment at a general section 'x' from top of chimney

$$\therefore M_x = -\frac{W_T x^2}{2} + \left(\frac{W_T - W_B x^3}{6H} \right) \dots \dots \dots 1.1$$

This is the equation for Bending Moment of Chimney at any height 'x'

Second Order Analysis of Chimney:



W_T = Lateral load intensity at top of chimney
 W_B = Lateral load intensity at bottom of chimney
 H = height of chimney
 W_x = Lateral load intensity at general section 'x' on chimney

$$= W_T - \left[\frac{(W_T - W_B)x}{H} \right]$$

$$\text{Put, } k_w = \frac{(W_T - W_B)}{H}$$

$$\therefore W_x = W_T - k_w x$$

\therefore Bending moment at a general section 'x' is given by

$$M_x = Py - \frac{W_T x^2}{2} + \frac{k_w x^3}{6} \dots\dots 2.1$$

Now we have, $EI_x \frac{\partial^2 y}{\partial x^2} = -M$

$$\therefore EI_x \frac{\partial^2 y}{\partial x^2} = -Py + \frac{W_T x^2}{2} - \frac{k_w x^3}{6}$$

$$\therefore EI_x \frac{\partial^2 y}{\partial x^2} + Py = \frac{W_T x^2}{2} - \frac{k_w x^3}{6} \dots\dots 2.2$$

For a circular hollow section the moment of inertia is given by,

$$I_x = \frac{\pi}{64} (d_1^4 - d_2^4)$$

And for a chimney the moment of inertia varies according to the height and is different for different section and depends upon cross section

On solving above equation we get,

$$y = \text{complementary solution} + \text{particular solution}$$

Where,

$$y_c = A \sin(\alpha x) + B \cos(\alpha x)$$

Where,

$$\alpha = \sqrt{\frac{P}{EI_x}}$$

$$\text{And, } y_p = ax^3 + bx^2 + cx = d$$

On solving above equation we get,

$$y_p = -\frac{k_w x^3}{6P} + \frac{W_T x^2}{2P} + 0x = ax^3 + bx^2 + cx$$

Now equating according to power of 'x', we get complete solution

$$y = y_c + y_p$$

$$\therefore y = A \sin(\alpha x) + B \cos(\alpha x) - \frac{k_w x^3}{6P} + \frac{W_T x^2}{2P}$$

...2.3

Taking derivative with respect to 'x', we get

$$\frac{\partial y}{\partial x} = A \alpha \cos \alpha x - B \alpha \sin \alpha x - \frac{k_w x^2}{2P} + \frac{W_T x}{P}$$

Taking derivative of equation 2.3 with respect to 'x', we get

$$\frac{\partial^2 y}{\partial x^2} = -A \alpha^2 \sin \alpha x - B \alpha^2 \cos \alpha x - \frac{k_w x}{P} + \frac{W_T}{P}$$

...2.5

Now using boundary condition, when $x=0$, $\frac{\partial^2 y}{\partial x^2} = 0$

Equation becomes

$$0 = -B \alpha^2 \cos \alpha x - \frac{k_w x}{P} + \frac{W_T}{P}$$

$$\therefore B = \frac{-\frac{k_w x}{P} + \frac{W_T}{P}}{\alpha^2 \cos \alpha x} \dots\dots\dots 2.6$$

Now using boundary condition, when $x=H$, $\frac{\partial y}{\partial x} = 0$

$$\text{We get, } 0 = A \alpha \cos \alpha x - B \alpha \sin \alpha H - \frac{k_w H^2}{2P} + \frac{W_T H}{P}$$

$$\therefore A = \frac{B \alpha \sin \alpha H + \frac{k_w H^2}{2P} - \frac{W_T H}{P}}{\alpha \cos \alpha H}$$

Now substitute the values of A and B in equation 2.3

$$\therefore \text{ We get, } y = \left\{ \frac{B \alpha \sin \alpha H + \frac{k_w H^2}{2P} - \frac{W_T H}{P}}{\alpha \cos \alpha H} \sin \alpha x \right\} +$$

$$\left\{ \left[\frac{-\frac{k_w x}{P} + \frac{W_T}{P}}{\alpha^2 \cos \alpha x} \right] \cos \alpha x \right\} - \frac{k_w x^3}{6P} + \frac{W_T x^2}{2P}$$

This is the equation of Deflection for Second Order Analysis of Chimney at any height 'x'

Now substituting the value of 'y' in equation 2.1

We get,

$$M_x = \left\{ P \left(\left\{ \frac{B \alpha \sin \alpha H + \frac{k_w H^2}{2P} - \frac{W_T H}{P}}{\alpha \cos \alpha H} \sin \alpha x \right\} + \left\{ \left[\frac{-\frac{k_w x}{P} + \frac{W_T}{P}}{\alpha^2 \cos \alpha x} \right] \cos \alpha x \right\} - \frac{k_w x^3}{6P} + \frac{W_T x^2}{2P} \right) \right\} - \frac{W_T x^2}{2} - \frac{k_w x^3}{6}$$

This is the equation of Bending Moment for Second Order Analysis of Chimney at any height 'x'

C. Problem Validation

Description of Loading

Details of the parameters are as follows

1. Height of the chimney - 270 m
2. Outer diameter of bottom - 36.6 m
3. Outer diameter at top - 19.6 m
4. Thickness of shell - 0.8 m
5. Grade of concrete - M25
6. Seismic zone - III

- 7. Basic wind speed - 39 m/sec (for Solapur)
- 8. Foundation type - RCC circular mat
- 9. Density of concrete - 1 kN/m³
- 10. Design life of structure - 100 yrs
- 11. Terrain category - 4
- 12. Probability factor - 1.06
- 13. Topography factor - 1
- 14. Class of structure - Class C

z = Height of any section of the chimney in m measured from the top of foundation

C_D = Drag coefficient of the chimney to be taken as 0.8

d_z = Diameter of chimney at height z in m

∴ Wind load at top of chimney = 21.784kN/m

∴ Wind load at bottom of chimney = 0kN/m

III. RESULTS AND DISCUSSION

A. Dead Load Calculations

Wind Analysis

Along wind loads are caused by the ‘drag’ component of the wind force on the chimney. This is accompanied by ‘gust buffeting’ causing a dynamic response in the direction of the mean flow. In the present analysis the across wind effect which is due to the dynamic response of chimney is neglected. Along wind effect is due to the direct buffeting action, when the wind acts in the face of the structure. For the purpose of estimation if this loads the chimney is modelled to act on the exposed face of the chimney causing predominant moments in the chimney.

Two methods of estimating of wind loads are given in IS 4998 (part 1)

1. Simplified Method
2. Random Response Method

Simplified method will be used for the estimation of wind loads

Simplified Method

The along wind load or the drag force per unit height of the Chimney at any level shall be calculated from the equation:

$$F_z = p_z \cdot C_D \cdot d_z$$

Where,

p_z = Design wind pressure obtained in accordance with IS 875 (Part 3): 1987

Dead load calculations are carried out by Frustum of cone method. Dead loads for each 20 m interval of distance of chimney is calculated by developing a programme in excel. The results for the same are displayed below

TABLE 1

Height(m)	Dead Load (kN)
0	463046.2
20	418695.3
40	376097.1
60	335081.9
80	295649.8
100	257800.7
120	221629
140	186851.8
160	116035
180	122291.7
200	92345.4
220	63982.17
240	37202
260	12004.9
270	0

B. Results By Beam-Column Theory

TABLE 2

Height(m)	BM1(KN.m)	BM2(kN.m)	y(mm)
0	530250.3	530250.3	0
20	471441.4	472337.8	2.141
40	413279	414882.3	4.263
60	356409.7	358818.2	7.188
80	301480	304313.5	9.584

100	249136.6	252225	11.98
120	200025.8	203212	14.376
140	154794.4	157928.3	16.772
160	114088.8	116313	19.168
180	78555.6	81192.7	21.564
200	48841.32	51053.83	23.959
220	25592.53	27278.78	26.355
240	9455.766	10525.36	28.751
260	1077.58	1451.496	31.147
270	0	0	32.345

BM1- First order bending moment
 BM2- Second order bending moment
 y- deflection

C. Validation In STAAD PRO

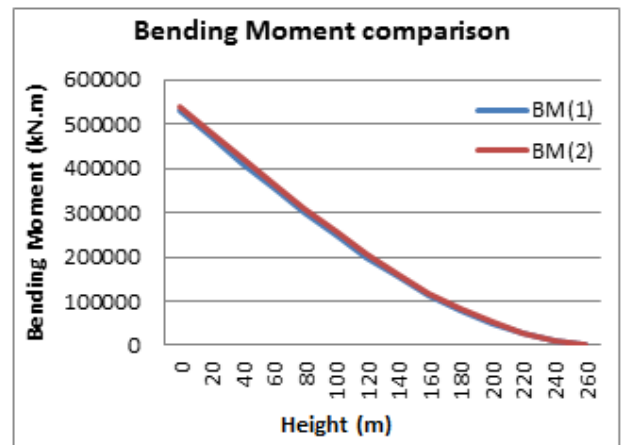
Same problem is now used for validation in software. A column of 270 m is modelled and dead load and wind load is applied. Following results are obtained.

TABLE 3

Height (m)	BM1(kN.m)	BM2(kN.m)	y(mm)
0	529351.2	540370.7	0
20	470642	480845.2	2.396
40	412578.2	421965.2	4.792
60	355805.3	364376.1	7.188
80	300968.8	308723.3	9.584
100	248714.1	255652.3	11.98
120	199686.6	205808.6	14.376
140	154531.9	159837.6	16.772
160	113895.3	118384.8	19.168
180	78422.37	82095.58	21.564
200	48758.48	51615.43	23.959
220	25549.11	27589.8	26.355
240	9439.703	10664.15	28.751
260	1075.722	1483.909	31.147
270	0	0	32.345

BM1- First order bending moment
 BM2- Second order bending moment
 y- Deflection

The results obtained manually by beam-column theory and by Staad pro match. The following graph shows the variation of bending moments manually and in software.



D. Percentage Increase in Second Order Analysis

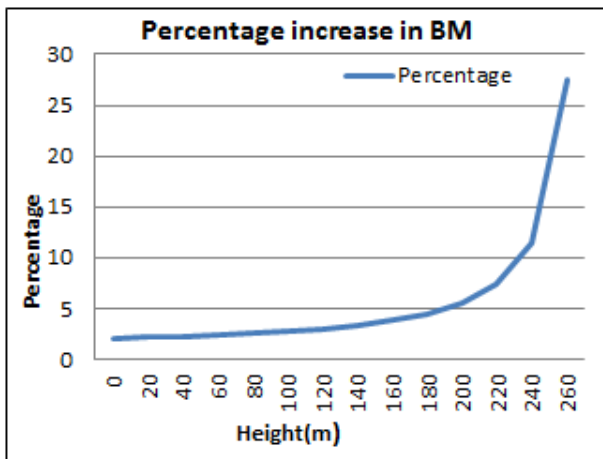
After getting the bending moments manually by beam-column theory and by Staad pro, now we will analyze the percentage increase in bending moment.

TABLE 4

Height (m)	BM1 (kN.m)	BM2 (kN.m)	Percentage increase
0	529351.188	540370.688	2.03924829
20	470641.961	480845.206	2.12193963
40	412578.186	421965.177	2.22458902
60	355805.316	364376.05	2.35216722
80	300968.8	308723.281	2.51179016
100	248714.093	255652.318	2.71393002
120	199686.644	205808.615	2.97459414
140	154531.907	159837.623	3.31944126
160	113895.332	118384.79	3.79225912
180	78422.373	82095.579	4.47430427
200	48758.481	51615.432	5.53507137
220	25549.107	27589.803	7.39655879
240	9439.703	10664.145	11.4818581
260	1075.722	1483.909	27.5075493

BM1- First order bending moment
 BM2- Second order bending moment

The above results are now shown graphically below.



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IV. CONCLUSION

From the analysis carried out manually by using beam-column theory and later by Staad pro it can be concluded that, for the combination of wind load and dead load, the effect of second order increases with increase in height. The graph of percentage increase in bending moment clearly indicated that even when the bending moment went on decreasing with increasing height, the deflection goes on increasing and the percentage of second order effect also goes on increasing.

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VI. BIOGRAPHIES



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A Framework for an Agent Based Computing using Data Mining Technique for Priceless Laptop Scheme of Tamilnadu Government

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ABSTRACT

Predicting the performance (usefulness) of any welfare scheme will be more useful for the government to make decision whether to continue or to drop out the schemes in the future. To attain this objective, the concept of agents and data mining can be used. Data mining techniques are used to discover models or patterns of data and are much helpful in the process of decision making. Intelligent agents represent an important opportunity to optimize knowledge management. The data used for this study is collected, evaluated and analysed by means of agent paradigm along with the clustering techniques of data mining technology.

Keywords: Agent Based Computing, Data Mining, Software Agents, Agent Mining, Clustering.

I. INTRODUCTION

Education in every sense is one of the fundamental factors of development. Education enriches the people's understanding of themselves and of the world. It improves the quality of their lives and leads to broad social benefits to individuals and society. Recognizing the significance of education in the development process and the economic imperative of "Quality of Education for all", the state Government has been encouraging students through various welfare schemes. One of the best schemes of state Government, which improves the technical skills of students', is "Providing free laptops to school and college students". This paper is designed to analyse the usefulness, activities, feel and the suggestions of students regarding the free laptops, based on their data [1]. The clustering technique of data mining technology is used for this study along with the agent paradigm. Detecting the interesting patterns and finding out the appropriate knowledge from the output is also an interesting issue in data mining. This research work addresses this issue with the help of software agents. The software (intelligent) agents help in detecting the clusters automatically. It also assists in viewing the cluster results graphically. Multidimensional visualization is used to view the results in a more meaningful way [2].

1.1 Intelligent Agents and Data Mining

Agents, i.e. special types of software applications, have become increasingly popular in computing world in recent years. Some of the reasons for this popularity are their flexibility, modularity and general applicability to a wide range of problems (data filtering and analysis, information brokering, condition monitoring and alarm generation, workflow management, personal assistance, simulation and gaming) [3].

Because of the explosive development of information source available on the Internet and on the business, government, and scientific databases, it has become quite necessary for the users to utilize automated and intelligent tools to extract knowledge from them [4]. Intelligent agents can help making computer systems easier to use, enable finding and filtering information, customizing views of information and automating work. An Intelligent agent is software that assists people and acts on their behalf. Intelligent agents work by allowing people to delegate work that they could have done to the agent software [2].

On the other hand, data mining is the process of posing queries and extracting useful information, patterns and trends previously unknown from large quantities of data

[5]. Data mining is also a multidisciplinary field, working in areas that include artificial intelligence, machine learning, neural networks, pattern recognition, knowledge-based systems, information retrieval, high performance computing, and data visualization [6].

The concept of knowledge is very important in data mining. In order to get the correct knowledge from the data mining system, the user must define the objective and specify the algorithms and its parameters exactly with minimum effort. If the data mining system produces large number of meaningful information by using a specialized data mining algorithm (association, clustering, decision trees etc.), it will take more time for the end- users to choose the appropriate knowledge for the problem discussed. Even choosing the correct data mining algorithm involves more time for the system. A solution for this problem could be an intelligent system based on agents. Data mining and intelligent agents can make a common front to help people in the decision making process, to elaborate decisional models and take good decision in real time” [3].

1.2 Cluster analysis

Clustering is the process of making a group of abstract objects into classes of similar objects. Cluster is a group of objects that belongs to the same class. In other words, similar objects are grouped in one cluster and dissimilar objects are grouped in another cluster.

- A cluster of data objects can be treated as one group.
- While doing cluster analysis, we first partition the set of data into groups based on data similarity and then assign the labels to the groups.
- The main advantage of clustering over classification is that, it is adaptable to changes and helps single out useful features that distinguish different groups.
- Clustering analysis is broadly used in many applications such as market research, pattern recognition, **data analysis**, and image processing.

1.2.1 Clustering Methods

Clustering methods can be classified into the following categories

- Partitioning Method
- Hierarchical Method

- Density-based Method
- Grid-Based Method
- Model-Based Method
- Constraint-based Method

Of all the above methods, the method used in this research work is density based method.

Density-based Method

This method is based on the notion of density. The basic idea is to continue growing the given cluster as long as the density in the neighbourhood exceeds some threshold, i.e., for each data point within a given cluster, the radius of a given cluster has to contain at least a minimum number of points.

II. LITERATURE REVIEW

Over the past decade, rapid technological advances have sparked interest in utilizing laptops as an instruction tool to improve student learning. As per the article of Deccan chronicle, the survey done by the private company has revealed that eight out of 10 students seemed to be happy with the quality of the free laptop provided by the Tamil Nadu Government. The survey also state that, “free laptops improves technical skills of students”. The Indian higher education system is presently facing several challenges. Various welfare schemes are to be implemented by the state Government and it has to be continued till the people become self-sufficient. The clearest areas in which the laptop program has had a positive impact are in improving computer skills, increasing access to educational resources, boosting student motivation and interest in school/college and enhancing interaction among students and teachers. The quality of the schemes and whether the current products meet the user needs should also determine by the study [1].

The developed automated system gets the input values form the user and chooses the appropriate data mining techniques with required parameters by using intelligent agents [2]. Ayse Yasemin SEYDIM’s [7] explained more on agents, the special types of software applications, has become a very popular paradigm in computing in recent years. The author states that, the agent based studies can be implemented for clustering, classification, and summarization. Some of the reasons where agents are more flexibility, modularity and

general applicability to a wide range of problems. Recent increase in agent-based applications is also because of the technological developments in distributed computing, robotics and the emergence of object-oriented programming paradigms. Advances in distributed computing technologies have given rise to use of agents that can model distributed problem solving.

Vuda Sreenivasa Rao [8] explained communications among the agents with in multi-agent system. According to the author, multi-agent system often deals with complex applications that required to solve the existing problem during data mining process in distributed system with individual and collective behaviors of the agents depends on the observed data from distributed system. Based on this concept, an integration of multi-agent system with data mining is incorporated and it also defines how multiple agents are communicated with respect to specific applications. Declaration of different agents with respect to specific task and communication behavior among agents is considered in this research work to meet the user requirements.

David Meunier and Helene Paugam-Moisy [DH, 9] focused on Girvan & Newman (GN) method which was created by Girvan & Newman to determine the clusters in a given undirected graph, without any restriction on the data size and number of clusters. GN method is based twopass algorithm where the first pass removes the edges with highest edge – betweenness centrality and cluster building in the second pass. Author proposed an another method based on GN method instead of undirected graph to directed graph in the name of arc-linked cluster detection method with neural networks concepts to achieves a narrower and higher modularity peak than GN method. The resultant value is more pertinent optimal set of clusters. The time complexity of Arclinked based is higher than GN method. The concept discussed by these authors is considered in this research work during cluster detection phases after cluster formation to detect the quality of cluster by means of attribute selection from the given database.

Wout Dullaert, Tijs Neutens, Greet Vanden Berghe [WTG, 10] implements an intelligent agent based communication for particular platform. Intelligent agents are used in the form of high potential output such as increase cost efficiency, better service and safety communication among the agents. They are also

autonomous, communicative and intelligent. Author also proposed real-time decision is also possible with the presence of intelligent agent. Agents are used to overcome the quality, reliable service, trust concerns and confidentiality during the exchange process. Agent technology is used for automated transport process. In this research work, intelligent agent-based concept is considered for cluster formation and cluster visualizations.

Nigel Robinson, Mary Shapcott [11] proposed a visualization aids (beyond charts and graphs) by consider virtual data mining environment and data set as liquid data. The author focused was based on limitations of the existing visualization methods and problems faced by the user while visualization. As innovation, the modified visualization result is in the form of 3D game representation so that all users can easy to understand without having domain knowledge. The minimization of user difficulties is taken into account in our research process during visualization. In this paper, automation of the process is not yet considered for result oriented. Because of this, it is difficult to find the results by rare user. From the above procedure, concept of visualization is taken into account as a part of this research work in which an automated data mining system is implemented to sense the user behavior for visualization so as to minimize the difficulties faced by the user during graphical representation of the results.

Dr. Ping Chen, Dr. Chenyi Hu, Dr. Heloise Lynn, and Yves Simon [12] discuss about visualization of high dimensional data which is very important in data analysts due to its visual nature. They also proposed a method to visualize large amount of high dimensional data in a 3-D space by dividing the high dimension data into several groups of lower dimensional data first. Then, different icons are used to represent different groups. A glyph-based technique is used to represent different set of data in the form of various color icons like line, point, polygon, etc. The visualization of high dimensional data using Glyphs – based techniques is considered in this research work for visualization of multi-dimensional data based on user expectation.

III. METHODS AND MATERIAL

As mentioned above, Data mining techniques are used to discover models or patterns of data and are much helpful

in the process of decision making. In the proposed system, the density based clustering technique of data mining model has been used to study the factors related to the usefulness of Priceless Government Laptops scheme. To expertise this process, the role of agents comes into picture. The proposed framework [13] has the following agents...

A. User Interface Agent

The user interface agent interacts with the user in assisting him / her to perform data analysis and data mining activities. The user can provide a general description of the problem at hand in terms of high level goals and objectives, or provide specific details about the data analysis or mining tasks to be performed. [14] Given this, three interesting questions arise.

- What aspects of the user's behaviour are useful to capture?
- What information such behaviour gives us on the actual intentions and preferences of the user?
- Finally, what use can be made of any such information captured?

The user interface agent provides the solution to the above questions in the following way: Based on the user behaviour the productive attributes are mined from user agent by data mining agent where the actual mining process takes place. User interface agent analyses all the information with respect to the user behaviors and transfer the control to data mining agent for further process.

B. Data mining Agent

A data mining agent is a pseudo-intelligent computer program designed to ferret out specific types of data, along with identifying patterns among those data types. These agents are typically used to detect trends in data, alerting organizations to paradigm shifts so effective strategies can be implemented to either take advantage of or minimize the damage from alterations in trends. In addition to reading patterns, data mining agents can also "pull" or "retrieve" relevant data from databases, alerting end-users to the presence of selected information [15].

The data mining agent is responsible for performing the actual data mining activity and generating the results. The specific data mining methods and algorithms are implemented by the data mining agent. It has two major

roles: cluster formation and cluster detection based on the data.

➤ Cluster formation

Cluster formation is defined as grouping of objects that are similar to one another within the same cluster and are dissimilar to the objects with other clusters. Partitioning approach is considered to cluster different types of attributes, numeric and categorical data. Clustering are also done depends upon data set, data size, and data types. Data mining agent will choose the appropriate clustering algorithm for better cluster formations.

➤ Cluster detection

Data mining agent is used here to analyze the formulated clusters quality based on quality parameters. Generally, clustering algorithms will produce clusters, based upon input data. But, all clusters are not good cluster. Intelligent agent in automated system is used to find the good clusters among various clusters.

C. Visualization Agent

To evaluate the effectiveness of visualization techniques, the way in which they assist and complement the data mining process need to be understood. The relationship between data mining and visualization process can be explained with few conditions visualization of data set can be defined as combination of various methods or user priority to an approach of selecting and indicating what patterns should be displayed. It is one of the interesting techniques to establish which patters are better than the one to enhance visualization techniques. Visualization will provides more added advantage to the user for easy understanding and also increases the power of understanding the end results.

The visualization agent is uses to generate various reports based on the cluster results. The visualization might be 1D, 2D or 3D based on the type of cluster nature (numerical or categorical). Generally, major difficult task in data mining is report generation, that to it should be understand able by all the users. Manually it

is possible to create reports but it is hard to justify the report at all times. In this work, visualization agent will coordinate with data mining agent, based on that it will identify suitable visual method for each specific cluster [13].

From these aspects, a framework is developed for data analysis, cluster detection and visualization for better decision making by means of intelligent agent technology. The methodology adopted in this research work is described as follows...

Proposed methodology

- Step 1: Start
- Step 2: Pre-process the data
- Step 3: Design a suitable procedure for intelligent agents to analyze the data
- Step 4: Selection of appropriate clustering technique
- Step 5: Selection of appropriate visualization tool
- Step 6: Multi-dimensional visualization of results
- Step 7: Stop

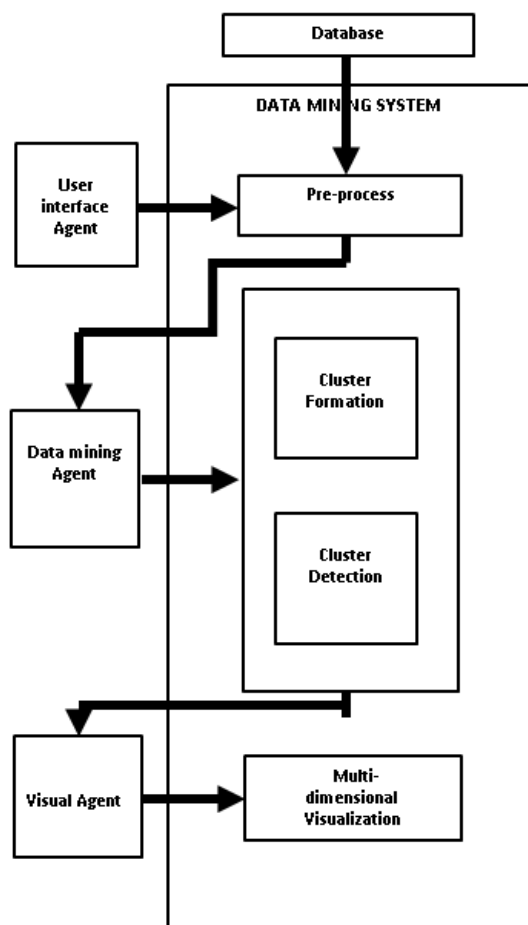


Figure 1: Proposed framework for agent based computing using data mining technique

The newly developed framework is represented diagrammatically is shown in Figure 4.1. From this framework, it is clear that the data mining system gets the data from the database for its processing.

Apart from getting data from the given database, it also gets the user specifications through the user interface agent. The data mining agent chooses the appropriate algorithm for the pre-processed data received from the user interface agent. The algorithm used here is the density based clustering algorithm. The data mining agent is responsible for the cluster formation and detection for the datasets available. Once the selection of appropriate clustering algorithm is over, the next step is to select the suitable visualization tool. The visualization agent is responsible for displaying the results in an easy understandable format, which can be used to portray the exact results of the survey. The intelligent agents are used in automated process of attribute selection, ranking process, cluster formation, cluster detection and visualization.

The user interface agent is responsible for receiving user specifications and delivering results to the data mining agent. The data mining agent mine the result based on the parameters given by user interface agent to perform cluster formation and cluster detection. Clustering algorithms are used to formulate a new cluster, based on the user interface agent with respect to specific user profile. Then cluster detection techniques are used to detect the cluster quality for further process. The quality of cluster is identified by various parameters with help of intelligent agent. As result, the best cluster will be discovered from the known knowledge. The visual agent is used to visualize the identified cluster depends on the nature of data within the detected cluster. After completion of cluster formation and cluster detection, it transfers the result to decision system where the visual agent find suitable representation tools based on the cluster nature. Finally, the end result is visualized in terms of 1D, 2D or 3D by visual agent. Thus, the entire process is monitored as well as executed by automated intelligent system based on the user profile. This makes the less domain knowledge users more convenient and understands ability.

In this research work different types of agents are used to perform the operations on behalf of user so that, the data mining result will be productive and knowledgeable

for less domain knowledge user. Agents used in this framework are for reliable communication, cooperation among the agents, and finally coordination among the other agents within the system to perform some specific tasks [13].

4.1 Database considered

Education acts an integrative force in society, imparting values that posters social position and national identity. Recognizing the importance of education the state Government has placed an unprecedented focus in expansion of education, significantly improving the quality of education imparted and ensuring that educational opportunities are available to all segments of the society [1]. To enhance the knowledge of students, the scheme of free laptops is introduced. So far, various surveys are conducted in various departments such as commerce and economics to analyze the quality of this scheme. Implementing this in the field of computer science is the first of its kind. The concept of data mining is used to perform this analysis. WEKA 3.7, one of the prominent tools of data mining is used for this study. It provides a collection of machine learning algorithms for data mining tasks. WEKA contains tools for data pre-processing, classification, association and clustering rules and visualization. The DBSCAN algorithm of clustering technique is used to carry out the study.

To perform the analysis the test data was collected from Dr. Ambedkar Government Arts College, Chennai from various courses. All students of all the departments are encouraged to participate in the survey. At least two percent of all the classes are covered. Nearly 500 students are participated in the survey. Out of these participants 53% are male students and 47% are female students. It contains nearly 27 attributes of various data types. Some of the attributes are as follows: NAME, GENDER, CLASS, AVAIL_BF_LAP, POSSESSION, USG_PURPOSE, SUGGESTION, DURATION, STUDENTS_FEEL, ADD_FEATURES etc.

IV. RESULTS AND DISCUSSION

There were nearly 28 attributes were analyzed. Some of the important findings of this study are presented below...

A. Specific purpose of usage

The specific purpose of using laptops by the students are classified as follows: 19% of the students use their laptop as study material, 16% use them for playing games, a single percent use for hearing songs and 10% uses them to watch movies and the major category, 54% of them use them for all the activities they are like to do such as playing games, watching movies, hearing songs, taking study materials etc.

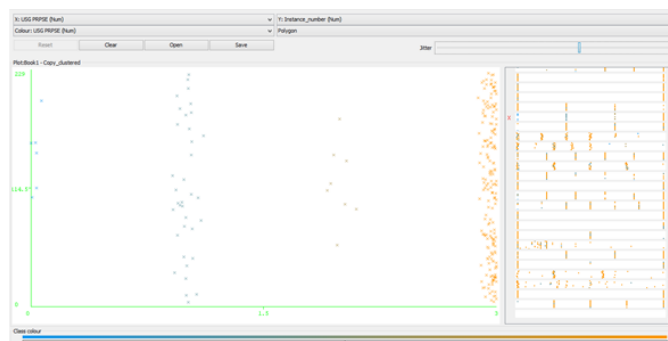


Figure 2: Specific purpose of usage

B. Students' Feel

The survey included an open ended question asking students about their feel when they carry laptop with them. Few more questions are also raised to understand the pulse of the students. First their opinion about giving laptop to students other than computer science students is questioned. 86% of them feel it is useful, 13% reported that they have no idea and the balance 1% feels it is not needed.

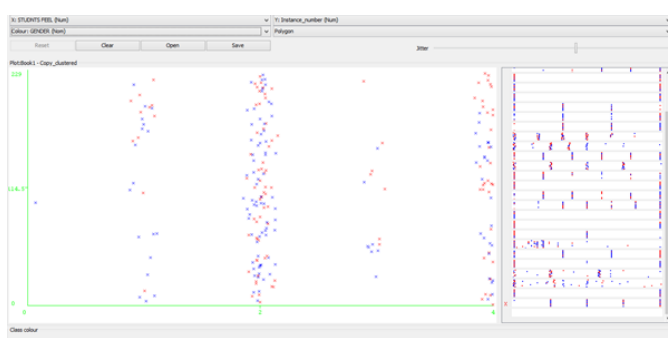


Figure 3: Students' Feel

Next the likeness about selling their laptop is analyzed. 60% of the survey respondents reported they don't like to sell their laptop. Third the students are asked whether the laptop has become an essential part of their life. Hopefully, 71% of them reported as it is essential. Now considering the feel 69% of the students feel proud and

happy with the Priceless Government laptop scheme provided by the Government of Tamil Nadu.

C. Suggestions

Students' stated many suggestions regarding the model of the laptop. The major category 77% of the students reported that they don't have any suggestions in improving the model. The next set of students suggested to provide the laptop with CD- drive and the touch model (each 5%). The rest of the students made various other suggestions. The suggestions made by them are visualized in the form of clusters as follows...



Figure 4: Suggestions provided by the students

V. CONCLUSION

Data mining is the procedure of mining knowledge from data, which can be widely used in the process of decision making. An agent is a computer system located in some environment, and is capable of autonomous action in this environment to meet its design objectives. Multi agent systems are systems made up of multiple interacting agents. In this research work, the mining process is carried out by different intelligent agents with the help of the data collected. The results are analyzed, evaluated and visualized by forming and detecting the clusters using user interface, data mining and visualization agents.

The major aim of this research work is to predict the usefulness of Priceless Government laptop scheme of Tamil Nadu. This study finds that there is convincing evidence that the laptop program has contributed much to improvement of students' performance. The laptops have given to Government / Government aided school and college students, who are basically from a poor family. So, it is a gift for those who cannot afford the price of owning laptops. The laptop provided by the

Government is not only useful for that one particular person but also to the whole family, either the sister or brother of him/her can make use of that laptop for their school projects and also for their further studies. It improves the technical skills of both school and college students. Though it has certain disadvantages (distraction of students in the classroom, using laptop for non-academic purposes more than academic activities like playing games and watching movies), the scheme's objective of enhancing students' knowledge is achieved. As per as our survey, we analyzed that the issue of Priceless Government laptop scheme is truly a boon to all students.

VI. FUTURE WORK

The future scope of this work is to carry out the analysis by using various other suitable methods and by using other data mining techniques. This model can be extended by implementing the proposed agent based computing framework using the various agent tools available. Its scope for future work can also be extended in the part of gathering data by increasing the number of instances from different colleges.

The data collected in this work is collected from the students' point of view and this can be extended by collecting data from teachers' and parents' point of view. This research work focussed only on the scheme implemented in Tamil Nadu. This can be extended by making comparative study between laptops issued by different state governments.

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Intrusion Detection Techniques in Mobile Adhoc Networks Simulators from Attackers

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ABSTRACT

Several Intrusion Detection Techniques (IDTs) projected for mobile unexpected networks suppose every node passively watching the info forwarding by its next hop. This paper presents quantitative evaluations of false positives and their impact on watching based mostly intrusion detection for unexpected networks. Experimental results show that, even for a straightforward three-node configuration, associate actual adhoc network suffers from high false positives; these results area unit valid by mathematician and probabilistic models. However, this false positive downside can't be determined by simulating constant network mistreatment common unexpected network simulators, like ns-2, OPNET or Glomosim. To remedy this, a probabilistic noise generator model is enforced within the Glomosim machine. With this revised noise model, the simulated network exhibits the combination false positive behavior just like that of the experimental testbed. Simulations of larger (50-node) unexpected networks indicate that monitoring-based intrusion detection has terribly high false positives. These false positives will scale back the network performance or increase the overhead. in a very easy monitoring-based system wherever no secondary and additional correct strategies area unit used, the false positives impact the network performance in 2 ways: reduced turnout in traditional networks while not attackers and inability to mitigate the impact of attacks in networks with attackers.

Keywords: Intrusion detection techniques, mobile unexpected networks, Adhoc network simulators, OPNET, Attackers.

I. INTRODUCTION

A wireless ad-hoc network may be a redistributed style of wireless network. The network is impromptu as a result of it doesn't consider a preceding infrastructure, like routers in wired networks or access points in managed (infrastructure) wireless networks. Instead, every node participates in routing by forwarding information for different nodes, and then the determination of those nodes forward information is formed dynamically supported the network property. Additionally to the classic routing, impromptu networks will use flooding for forwarding the information. An impromptu network generally refers to any set of networks wherever all devices have equal standing on a network and are absolute to go with the other ad hoc network devices in link vary. Very often, impromptu network refers to a mode of operation of IEEE 802.11 wireless networks.

1.1 Wireless Ad-hoc Network

It additionally refers to a network device's ability to take care of link standing data for any variety of devices in an exceedingly one link "hop" vary, and therefore this is often most frequently a Layer two activity. As a result of this is often solely a Layer two activities, impromptu networks alone might not support a routable information science network surroundings while not further Layer two or Layer three capabilities. The earliest wireless ad-hoc networks were the "packet radio" networks (PRNETs) from the Seventies, sponsored by government agency when the ALOHA net project.

1.1.1 Application

The redistributed nature of wireless ad-hoc networks makes them appropriate for a range of applications wherever central nodes cannot be relied on, and will improve the quantifiability of wireless ad-hoc networks

compared to wireless managed networks, although theoretical and sensible limits to the capability of such networks are known.

Minimal configuration and fast preparation build impromptu networks appropriate for emergency things like natural disasters or military conflicts. The presence of dynamic and adaptive routing protocols allows ad-hoc networks to be shaped quickly.

1.1.2 Technical needs

An ad-hoc network is formed from multiple “nodes” connected by “links”.

Links are influenced by the node's resources (e.g. transmitter power, computing power and memory) and by activity properties (e.g. dependableness), furthermore as by link properties (e.g. length-of-link and signal loss, interference and noise). Since links may be connected or disconnected at any time, a functioning network should be ready to deal with this dynamic restructuring, ideally in an exceedingly method that's timely, efficient, reliable, and sturdy and ascendible. The network should permit any 2 nodes to speak, by relaying the knowledge via different nodes. A “path” may be a series of links that connects 2 nodes. Varied routing strategies use one or 2 methods between any 2 nodes; flooding strategies use all or most of the out there methods.

1.1.3 Medium Access management

In most wireless impromptu networks, the nodes vie for access to shared wireless medium, typically leading to collisions (interference). Victimisation cooperative wireless communications improves immunity to interference by having the destination node mix self-interference and other-node interference to boost cryptography of the specified signal.

1.1.4 Four AND impromptu Networking

A major goal toward the 4G Wireless evolution is that the providing of pervasive computing environments which will seamlessly and ubiquitously support users in accomplishing their tasks, in accessing data or act with different users at anytime, anywhere, and from any device. During these surroundings, computers get pushed any into background; computing power and network property are embedded in just about each device to bring computation to users, notwithstanding wherever there, or beneath what circumstances they

work. These devices change themselves in our presence to find the knowledge or code we want. The new trend is to assist users within the tasks of daily life by exploiting technologies and infrastructures hidden within the surroundings, while not requiring any major amendment within the users behavior. This new philosophy is that the basis of the close Intelligence idea. The target of close intelligence is that the integration of digital devices and networks into the everyday surroundings, rendering accessible, through simple and “natural” interactions, a large number of services and applications. Close intelligence places the user at the middle of the knowledge society. This read heavily depends on 4G wireless and mobile communications. 4G is all regarding associate integrated, world network, supported associate open systems approach. Group action different kinds of wireless networks with wire-line backbone network seamlessly, and convergence of voice, multimedia system and information track over one IP-based core network are the most foci of 4G. With the supply of ultra-high information measure of up to one hundred Mbps, multimedia system services may be supported efficiently; present computing is enabled with increased system quality and movableness support, and location-based services are all expected. Network Integration 4G networks are touted as hybrid broadband networks that integrate different network topologies and platforms. The overlapping of different network boundaries represents the mixing of different kinds of networks in 4G. There are 2 levels of integration. 1st is that the integration of heterogeneous wireless networks with variable transmission characteristics like Wireless computer network, WAN, PAN, furthermore as mobile impromptu networks. At the second level we have a tendency to find the mixing of wireless networks with the fixed network backbone infrastructure, the net, and PSTN. Abundant work remains to modify a seamless integration, as an example which will extend information science to support mobile network devices. All information science Networks 4G starts with the belief that future networks are going to be entirely packet-switched, victimisation protocols evolved from those in use in today's net. Associate all IP-based 4G wireless network has intrinsic blessings over its predecessors. Information science is compatible with, and freelance of, the particular radio access technology, this suggests that the core 4G network may be designed and evolves severally from access networks. Victimisation IP based core network additionally

suggests that the immediate sound of the made protocol suites and services already out there, as an example, voice and information convergence, may be supported by victimisation promptly out there VoIP set of protocols like MEGACOP, MGCP, SIP, H.323, SCTP, etc. Finally the converged all-IP wireless core networks are going to be packet primarily based and support packetized voice and multimedia system on high of knowledge. This evolution is predicted to greatly modify the network and to cut back prices for maintaining separate networks, for different traffic varieties.

1.1.5 Classification

Wireless impromptu networks may be any classified by their application:

- a) Mobile ad-hoc networks (MANET)
- b) Wireless mesh networks (WMN)
- c) Wireless sensing element networks (WSN)

Non-infrastructure-based painter are expected to become a vital a part of the 4G design. a commercial hoc mobile network may be a transient network shaped dynamically by a group of (arbitrarily located) wireless mobile nodes while not the employment of existing network infrastructure, or centralized administration. Imprompt networks are created, as an example, once a gaggle of individuals move, and use wireless communications for a few computer-based cooperative activities; this is often additionally spoken as spontaneous networking.

1.2 MANETS

1.2.1 Regarding MANETS

A mobile ad-hoc network (MANET) may be a self-configuring infrastructure less network of mobile devices connected by wireless. Impromptu is Latin and suggests that "for this purpose". Each device in an exceedingly painter is absolve to move severally in any direction, and can so amendment its links to different devices oftentimes. Everything should forward traffic unrelated to its own use, and thus be a router. The first challenge in building a painter is militarization every device to unceasingly maintain the knowledge needed to properly route traffic. Such networks might operate by themselves or could also be connected to the larger net. MANETs are a form of wireless impromptu networks that sometimes encompasses routable networking surroundings on high of a Link Layer impromptu network. The growth of laptops and 802.11/Wi-Fi

wireless networking has created MANETs a preferred analysis topic since the middle Nineteen Nineties. Several tutorial papers judge protocols and their skills, forward variable degrees of quality among a finite area, typically with all nodes among many hops of every different. Completely different protocols square {measure} then evaluated supported measure like the packet drop rate, the overhead introduced by the routing protocol, end-to-end packet delays, network output etc. In the next generation of wireless communication systems, there'll be a desire for the fast preparation of freelance mobile users. Vital examples embrace establishing survivable, efficient, dynamic communication for emergency/rescue operations, disaster relief efforts, and military networks. Such network situations cannot consider centralized and arranged property, and might be planned as applications of Mobile impromptu Networks. A painter is associate autonomous assortment of mobile users that communicate over comparatively information measure forced wireless links. Since the nodes are mobile, the constellation might amendment apace and erratically over time. The network is redistributed, wherever all network activity together with discovering the topology and delivering messages should be dead by the nodes themselves, i.e., routing practicality are going to be incorporated into mobile nodes.

The set of applications for MANETs is numerous; starting from tiny, static networks that are forced by power sources, to large-scale, mobile, extremely dynamic networks. The planning of network protocols for these networks may be a advanced issue. In spite of the appliance, MANETs would like economical distributed algorithms to see network organization, link programming, and routing. However, determinant viable routing methods and delivering messages in exceedingly redistributed surroundings wherever constellation fluctuates isn't a well-defined downside. Whereas the shortest path (based on a given value function) from a supply to a destination in an exceedingly static network is typically the optimum route, this idea isn't simply extended to MANETs. Factors like variable wireless link quality, propagation path loss, fading, multiuser interference, power spent, and topological changes, become relevant problems. The network ought to be ready to adaptively alter the routing methods to alleviate any of those effects. Moreover, in exceedingly military surroundings, preservation of security, latency,

reliability, intentional ECM, and recovery from failure are vital issues. Military networks are designed to take care of a coffee likelihood of intercept and/or a coffee likelihood of detection. Hence, nodes favour to radiate as very little power as necessary and transmit as sometimes as doable, therefore decreasing the likelihood of detection or interception. A lapse in any of those needs might degrade the performance and irresponsibility of the network. A mobile impromptu network (MANET) may be an assortment of wireless devices occupation on the face of it random directions and act with each other while not the help of a long time infrastructure. To increase the reachability of a node, the opposite nodes within the network act as routers. Thus, the communication could also be via multiple intermediate nodes between supply and destination. Since MANETs may be found out simply and inexpensively, they need a good vary of applications, particularly in military operations and emergency and disaster relief efforts. In a MANET, the user's mobile devices are the network, and that they should hand and glove give the practicality typically provided by the network infrastructure (e.g., routers, switches, servers). In a MANET, no infrastructure is needed to modify data exchange among user's mobile devices. We are able to ideate these devices as associate evolution of current mobile phones, and rising

PDA's equipped with wireless interfaces. The sole external resource required for his or her triple-crown operation is that the information measure, typically the (unlicensed) philosophical system band. Near terminals will communicate directly by exploiting, as an example, wireless computer network technologies. Devices that don't seem to be directly connected, communicate by forwarding their traffic via a sequence of intermediate devices. MANETs are gaining momentum as a result of the assist realizing network services for mobile users in areas with no pre-existing communications infrastructure, or once the employment of such infrastructure needs wireless extension. impromptu nodes can even be connected to a fixed backbone network through a fanatical entranceway device facultative information science networking services within the areas wherever net services don't seem to be out there attributable to a scarcity of preinstalled infrastructure of these blessings build impromptu networking a pretty possibility in future wireless networks. Historically, mobile impromptu networks

have primarily been used for plan of action network connected applications to boost battlefield communications/survivability. The dynamic nature of military operations implies that military cannot consider access to a fixed pre-placed communication infrastructure in battlefield. Pure wireless communication additionally has limitation in this radio signals are subject to interference and frequency beyond one hundred megacycle per second seldom propagate on the far side line of sight (LOS). Mobile impromptu network creates an acceptable framework to deal with these problems by providing a multi-hop wireless network while not pre-placed infrastructure and property on the far side LOS. Early impromptu networking applications may be derived back to the government agency Packet Radio Network (PRNet) project in 1972, that was primarily impressed by the efficiency of the packet shift technology, like information measure sharing and store and-forward routing, and its doable application in mobile wireless surroundings. PRNet options a distributed design consisting of network of broadcast radios with stripped-down central control; a mix of acknowledgement and CSMA channel access protocols are wont to support the dynamic sharing of the printed radio channel. additionally, by victimisation multi-hop store-and-forward routing techniques, the radio coverage limitation is removed, that effectively allows multi-user communication among a awfully giant region. Survivable Radio Networks (SURAN) were developed by government agency in 1983 to deal with main problems in PRNet, within the areas of network quantifiability, security, process capability and energy management. The most objectives were to develop network algorithms to support a network which will scale to tens of thousands of nodes and stand up to security attacks, furthermore as use tiny, low-cost, low-power radios that might support refined packet radio protocols. This effort ends up in the planning of low-priced Packet Radio (LPR) technology in 1987, that options a digitally controlled DS spread-spectrum radio with associate integrated Intel 8086 microprocessor-based packet switch. Additionally, a family of advanced network management protocols was developed and hierarchic constellation supported dynamic bunch is employed to support network quantifiability. Different enhancements in radio ability, security, and magnified capability are achieved through management of spreading keys. Towards late Nineteen Eighties and early Nineteen Nineties, the expansion of the net

infrastructure and also the PC revolution created the initial packet radio network concepts additional applicable and possible. To leverage the world data infrastructure into the mobile wireless surroundings, United States Department of Defense initiated government agency world Mobile (GloMo) data Systems program in 1994, which aimed to support Ethernet-type multimedia system property anytime, anyplace among wireless devices. many networking styles were explored; as an example Wireless net Gateways (WINGs) at UCSC deploys a flat peer-to-peer spec, whereas multimedia system Mobile Wireless Network (MMWN) project from GTE Internetworking uses a hierarchic spec that's supported bunch techniques. Tactical net (TI) enforced by regular army at 1997 is far and away the largest-scale implementation of mobile wireless multi-hop packet radio network [97]. Direct-sequence spread-spectrum, time division multiple access radio is employed with information rates within the tens of kilobits per second ranges, whereas modified business net protocols are used for networking among nodes. It reinforces the perception that business wireline protocols weren't smart at handling topology changes, furthermore as low rate, and high bit error rate wireless links. In 1999, Extending the Littoral Battle-space Advanced idea Technology Demonstration (ELB ACTD) was associate other painter preparation exploration to demonstrate the practicableness of naval unit war fighting ideas that need over the-horizon (OTH) communications from ships embarrassed to Marines toward land via an aerial relay. More or less twenty nodes were configured for the network; Lucent WaveLAN and VRC-99A were wont to build the access and backbone network connections. The ELB ACTD was triple-crown in demonstrating the employment of aerial relays for connecting users on the far side LOS. within the middle of 1990, with the definition of standards (e.g., IEEE 802.11), business radio technologies have begun to look on the market, and also the wireless analysis community became tuned in to the good business potential and blessings of mobile impromptu networking outside the military domain. Most of the present impromptu networks outside the military arena are developed within the tutorial surroundings, however recently commercially directed solutions began to seem.

1.2.2 Security problems In MANETS

In recent years mobile impromptu networks (MANETs) have received tremendous attention owing to their self-configuration and self-maintenance capabilities. Whereas early attempt assumed a friendly and cooperative surroundings and targeted on issues like wireless channel access and multihop routing, security has become a primary concern so as to produce protected communication between nodes in an exceedingly doubtless hostile surroundings. Though security has long been a vigorous analysis topic in wireline networks, the distinctive characteristics of MANETs gift a brand new set of nontrivial challenges to security style. These challenges embrace open spec, shared wireless medium, tight resource constraints, and extremely dynamic constellation. Consequently, the present security solutions for wired networks don't directly apply to the painter domain. The final word goal of the safety solutions for MANETs is to produce security services, like authentication, confidentiality, integrity, anonymity, and availableness, to mobile users. So as to realize this goal, the safety resolution ought to give complete protection spanning the whole protocol stack. Table one describes the safety problems in every layer. One distinctive feature of MANETs from the safety style perspective is that the lack of a transparent line of defense. Not like wired networks that have dedicated routers, every mobile node in a commercial hoc network might operate as a router and forward packets for different peer nodes. The wireless channel is accessible to each legitimate network users and malicious attackers. There's no well outlined place wherever traffic observation or access management mechanisms may be deployed. As a result, the boundary that separates the within network from the surface world becomes blurred. On the opposite hand, the present impromptu routing protocols, like impromptu On Demand Distance Vector (AODV) and Dynamic supply Routing (DSR), and wireless macintosh protocols, like 802.11, generally assume trustworthy and cooperative surroundings. As a result, a malicious wrongdoer will promptly become a router and disrupt network operations by design disobeying the protocol specifications. There are essentially 2 approaches to protective MANETs: proactive and reactive. The proactive approach attempts associate attempts to stop a wrongdoer from launching attacks within the 1st place, generally through varied science techniques. In

distinction, the reactive approach seeks to sight security threats a posteriori and react consequently. Attributable to the absence of a transparent line of defense, an entire security resolution for MANETs ought to integrate each approach and embrace all 3 components: hindrance, detection, and reaction. As an example, the proactive approach may be wont to make sure the correctness of routing states, whereas the reactive approach may be wont to shield packet forwarding operations. As argued in, security may be a chain, and it's solely as secure because the weakest link. Missing one part might considerably degrade the strength of the security resolution. Security ne'er comes for free of charge. Once additional security measures are introduced into the network, in parallel with the improved security strength is that the ever-increasing computation, communication, and management overhead. Consequently, network performance, in terms of quantifiability, service availableness, robustness, and then on of the safety solutions, becomes a vital concern in an exceedingly resource-constrained impromptu network. Whereas several modern proposals target the safety vigor of their solutions from the science point of view, they leave the network performance side for the most part unaddressed. In fact, each dimensions of security strength and network performance are equally vital, and achieving a decent trade-off between 2 extremes is one elementary challenge in security style for MANETs.

Layer Security Issues

Application Layer - Detecting and preventing viruses, worms, malicious codes, and application abuses

Transport Layer - Authenticating and securing end-to-end communications through data encryption

Network Layer - Protecting the ad hoc routing and forwarding protocols

Link Layer - Protecting the wireless MAC protocol and providing link-layer security support

Physical Layer - Preventing signal jamming denial-of-service attacks

In this section, we consider a fundamental security problem in MANET: the protection of its basic functionality to deliver data bits from one node to

another. In other words, we seek to protect the network connectivity between mobile nodes over potentially multihop wireless channels, which is the basis to support any network security services. Multihop connectivity is provided in MANETs through two steps:

(1) Ensuring one-hop connectivity through link-layer protocols (e.g., wireless medium access control, MAC); and

(2) Extending connectivity to multiple hops through network layer routing and data forwarding protocols (e.g., ad hoc routing).

1.2.3 Attacks

A painter provides network property between mobile nodes over doubtless multihop wireless channels principally through link-layer protocols that guarantee one-hop property, and network-layer protocols that reach the property. To multiple hops these distributed protocols generally assume that each one node is cooperative within the coordination method. This assumption is sadly not true in exceedingly hostile surroundings. Because cooperation is assumed however not enforced in MANETs, malicious attackers will simply disrupt network operations by violating protocol specifications. The most network-layer operations in MANETs are impromptu routing and information packet forwarding that move with one another and fulfill the practicality of delivering packets from the supply to the destination. The impromptu routing protocols exchange routing messages between nodes and maintain routing states at every node consequently. Supported the routing states, information packets are forwarded by intermediate nodes on a long time route to the destination still, each routing and packet forwarding operations are susceptible to malicious attacks, resulting in varied kinds of malfunction within the network layer. Whereas a comprehensive enumeration of the attacks is out of our scope, such network-layer vulnerabilities typically make up one among 2 categories: routing attacks and packet forwarding attacks supported the target operation of the attacks. The family of routing attacks refers to any action of advertising routing updates that doesn't follow the specifications of the routing protocol. The particular attack behaviours are associated with the routing protocol employed by the painter. As an example, within the context of DSR, the

wrongdoer might modify the supply route listed within the RREQ or RREP packets by deleting a node from the list shift the order of nodes within the list, or appending a brand new node into the list. Once distance-vector routing protocols like AODV are used, the wrongdoer might advertise a route with a smaller distance metric than its actual distance to the destination, or advertise routing updates with an oversized sequence number and invalidate all the routing updates from different nodes. By assaulting the routing protocols, the attackers will attract traffic toward bound destinations within the nodes beneath their management, and cause the packets to be forwarded on a route that's not optimum or perhaps non-existent. The attackers will produce routing loops within the network, and introduce severe network congestion and channel rivalry in bound areas. Multiple colluding attackers might even stop a supply node from finding any route to the destination, and partition the network within the worst case. There are still active analysis efforts in distinctive and defeating additional refined and refined routing attacks. as an example, the wrongdoer might any subvert existing nodes within the network, or fabricate its identity and impersonate another legitimate node. A try of wrongdoer nodes might produce a hole and cut off the conventional flows between one another. Within the context of on-demand impromptu routing protocols, the attackers might target the route maintenance method associated advertise that an operational link is broken. Additionally to routing attacks, the person might launch attacks against packet forwarding operations furthermore. Such attacks don't disrupt the routing protocol and poison the routing states at every node. Instead, they cause the information packets to be delivered in an exceedingly method that's by design inconsistent with the routing states. as an example, the wrongdoer on a long time route might drop the packets, modify the content of the packets, or duplicate the packets it's already forwarded. Another style of packet forwarding attack is that the denial-of-service (DoS) attack via network-layer packet blasting, within which the wrongdoer injects an oversized quantity of junk packets into the network. These packets waste a big portion of the network resources, and introduce severe wireless channel rivalry and network congestion within the painter. Recent analysis efforts have additionally known the vulnerabilities of the link-layer protocols, particularly the actual normal IEEE 802.11 macintosh protocol [3], for MANETs. it's documented that 802.11 WEP is susceptible to many

kinds of cryptography attacks attributable to the misuse of the science primitives . The 802.11 protocol is additionally susceptible to DoS attacks targeting its channel rivalry and reservation schemes. The wrongdoer might exploit its binary exponential back off theme to deny access to the wireless channel from its native neighbours. As a result of the last winner is often favoured among native competitive nodes, a unceasingly transmission node will perpetually capture the channel and cause different nodes to backpedal endlessly. Moreover, back offs at the link layer will incur a sequence reaction in higher layer protocols victimisation back off schemes (e.g., TCP's window management). Another vulnerability of 802.11 comes from the NAV field carried within the request to send/clear to send (RTS/CTS) frames that indicates the period of channel reservation. Associate adversarial neighbour of either the sender or the receiver might catch the NAV data then by design introduce a 1-bit error into the victim's link-layer frame by wireless interference. The corrupted frame should be discarded by the receiver when error detection. This effectively constitutes another style of DoS attack.

1.2.4 Challenges

One elementary vulnerability of MANETs comes from their open peer-to-peer design. not like wired networks that have dedicated routers, every mobile node in a commercial hoc network might operate as a router and forward packets for different nodes. The wireless channel is accessible to each legitimate network users and malicious attackers. As a result, there's no clear line of defense in MANETs from the safety style perspective. The boundary that separates the within network from the surface world becomes blurred. There's no we have a tendency toll outlined place/infrastructure wherever we might deploy one security resolution. Moreover, transportable devices, furthermore because the system security data they store, are susceptible to compromises or physical capture, specially low-end devices with weak protection. Attackers might sneak into the network through these subverted nodes, that create the weakest link and incur a effect of security breaches within the system. The tight resource constraints in MANETs represent another nontrivial challenge to security style. The wireless channel is bandwidth-constrained and shared among multiple networking entities. The computation capability of a mobile node is additionally

forced. As an example, some low-end devices, like PDAs, will hardly perform computation-intensive tasks like uneven science computation. as a result of mobile devices are generally battery-powered by batteries, they'll have terribly restricted energy resources. The wireless medium and node quality poses much more dynamics in MANETs compared to the wireline networks. The constellation is extremely dynamic as nodes oftentimes be a part of or leave the network, and ramble within the network on their own can. The wireless channel is additionally subject to interferences and errors, exhibiting volatile characteristics in terms of information measure and delay. Despite such dynamics, mobile users might request for anytime, anyplace security services as they move from one place to a different. The on top of characteristics of MANETs clearly builds a case for building multifence security solutions that bring home the bacon each broad protection and fascinating network performance. First, the safety resolution ought to unfold across several individual elements and consider their collective protection power to secure the whole network. The safety theme adopted by every device should work among its own resource limitations in terms of computation capability, memory, communication capability, and energy offer. Second, the safety resolution ought to span completely different layers of the protocol stack, with every layer causative to a line of defense. No single-layer resolution is feasible to thwart all potential attacks. Third, the safety resolution ought to thwart threats from each outsider World Health Organization launch attacks on the wireless channel and constellation, and insiders World Health Organization sneak into the system through compromised devices and gain access to bound system information. Fourth, the safety resolution ought to embrace all 3 elements of hindrance, detection, and reaction, that job together to protect the system from collapse. Last however not least, the safety resolution ought to be sensible and cheap in an exceedingly extremely dynamic and resource forced networking state of affairs. Intrusion detection systems (IDSs), that commit to sight associated mitigate an attack when it's launched, are vital to painter security. Many monitoring-based intrusion detection techniques (IDTs) are planned in literature and System architecture in fig 1.

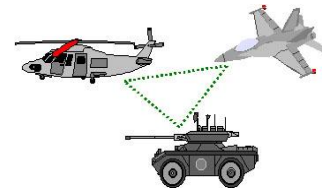
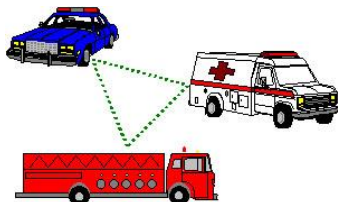


Figure 1: Mobile Ad-hoc Network Example

Existing System

In the existing work we've used several monitoring-based intrusion detection techniques proposed in literature rely on each node passively monitoring the data forwarding by its next hop to mitigate packet dropping attacks by insider nodes. Though monitoring-based intrusion detection is not likely to be accurate for ad hoc networks due to varying noise levels ,Varying signal propagation characteristics in different directions, and interference from competing transmissions, there are no specific studies on the impact of noise on false positives and the impact of false positives on network Performance.

Problem Statement

We proposed quantitative evaluations of false positives in monitoring-based intrusion detection for Ad hoc networks. We showed that, even for a simple three-node configuration, an actual ad hoc network suffers from high false positives. We validated the experimental results using discrete-time Markov chains and probabilistic analysis. However, this problem of false positives cannot be observed by simulating the same three node network using popular ad hoc network simulators such as ns-2 with mobility extensions, OPNET or Glomosim, because they do not simulate the noise seen in actual network environments.

Objective of the Problem Statement

1. Intrusion detection in heterogeneous WSNs by characterizing intrusion detection with respect to the network parameters
2. Two detection models

II. METHODS AND MATERIAL

1. In this we are going to connect the network .Each node is connected the neighbouring node and it is independently deployed in network area. And also deploy the each port no is authorized in a node.
2. In this browse and select the source file. And selected data is converted into fixed size of

packets. And the packet is send from source to detector.

3. The intrusion detection is defined as a mechanism for a WSN to detect the existence of inappropriate, incorrect, or anomalous moving attackers. In this module check whether the path is authorized or unauthorized. If path is authorized the packet is send to valid destination. Otherwise the packet will be deleted. According port no only we are going to find the path is authorized or Unauthorized.
4. If the packet is received from other than the port no it will be filtered and discarded. This filter only removes the unauthorized packets and authorized packets send to destination.
5. In this module, after filtering the invalid packets all the valid Packets will reach the destination.

The objective of this paper was to demonstrate our BPCS-Steganography, which is based on a property of the human visual system. The most important point for this technique is that humans cannot see any information in the bit-planes of a colour image if it is very complex. We have discussed the following points and showed our experiments.

1. We can categorize the bit-planes of a natural image as informative areas and noise-like areas by the complexity thresholding.
2. Humans see informative information only in a very simple binary pattern.
3. We can replace complex regions with secret information in the bit-planes of a natural image without changing the image quality. This leads to our BPCS-Steganography.
4. Gray coding provides a better means of identifying which regions of the higher bit planes can be embedded.
5. A BPCS-Steganography program can be customized for each user. Thus it guarantees secret Internet communication. We are very convinced that this steganography is a very strong information security technique, especially when combined with encrypted embedded data.

Furthermore, it can be applied to areas other than secret communication. Future research will include the application to vessels other than 24-bit images, identifying and formalizing the customization parameters, and developing new applications.

Using the delegation event model: Now that you have learned the theory behind the delegation event model and have had an over view of its various components, it is time to see it in practice applet programming using the delegation event model is actually quite easy just follow these two steps:

1. Implement the appropriate interface in the listener so that it will receive the type of event desired.
2. Implement code to register and unregistered (if necessary) the listener as a recipient for the event notifications.

Remember that a source may generate several types of events. Each event must be registered separately. Also an object may register to receive several types of events, but it must implement all of the interfaces that are required to receive these events. To see how the delegation model works in practice, we will look at examples that handle the two most commonly used event generators: the mouse and keyboard.

III. CONCLUSION

Several monitoring-based intrusion detection techniques proposed in literature rely on each node passively monitoring the data forwarding by its next hop to mitigate packet dropping attacks by insider nodes. Though monitoring-based intrusion detection is not likely to be accurate for ad hoc networks due to varying noise levels, varying signal propagation characteristics in different directions, and interference from competing transmissions, there are no specific studies on the impact of noise on false positives and the impact of false positives on network performance. In this paper, we presented quantitative evaluations of false positives in monitoring-based intrusion detection for ad hoc networks. We showed that, even for a simple three node configuration, an actual ad hoc network suffers from high false positives. Our Future enhancements are intrusion detections in internet application and parallel computer interconnection network.

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Predicting of the Relationship between Memory Difficulties and Language Disorder among Pupils with Mathematics Learning Disabilities (MLD) in Khartoum State

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ABSTRACT

This study was conducted during (2014- 2015) in special educational center, Khartoum State- Sudan. The study aimed to predicting of relation between memory difficulties and language disorder among children with mathematics learning disabilities. Researcher used descriptive methods, by applied memory difficulties and language disorder questionnaire which designed by researcher. The community of this study consisted from teachers of children with learning disabilities. Sample was chosen randomly included (40) teachers. Researcher used statistical package for social sciences program (SPSS). Finally, the results are indicate that: The predicting of relationship between memory difficulties and language disorder among pupils with mathematics learning disabilities is significant, the level of memory difficulties among children with mathematics learning disabilities is above moderate and the level of language disorder among pupils with mathematics learning disabilities, is above moderate.

Key words: Memory difficulties, Language Disorder, Children with mathematics learning disabilities.

I. INTRODUCTION

There is a good, established system of special education provision in Sudan which has become increasingly specialized since 2000. Grew up on private capital, the government did not contribute to the system. However, the latest significant change in children with special needs and their families lives, which sent a message of hope, and awakened hum about learning. There are specialist centres for children with learning difficulties, for children who are disabled and learning disabilities.

1.1 Mathematics Disabilities

The study of Pfannenstiel. H. Kathleen & et al (2015) suggested that students with mathematics difficulties and learning disabilities typically struggle with solving word problems. These students often lack knowledge about efficient, cognitive strategies to utilize when solving

word problems. Cognitive strategy instruction has been shown to be effective in teaching struggling students how to solve word problems that employ specific word problem types. The cognitive strategy, math scene investigator, is an example of a cognitive strategy for word problem solving. Torbeyns. J & et al (2004) investigated the strategy characteristics and development of children with mathematical disabilities, the results revealed clear differences in the frequency, efficiency, and adaptiveness with which the CA-matched children applied the available strategies. In contrast, we observed no differences in strategy frequency, efficiency, and adaptiveness between the AL-matched children. These results support the hypothesis that the strategy development of children with mathematics disabilities is marked by a delay rather than a specific deficit. Moreover, this study further documents the value of the methodology used to study children's strategy use and development in the domain of simple arithmetic Donald

J. Mabbott & Bisanz. J(2008).The authors consider the power and limitations of responsiveness-to-intervention for reducing the need for ongoing and intensive services for the segment of the school population traditionally identified as having a learning disability in mathematics. To assess the robustness of RTI, the authors describe four studies with strong demonstrations of efficacy, as they considered the percentage of students who failed to respond, the post-tutoring achievement gap between tutored and not-at-risk students, and the extent of transfer across components of the mathematics curriculum. Lynn S. Fuchs & et al (2012).

1.2 Memory

As predicted by the metamemory approach to memory confidence, there was a positive confidence/accuracy relationship for non-deceptive items and a negative relationship for deceptive items. The results supported the hypothesis that the participants were aware of the levels of memory accuracy associated with the different strategies and used that information to generate their memory confidence judgments William. F. Brewer &, Cristina. S (2012). Finally, we found that the reactivation of a strongly acquired memory requires an activation of the anterior cingulate cortex as soon as 24 h after acquisition. De Jaeger. X & et al (2014), found that the negative relation between performance goal and mathematics was stronger for children with lower levels of mastery goal or working memory, than for those with higher levels in addition, These findings suggest that a reduction in the availability of working memory resources may be one reason for a high performance orientation to be associated with poorer academic performance. Kerry. L & et al (2014), study results suggest that the initial search processes for memories of different specificity levels preferentially engage different components of the autobiographical memory network. Study of Jaclyn Hennessey & et al (2011). Findings suggest that differences in list structure underlie the divergent developmental trajectories previously reported in semantic and phonological false memories. Ellen R. Swannell & Stephen A. Dewhurst (2012).

1.3 Language Disorders

Ellen R. Swannell & Stephen A. Dewhurst (2012). These results indicate grammatical knowledge is relatively more affected than lexical knowledge in

Danish speaking children with SLI. However, the results were not consistent with the proposal linking impaired grammar to impairments with procedural memory. At the same time, the study does not rule out that other aspects of procedural learning and memory contribute to the language problems in SLI Jarrad A. G. Lum & Dorthe. B (2012), indicate no significant group differences on all verbal short-term memory tasks and verbal working memory tasks with low and moderate language loads. Statistically significant group differences were found on the most taxing condition, the verbal working memory task involving high language processing load. The L/LD group performed significantly worse than the control group on both the processing and storage components of this task. These results support the limited capacity hypothesis for adults with L/LD. Rather than presenting with a uniform impairment in verbal memory, they exhibit verbal memory deficits only when their capacity limitations are exceeded under relatively high combined memory and language processing demands. Emi. I & et al (2008). they examined the association of the types of language disorders experienced by these students with specific learning disabilities and clinical levels of specific types of psychopathology. Nearly 66% of the students with ED experienced a language disorder, with combined receptive-expressive disorders being the most common (35.5%). Students with a language disorder, particularly combined receptive-expressive disorder, showed significantly poorer achievement and more learning disabilities in all areas compared to students with no language disorder. Furthermore, 91.3% of the students with any mathematics disabilities also had a language disorder. Types of language disorders were not significantly distinguished by psychopathology, although severity was serious in both students with and without a language disorder. These findings have implications for the identification and treatment of language disorders in students classified.

1.4 Literature Review

The study of Shin & et al (2015) revealed that students with mathematics learning disabilities exhibited higher word problem-solving abilities and no significant group differences on working memory, long-term memory, and metacognition measures compared to students with learning disabilities in mathematics and reading. Findings also revealed students with mathematics

learning disabilities demonstrated significantly lower performance compared to age- or grade-matched students with no learning disabilities on both mathematical and cognitive measures. Comparison between students with mathematics learning disabilities and younger students with no learning disabilities revealed mixed outcomes on mathematical measures and generally no significant group differences on cognitive measures. The study of Proctor. B & Proctor. B (2012) Indicate that processing speed and working memory were related to math calculation scores and that comprehension-knowledge, fluid Reasoning, and working memory were related to math reasoning. The study of Sideridis.G & Padeliadu. S (2013) suggested that, the best item synthesis involved items from cognition, motivation, strategy use, and advanced reading skills. It is suggested that multiple psychometric criteria be employed in evaluating the psychometric adequacy of scales used for the assessment and identification of learning disabilities and comorbid disorders. The study of Swanson H. Lee (1994) suggested that, short-term memory and working memory loaded on different factors, and the regressions and partial correlations showed that these different factors accounted for separate variance in reading comprehension and mathematics. Both short-term memory and working memory are important in understanding reading comprehension and mathematics performance in children and adults with learning disabilities; however, working memory is more important for children and adults without learning disabilities. In contrast to working memory, short-term memory contributed minimal variance to word recognition in both ability groups. Overall, it was concluded that short-term memory and working memory do reflect different processes, both of which seem to separate the two ability groups. However, models of memory that view short-term memory and working memory as interchangeable, or short-term memory in isolation, do not provide an adequate framework for capturing academic performance in children and adults with learning disabilities. The study of Pelegrina. S & et al (2014) suggested that children with an arithmetic disability failed in a number updating task, but not in the object updating task. The opposite was true for the group with poor reading comprehension, whose performance was worse in the object than in the number updating task. It may be concluded that the problem of working memory updating in children with learning disabilities is

also due to a poor representation of the material to be updated. In addition, our findings suggest that the mental representation of the size of objects relates to the semantic representation of the objects' properties and differs from the quantitative representation of numbers. Passolunghi. C. Maria & Mammarella. C. Irene (2011) Results showed that only children with severe mathematics learning disabilities failed in spatial working memory tasks if compared with children with low mathematical achievement and TD. The study of Swanson H. Lee (2011) suggested that, support the notion that children's working memory performance under dynamic testing conditions was related to the rate of growth in reading comprehension but unrelated to subgroup differences in reading. The study of Swanson H. Lee & et al (2010) suggested that, stable strategy choices, cued performance, and strategy instruction significantly bolstered working memory performance in children with RD, their overall working memory performance, however, was constrained by capacity limitations. The study of Donald J. Mabbott & Bisanz. J (2008) suggested that, the performance of children with mathematics learning disabilities on multiple measures of multiplication skill and knowledge was most similar to that of ability-matched younger children, mathematics learning disabilities may be due to difficulties in computational skills and working memory. James D. Oyleret & et al (2012) the results indicated that the reading disabilities group learned significantly fewer list items and did so at a slower rate than the control group. Although the participants with reading disabilities were equally able to retain information once learned, they did demonstrate inefficient elaborative rehearsal strategies. They also recalled fewer words in both the semantic and phonetic cued-recall conditions, but the effect size was significantly greater in the latter. Taken together, the data suggest that students with reading disabilities have less efficient rehearsal and encoding mechanisms but typical retention. Retrieval also appears typical except under conditions that require information to be recalled based on phonetic codes. The study of De Weerd. F & et al (2013) suggested that, elementary school children with reading disabilities (RD; n = 17), mathematical disabilities (MD; n = 22), or combined reading and mathematical disabilities (RD+MD; n= 28) were compared to average achieving (AA; n = 45) peers on working memory measures. On all working memory components, 2 (RD vs. no RD) × 2 (MD vs. no MD) factorial ANCOVAs revealed clear differences between

children with and without RD. Children with mathematics disabilities had lower span scores than the AA children on measures of the phonological loop and the central executive. A significant interaction effect between RD and MD was found only for listening recall and had a small, partial effect size. In addition, analyses showed that the best logistic regression model consisted of a visuospatial and a central executive task. The model significantly distinguished between the AA and clinical groups and between the MD and RD+MD groups. Evidence was found for domain-general working memory problems in children with learning disabilities. Management of working memory loads in structured learning activities in the classroom, at home, or during therapy may help these children to cope with their problems in a more profound manner. Julia A. Englund & et al (2014) study has demonstrated strong connections among working memory, higher-level cognition, and academic achievement. Results indicated the WOMBAT measures separate verbal, Static visual-spatial, and dynamic visual-Spatial dimensions, and that more than 98% of items contribute to measurement of those dimensions. This provides support for the theoretical organization of working memory into three distinct content domains in the WOMBAT. Misfitting items were identified using infit and outfit indices for further review to improve reliability and stability. Results also demonstrated adequate person separation and Rasch person reliability and item reliability. Test-retest reliability and internal consistency coefficients suggest adequate reliability for early-stage research, but further refinement is needed before the WOMBAT can be used for individual decision making. Implications for future test development and research on the working memory construct are provided. Peng. P & Fuchs. D (2015) Findings suggest however tentatively that brief but intensive verbal working memory training may strengthen the verbal working memory and comprehension performance of young children at risk. The study of Swanson H. Lee, Xinhua Zheng, & Olga Jerman (2009) suggested that, the purpose of the present study was to synthesize research that compares children with and without reading disabilities on measures of short-term memory and working memory. The findings indicated that domain-specific short-term memory and working memory differences between ability groups persisted across age, suggesting that a verbal deficit model that fails to efficiently draw resources from both a phonological and executive system underlies reading

disabilities. The study of Michael J. Orosco & et al (2013) suggested that, the purpose of this study was to assess the effectiveness of a math comprehension strategy called dynamic strategic math on word problem solving for Latino ELLs. The results suggest the intervention facilitated math problem-solving performance. The study of H el ene Deacon & et al (2014) suggested that children with specific language impairment have demonstrated general spelling and writing difficulties. Our results suggest that elementary-school-aged children with specific language impairment are sensitive to the consistent spelling of roots, at least to the extent predicted by their general spelling abilities. The aims of this study to determine the level of the quality of learning disabilities curriculum, classroom environment and supporting services, among pupils with mathematics learning disabilities, of high quality and safe services, which meet the needs of pupil with learning disabilities throughout the life course. In addition to verify their aims by answer following question are:

- i. What the level of memory disabilities among pupils with mathematics learning disabilities?
- ii. What the level of language disorder among pupil with mathematics learning disabilities?
- iii. What the level relation between memory disabilities and language disorder among pupil with mathematics learning disabilities?

II. METHODS AND MATERIAL

2.1 Method Research Approach

In a study, the researcher used descriptive method, depend on analytical technique. In addition, were consists of questionnaire adapted by the researcher.

2.2 Study Group

It formed from male and female student with learning difficulties in special educational center, Khartoum state, Sudan (20) of male and female pupils with mathematics learning disabilities. Also consisted major of learning difficulties teams there are including learning difficulties teachers, normal classroom teachers, directors of learning difficulties programs and directors of educational.

2.3 Sampling

The researcher used a simply random sampling method. The sample was consist of (22) pupils with mathematics learning disabilities.

2.4 Supervisors-Questionnaire Techniques

The questionnaire was prepared by the researcher, is formed from (20) phrases distributed into two dimensions, memory disabilities (10), Language disorder (10) phrases.

In order to ensure the validity and reliability of the questionnaire form, it distributed to four instructors who had completed their doctorates and this form developed in accordance with the opinions of the instructors, then pilot were conducted and the value of reliability was found. It was about (0.85) and after that, the questionnaire forms became ready for application.

2.5 Practical Procedures:

The principle of voluntarism was the pre-condition of participating in questionnaire. For the questionnaire, an explanation was prepared. The goal of the research and how the study would be carried out were clearly stated in it. In addition, it was emphasized that the identities of the participants would remain confidential. During the questionnaire, written forms were used. Questionnaire took place between 1-6 weeks, and the researcher used E-mailing technique to answering the questionnaire.

2.6 Data Analysis

After collecting data, the researcher used: T- test for one sample, T-test for independent samples test, to examine the study hypotheses depend to SPSS program.

III. RESULTS

3.1. What the level of memory difficulties among pupils with mathematics learning disabilities mathematics learning disabilities? To answer this question, the researcher used (T) test for one sample, table (1) shows the result. When we compare the mean respectively (9.64), with standard mean (9), I found the mean is greater than standard mean and the significant level (0.21) is greater than the sig value (0.05), this is means that the level of memory difficulties among pupils with mathematics learning disabilities is low.

3.2. What the level of language disorder among pupils with mathematics learning disabilities? To answer this question, the researcher used (T) test for one sample, table (2) shows the result. When we compare the mean respectively (9.27), with standard mean (9), I found the mean is greater than standard mean and the significant level (0.53) is greater than the sig value (0.05), this is means that the level of language disorder among pupils with mathematics learning disabilities is low.

3.3. what the relation between memory difficulties and language disorder among pupil with mathematics learning disabilities? To answer this question, the researcher used Pearson correlation, table (3) shows the result. When we compare the correlation value (659),

with standard sigma level (0.001), I found that it, greater than significant level (0.05) is greater than the sig value (0.01), and this is means that the relation between memory difficulties and language disorder among pupil with mathematics learning disabilities is significant.

Table1. Shows level of memory disabilities among pupil with mathematics learning difficult.

Variable	Mean	Std	T	df	sig	Result
Memory Difficult	9.6	2.3	1.3	21	0.2	Significant

Table2. Shows level of Language disorder among pupil with mathematics learning disabilities.

Variable	mean	Std	T	df	sig	Result
Language Disorder	9.3	2.0	0.6	21	0.5	Significant

Table3. Shows the relation between memory disabilities and Language disorder among pupils with mathematics learning disabilities.

Variables	Correlation	sig	Result
Memory &Language	659**	0.001	Significant

IV. DISCUSSION

4.1. The level of memory difficulties among pupils with mathematics learning disabilities, is above moderate. This result means, that memory difficulties was effected on pupils with mathematics learning disabilities, this result is on line the study of Passolunghi & et al (2011) suggested that only children with severe mathematic learning disabilities failed in spatial working memory tasks if compared with children with low mathematical achievement and TD. In addition, the study of De Weerd & et al (2013) suggested that, children with mathematic disabilities had lower span scores than the AA children on measures of the phonological loop and the central executive, also analyses showed that the best logistic regression model consisted of a visuospatial and a central executive task. The model significantly distinguished between the AA and clinical groups and between the mathematic learning disabilities and reading disabilities+ mathematic learning disabilities groups. Evidence was found for domain-general working memory problems in children with learning disabilities. Management of working memory loads in structured learning activities in the classroom, at home, or during therapy may help these children to cope with their problems in a more profound manner. In addition, the study of Passolunghi. C. Maria & Mammarella. C. Irene (2011) suggested that only children with severe mathematic learning disabilities failed in spatial working

memory tasks if compared with children with low mathematical achievement and TD, in addition, the study of Donald J. Mabbott & Bisanz. J(2008) suggested that, the performance of children with mathematic learning disabilities on multiple measures of multiplication skill and knowledge was most similar to that of ability-matched younger children Mathematic learning disabilities may be due to difficulties in computational skills and working memory, in addition, the study of Swanson. H. Lee & et al (2010) suggested that stable strategy choices, cued performance, and strategy instruction significantly bolstered working memory performance in children with reading difficulties, their overall mathematic learning disabilities performance, however, was constrained by capacity limitations. In addition, the study of Shin. M & Bryant. P. Diane (2015) suggested that, students with mathematics learning disabilities demonstrated significantly lower performance compared to age- or grade-matched students with no learning disabilities on both mathematical and cognitive measures comparison between students with mathematics learning disabilities and younger students with no learning disabilities revealed mixed outcomes on mathematical measures and generally no significant group differences on cognitive measures.

Researcher suggested that, memory difficulties have a significant impact on the desirable learning building, and it should be on teachers of learning difficulties in sourcing search for the best educational strategies rooms and used with people with learning difficulties, and people with mathematics difficulties, in particularly.

4.2. The level of language disorder among pupils with mathematics learning disabilities is above moderate. This result means that language disorder is significant, on line, the study of Deacon. H & et al (2014) suggested that, elementary-school-aged children with SLI are sensitive to the consistent spelling of roots, at least to the extent predicted by their general spelling abilities, in addition, the study of Pfannenstiel. H. Kathleen & et al (2015) suggested that students with mathematics difficulties and learning disabilities typically struggle with solving word problems. These students often lack knowledge about efficient, cognitive strategies to utilize when solving word problems. Cognitive strategy instruction has been shown to be effective in teaching struggling students how to solve word problems that employ specific word problem types. The cognitive strategy, Math Scene Investigator, is an example of a cognitive strategy for word problem solving.

Researcher suggested that, a significant impact of language disorder among students with learning disabilities, if not rapid early intervention, it will increase the complexity of the learning process, which doubles the efforts of teachers in the face of Other disorders associated with the difficulty of learning.

4.3. There are relation between memory difficulties and language disorder among pupils with mathematics learning, is significant, on line, the study of De Weerd. F & et al (2013) suggested that significant interaction effect between RD and learning disabilities was found only for listening recall and had a small, partial effect size, in addition, the study of Disagree, Swanson. H. Lee (2011) suggested that support the notion that children's working memory performance under dynamic testing conditions was related to the rate of growth in reading comprehension but unrelated to subgroup differences in reading, in addition, the study of Proctor. B & Proctor (2012) suggested that, multiple regression analyses found that processing Speed and working memory were related to math calculation scores and that comprehension-knowledge, fluid reasoning, and working memory were related to math reasoning, in addition, the study of Shin. M & Bryant. P. Diane (2015) suggested that comparison between students with mathematics learning disabilities and younger students with no learning disabilities revealed mixed outcomes on mathematical measures and generally no significant group differences on cognitive measures.

Researcher suggested that, the relationship is that the language is the basis learning to speak and acquire concepts, Learning depends entirely on the growth and development of the language level, memory are responsible for receiving information, processing, interpretation, recognizable, and be aware of. So the relationship is a positive whenever it grew language disorder increased the possibility of a difficulty in the multi-memory.

V. CONCLUSION

This is study is modern and contemporary studies because conducted about the predicting of the relationship between memory difficulties and language disorder among pupils with mathematics learning disabilities, so that to enhance the quality of education with learning disabilities, by evaluating the level of availability of programs services very important, to promote abilities and build skills for learning disabilities pupils . Which helps educators and teachers on educational planning successful, towards a better future for this category among special groups which meet the needs of pupil with learning disabilities throughout the life course, Evaluate the quality of learning disabilities programs services is very important in special education field, to improving academic achievement. Finally, the study found that, the predicting of the relationship between memory difficulties and language disorder

among pupils with mathematics learning disabilities is significant, the level of memory difficulties among children with mathematics learning disabilities is above moderate and the level of language disorder among pupils with mathematics learning disabilities, is above moderate.

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Traditional Uses, Phytochemistry and Pharmacological Properties of Garlic (*Allium Sativum*) and its Biological Active Compounds

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ABSTRACT

Garlic has a tremendous pharmacological effects due to its biological active constituent (*Allicin and its derivatives*) organosulfur compounds. Studies carried out on the chemical composition of the plant show that the most important constituents of this plant are organosulfur compounds such as allicin, diallyl disulphide, S-allylcysteine, and diallyl trisulfide which contribute a vital role in its nutraceutical applications. Garlic is one of the most important bulb vegetables, which is used as spice and flavoring agent for foods Garlic adds to taste of foods as well as it helps to make them digestible. Garlic contains different useful minerals, vitamins and many other substances used for health of human beings. It is rich in sugar, protein, fat, calcium, potassium, phosphorous, sulfur, iodine fiber and silicon in addition to vitamins. It possesses high nutritive value. Furthermore, garlic has pharmaceutical effects and used to cure a vast conditions including blood pressure and cholesterol, cancer, hepatoprotective, antihelmentics, antiinflammatory, antioxidant, antifungal and wound healing, asthma, arthritis, sciatica, lumbago, backache, bronchitis, chronic fever, tuberculosis, rhinitis, malaria, obstinate skin disease including leprosy, leucoderma, discolouration of the skin and itches, indigestion, colic pain, enlargement of spleen, piles, fistula, fracture of bone, gout, urinary diseases, diabetes, kidney stone, anemia, jaundice, epilepsy, cataract and night blindness.

Key Word: Allicin, *Allium Sativum*, Organosulfur, Nutraceutical Effects, Pharmaceutical

I. INTRODUCTION

Garlic (*Allium sativum* L.) members of family *Alliaceae* and is the second most widely used *Allium* next to onion widely cultivated throughout the world as described by (Rubatzky and Yamaguchi, 1997) and used as spice, additive as well as medicinal plant noticed by Velisek *et al.* (1997)

Garlic has tremendous biological active constituent which contribute in its pharmaceutical applications. Garlic has been used around the world to cure many diseases, including hypertension, infections, and snake bites, and some cultures have used it to ward off evil spirits, Garlic is used for reducing cholesterol levels and cardiovascular risk, as well as for its antineoplastic and antimicrobial properties as described by Koch (1996).

Teferi and Hahn (2002) pointed out that, garlic inhibit and kill bacteria, fungi, parasites, lower blood pressure, blood cholesterol and blood sugar, prevent blood clotting, protect the liver and contains antitumor properties. Furthermore, Kik and Gebhardt (2001) explained that, garlic can also lift the immune system to fight off potential disease and maintain health. It has the ability to stimulate the lymphatic system which expedites the removal of waste from the body. It is considered an effective antioxidant and can help protect cells against free radical damage. In addition, the studies of Sterling and Eagling (2001) and Sovova and Sova (2004) reported that garlic promotes and support the heart, stomach, circulation and the lungs. Garlic has come an effective natural agent all rounded treatment for preventing wound infection, common cold, malaria, cough and lung tuberculosis, hypertension, sexually

transmitted diseases, mental illness, kidney diseases, liver diseases, asthma, diabetes as mentioned by Velisek *et al.* (1997). The focal point of this review is to overview the traditional uses, photochemistry and pharmacological properties of garlic.

II. METHODS AND MATERIAL

Data Sources and Data Extraction

In order to collect the desirable information, systematic literature searches were conducted on MEDLINE, EMBASE, BIOSIS databases and poplar search engine (Pdf searcher.org., google scholar, Osun.org and other Journal sites) were included. A huge number of recently published paper were studied during the year 2014/2015 and data extraction was performed methodologically based on previously identified keywords including: *Allium sativum*, garlic, *Allium*, organosulfur compounds, allicin, and ajoene

Data Presentation

The findings were interpreted and classified on the basis of relevance to the topic and a summary of all effects were reported as table and figure. Each topic starts with a brief review traditional uses of the plant that suits the topic and then the information is supported by the results of various pharmacological studies conducted in that field. Finally based on the reviewed information a conclusion was reached.

Overview of Garlic (*Allium sativum*)

A. sativum L, commonly known as garlic is a species in the onion family. Botanically, it belongs to the genus *Allium*, family *Alliaceae* of plants that produce organosulfur compounds, such as allicin and diallyldisulfide (DADS), which account for their pungency, lachrymatory effects spicy aroma and pharmaceutical activities. Its close relatives include vegetable crop such as onion (*Allium cepa*), leek (*Allium ampeloprasum*), shallots (*Allium ascalonicum*) and chive (*A. schoenioprasum*) as indicated by Eric (2010).

Garlic is monocotyledonous biennial plant. It is an erect or upright plant that can reach a height of 70 cm to 90 cm as described by (Brewster, 1994). Pulseglove (1972) stated that, the plant contains an

underground bulb and above the ground vegetative part which consist of the leaves and flowers. The rooting system is adventitious while the bulbs comprise of small bulbils called cloves, which are the vegetative propagating materials of the crop. The true stem is much reduced. The long, sword shaped leaves grow from the bulb beneath the surface of the soil are linear, flat and lance shaped. They are green, sometimes with a blue tinge. The bulbs are broadly ovoid two to four centimeters in diameter and consist of several, densely crowded, angular, truncated smaller bulbs called cloves. The garlic bulb consists of numerous cloves, which is the main economic organ both for consumption and propagation explained by Warriar *et al* (1993).

Garlic can be grown under a wide range of climatic conditions, soil texture and pH levels but prefers cool weather and grows at higher elevation (900 to 1200 meters) and annual temperature ranging from 12°C to 24°C as stated by (Libner, 1989). Garlic grow in low rainfall areas with irrigation during the early vegetable growth and prefer short day for better bulb formation. It requires well drained loamy soils rich in humus, with fairly good content of potassium. Sandy loams are best because of their water holding capacity and generally good drainage. Though, sandy, silt and clay loam are recommended for commercial production, the soil should be fertile, rich in organic matter, well drained, capable of holding adequate moisture during the growing period, and having soil pH ranging from 6.8 to 7.2. Lower pH levels inhibit plant growth, and soil pH below 5.0 can actually lead to plant death as indicated by Janet (2008).

Phytochemical Constituent of Garlic (*Allium sativum*)

As pointed out by Ameenah *et al.* (2004) garlic contains sulfur compounds including aliin, allicin, ajoene, allylpropl, diallyl, trisulfide, sallylcysteine, vinylthiines, S-allylmercaptocystein, and, peptides, steroids, terpenoids, flavonoids, and phenols. Besides sulfur compounds garlic contains 17 amino acids and their glycosides, arginine and others. Minerals such as selenium and enzymes allinase, peroxidases, myrosinase, and others amino acids and their glycosides: arginine and others Selenium, germanium, tellurium and other trace minerals, and others. Garlic also contains arginine, oligosaccharides, flavonoids, and selenium, all of which may be beneficial to health as mentioned by Milner

(1996). Garlic contains a higher concentration of sulfur compounds than any other *Allium* species. Mikaili *et al.* (2013) reported that the sulfur compounds present in garlic are responsible both for its nutraceutical and medicinal effects.

Garlic contains alliin (S-allyl cysteine sulfoxide) which can be metabolized into allicin (diallyl thiosulfinate or diallyl disulfide), by the enzyme allinase which is activated through injuries on garlic as described by Shela *et al.* (2006). Allicin is further metabolized to vinyl dithiines within hours at room temperature and within minutes during culinary use (Kaschula *et al.*, 2010). Ajoene is a garlic-derived compound produced most efficiently from pure allicin by several enzymes. Garlic oil, aged garlic and steam-distilled garlic do not contain significant amounts of alliin or allicin, but instead contain various products of allicin transformation; none appears to have as much physiologic activity as fresh garlic or garlic powder as stated by Shela *et al.* (2006), and Ameenah *et al.*, (2004). Besides this garlic also contains a volatile oil which contributes to its pharmacological properties as mentioned by Kaschula *et al.*, 2010.

Traditional Uses
Culinary use

Garlic is one of the most important bulb vegetables, which is used as a spice and flavoring agent for foods as reported by (Velisek *et al.*, 1997). It is widely used around the world for its pungent flavor as a seasoning or condiment. Moreover, Edwards *et al.* (1997) noticed that garlic is used in preparing foods, particularly some kinds of stew and in making dried foods for storage. The pungency, lachrymatory effects and spicy aroma of garlic are due to the presence of organosulfur compounds such as allicin and diallyl disulfide.

Garlic adds to the taste of foods as well as it helps to make them digestible. It is an important ingredient in the leading cuisines around the world. Garlic as a spice is utilized in both fresh and dehydrated states in the food industry. It is dehydrated into different products such as flakes, slices, and powders as described by Ahmad (1996). In addition to adding taste to foods, garlic contains different useful minerals, vitamins and many other substances used for the health of human beings. It is rich in sugar, protein, fat, calcium, potassium, phosphorus, sulfur, iodine, fiber and silicon in addition to vitamins. It possesses high nutritive value. Its pungent flavor makes it used mainly as a spice, seasoning and flavoring of foodstuffs involving both green tops and bulbs.

Table 1: Summary of nutritive value of garlic [Source *USDA nutrition database (2009)*]

Substance	Amount found/100g	Substance	Amount found/100g
Water(Moisture)	58.58%	Vitamin B6	1.235 mg
Energy	623 kJ (149 kcal)	Folate (Vitamin. B9)	3 µg
Carbohydrates	33.06 g	Vitamin C	31.2 mg
Sugars	1.00g	Calcium	181 mg
Dietary fiber	2.1 g	Iron	1.7 mg
Fat	0.5g	Magnesium	25 mg
Protein	6.39g	Phosphorus	153 mg
Beta-carotene	5 µg	Potassium	401 mg
Thiamine(Vitamin B1)	0.2 mg	Sodium	17 mg
Riboflavin (Vitamin. B2)	0.11 mg	Zinc	1.16 mg
Niacin (Vitamin. B3)	0.7 mg	Manganese	1.672 mg
Pantothenic acid (Vitamin B5)	0.596 mg	Selenium	14.2 µg

Pharmacological Activities of Garlic

Due to its biological active component allicin and its derivative, garlic has been used as a medicine to cure a wide range of diseases and conditions related the heart and blood system including high blood pressure, high cholesterol, coronary heart disease, heart attack, and "hardening of the arteries" (atherosclerosis) as pronounced by Mikaili *et al.* (2013).

Amagase (2006) noticed out garlic is used to prevent various types of cancer comprising colon cancer, rectal cancer, stomach cancer, breast cancer, prostate cancer, prostate cancer and bladder cancer, and lung cancer. It is also used to treat Cardiovascular disease including: Antilipemic, antihypertensive, anti-atherosclerotic, an enlarged prostate (benign prostatic hyperplasia; BPH), diabetes, osteoarthritis, hayfever (allergic rhinitis), traveler's diarrhea, high blood pressure late in pregnancy (pre-eclampsia), cold and flu. It is also used for building the immune system, preventing tick bites, and preventing and treating bacterial and fungal infections.

Furthermore, Pendbhaje *et al.* (2000) listed out the pharmaceutical activities of garlic. The plant is effective to treat fever, coughs, headache, stomach ache, sinus congestion, gout, rheumatism, hemorrhoids, asthma, bronchitis, shortness of breath, low blood pressure, low blood sugar, high blood sugar, and snakebites. It is also used for fighting stress and fatigue, and maintaining healthy liver function. In addition to this, Jung *et al.* (2000) reported that garlic is also used to promising effect against to asthma, arthritis, sciatica, lumbago, backache, bronchitis, chronic fever, tuberculosis, rhinitis, malaria, obstinate skin disease including leprosy, leucoderma, discolouration of the skin and itches, indigestion, colic pain, enlargement of spleen, piles, fistula, fracture of bone, gout, urinary diseases, diabetes, kidney stone, anemia, jaundice, epilepsy, cataract and night blindness.

Garlic paly crucial role in area of pharmaceutical and used for the treatment of cardiovascular and other demise causing ailments including:

Antilipemic (cholesterol lowering)

Garlic can prevent blood clotting and increase the rate at which blood clots are broken down, as as indicted by Auer *et al.* (1990). Garlic powder and it oil significantly reduced cholesterol biosynthesis by inhibiting HMG-CoA reductase and 14-alpha-demethylase

Antihypertensive

Garlic powder is used to cure hypertensive. According to Silagy and Neil (1994) garlic extracts has a significant reduction in systolic blood pressure (SBP) and in diastolic blood pressure (DBP) and act as anti-hypertensive.

Antibiotic

Due to Allicin and its derivative, garlic has the broadest spectrum of any antimicrobial substance comprising of antibacterial, antifungal, antiparasitic, antiprotozoan and antiviral this chemical contributes fresh garlic its strong biting flavor, and reliable antibiotic effect. As indicated by Caporaso *et al* (1983) Garlic appears to have antibiotic activity whether taken internally or applied topically.

Anti-tumor Effects

Garlic extracts used as inhibition of cancer development in the presence of known tumor promoters and Sulphurous components present in garlic are believed to be liable to evade the developing of cancerous cells in stomach, liver, and other organs of human as described by Pendbhaje *et al.* (2000).

Antimicrobial Activity

Garlic is believed to possess antimicrobial properties that can control a variety of organisms. Several studies recommend garlic as an alternative form of treatment or prophylaxis in cases of infections especially gastrointestinal infections.as noticed by Prafulla *et al.* (2011) Crude garlic extracts and its constituent, Ajoene exhibited activity against both gram negative and gram positive bacteria at room temperature as described by Yangha, (2007).

Anthelmentic

Pendbhaje *et al.* (2000) reported that garlic is useful in the treatment of intestinal worms. Sulfurous components of garlic may be useful to eliminate tapeworms.

Diuretic

Garlic acts as a diuretic which helps to get rid of body liquids. It may act as a very useful resource in case of rheumatism, gout, arthritis, hidropesía, edemas as described by Ali (1995)

Digestive

Ali (1995) noticed that garlic facilities the digestion by

stimulating the liver, the gall bladder and the pancreas although its use should be avoided when existing hyperchloridia (stomach acidity) and also when having frail stomachs (Eat it raw or crushed and mixed with butter.)

Vaginal Infections

According to Ali *et al.* (1995) garlic is one of the best antibiotics. It has bactericidal and fungicidal properties, able to kill or inhibit the growth of microorganisms that could be responsible for infections that cause vaginal irritation, vaginitis or vaginal flow.

Platelet Effects

Al Qattan *et al.* (2006) pointed out that garlic and its derived compound (ajoene) have proven inhibition of platelet aggregation in vitro and in animals and reduction of platelet- dependent thrombus formation. Anti-platelet activity may be attributable to garlic constituents including adenosine, allicin and paraffinic polysulfides as described Srivastava and Tyagi (1995).

Sickle Cell Anemia

Sickle cell anemia is a genetic disease caused by abnormal hemoglobin. Dense cells, which have an elevated density and possess an abnormal membrane, have a tendency to adhere to blood components such as neutrophils, platelets, and endothelial cells, which line blood vessels. Ohnishi *et al.* (2001) found that Aged Garlic Extract (4.0 mg/ml) could inhibit dense cell

formation by 50% along with other effective nutrients like black tea extract, green tea extract, pycnogenol, α -lipoic acid, vitamin E, coenzyme Q10, and β -carotene

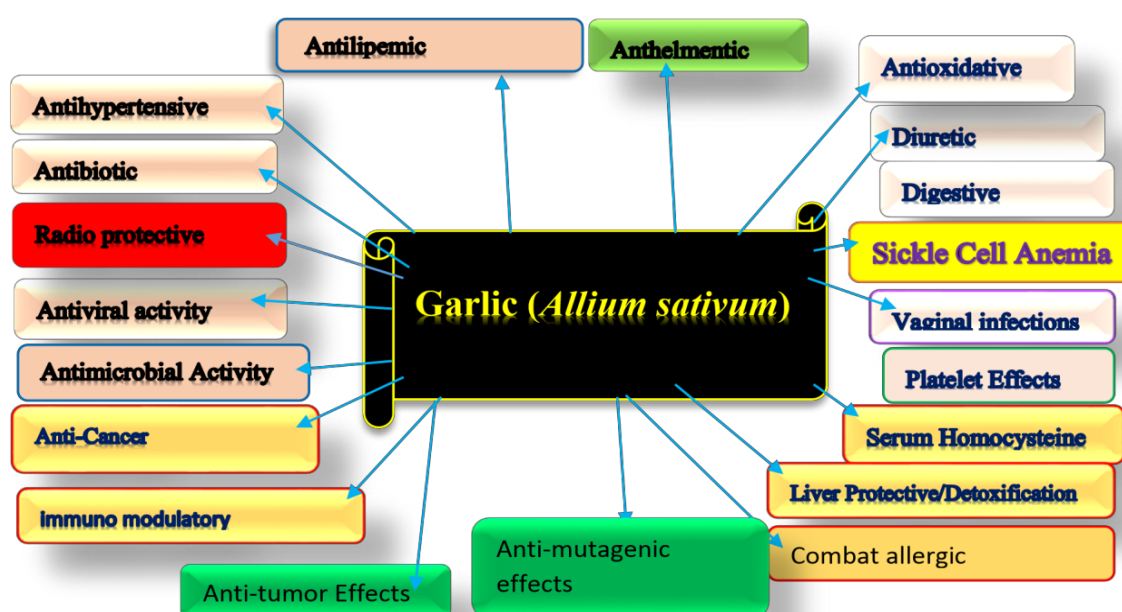
Liver Protective/Detoxification Effects

It has been reported that aged Garlic Extract have liver protective effects. It has demonstrated in vivo from the liver toxins: carbon tetrachloride, paracetamol (acetaminophen) and bromobenzene by Amagase (2000). It has been shown to inhibit both the formation and bioactivation of liver carcinogenic nitrosamines and has prevented the mutagenic effects of aflatoxin B1 as pronounced by Borek (1998).

Antioxidative and Radioprotective Effects

Borek (2001) reported that aged garlic extract and its various constituents have proven an array of antioxidant and radio-protective effects in studies.

They have been shown to protect white blood cells from radiation damage, liver cells from lipid peroxidation and vascular endothelial cells from oxidant injury and enhance antioxidative enzyme systems in cells. They have been shown to scavenge hydrogen peroxide, to inhibit the formation of TBA-RS, to protect the heart from cardiotoxic, anticancer drug doxorubicin, to protect the kidneys from the antibiotic gentamicin as described by Oshiba *et al* (1990).



III. CONCLUSION

Garlic (*Allium sativum* .L) has been described with the various biological activities from ancient times. The plant contains biological active constituents which contributes a vital role in its nutraceutical application. it contains essential mineral, vitamins, protein and is well known to all as it's wide use as a spice or condiment continental cuisine besides to its, Along with this the plant has various potential pharmacological activities against various life threatening diseases and disorders' The impression of research in this review is directed to provide a brief spectrum of garlic in medicines and culinary.

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Bio Metric and Local Language Speaking Voting System Using Fingerprint and Voice Module

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ABSTRACT

Electoral system is gaining generous endorsement across the world is biometric voter registration (BVR), which experts describe as one of the potent means of solving the election riddle called rigging. A voting system or electoral system is a method by which the voters make a choice between options, often in an election. The main aim of the project is to design a biometric electronic voting system for native language speakers using ARM7. This has been used in the development process to widen access, comprehension and to reduce the possibility of disenfranchising who are illiterates. This has been developed using the Keil uvision 4 IDE tool.

Keywords: Biometric, Electronic Voting, Finger Print.

I. INTRODUCTION

Voting is the foundation of any democratic system of government, whether the system uses the direct or representative governance.

Electronic voting (also known as e-voting) is voting using electronic means to either aid or take care of chores of casting and counting votes. Depending on the particular implementation, e-voting may encompass range of internet services, from basic data transmission to full function online voting through common connectable house hold devices.

Electronic voting technology can speed the counting of ballots and can provide improved accessibility for disabled voters.

II. METHODS AND MATERIAL

A. Biometric Voter Registration

Biometrics literally means life measurement and is associated with utilization of distinctive physiological characteristics for identifying individuals. Though most important application related with biometrics is that of security, it is used as the computer interface too. A range

of biometric applications are being used for authenticating person's identity. With the use of various features including fingerprints, face, signature and iris, a person is identified.

Voter identification is required during two phases of the electoral process: first for voter registration in order to establish the right to vote and afterwards, at voting time, to allow a citizen to exercise their right to vote by verifying if the person satisfies all the requirements needed to vote (authentication).

Biometric voter registration system (BVRS) is a highly advanced biometric information system that allows enrolling and identifying millions of voters quickly and unmistakably.

The field of biometrics was formed and has since expanded on to many types of physical identification. Still, the human fingerprint remains a very common identifier and the biometric method of choice among law enforcement. These concepts of human identification have led to the development of fingerprint scanners that serve to quickly identify individuals and assign access privileges. The basic point of these devices is also to examine the fingerprint data of an individual and compare it to a database of other fingerprints.

Nearly everyone in the world is born with a finger print that is unique; a separate and comprehensively identifying attribute that sets us apart from the other billion people that inhabit this world. It is because of this fact that the fingerprint has proven such a useful part of biometric security. The very reason that finger print scanners are useful can be found in this fact as well. However, this is far from the only reason they are used.

B. Working Principle

In the project, ARM7 controller (LPC2718) has been used. The LPC 2148 is a general purpose 32 bit microprocessor, which offers high performance and a very low power consumption.

The block diagram of the project is shown in the figure 1. It consists of different modules for performing the operation.

- Finger print module
- Voice play back module
- LCD
- Switches
- Microcontroller ARM7

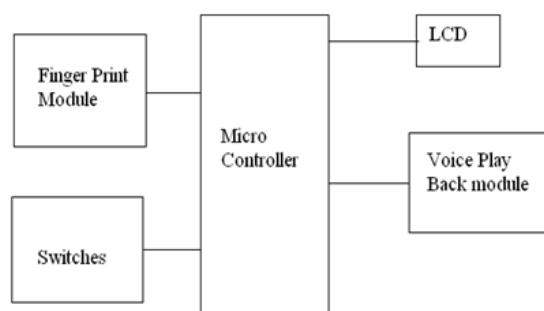


Figure1: Block Diagram Of Biometric Voting Machine

Initially the voter needs to register the thumb print by using the biometric finger print registration. During the elections, by using the finger print module it scans the finger print of the candidate need to be vote. If the finger print of the candidate matches with the registered finger print then the machine gives the instructions through voice in the particular registered language to cast the vote. This is done by using the voice play back module. Then the particular candidate is eligible and can cast the vote using switches.

The finger print module also checks whether the candidate is new or already registered. Thus it can be helpful for cast the vote rigging free. It also helps to

detect unauthorised person, for example, whether the person belongs to particular constituency, having voter id or not. Appropriate instructions are displayed on the LCD screen.

C. Advantages

The advantages of the system are

- The system is highly reliable and secure.
- Illegal practices like rigging in elections can be checked off.

III. CONCLUSION

In this project, the implementation of the BEVS system with the native language is presented. The system will be sufficiently robust and would carry out instructions as well as guide to vote in the voters native language.

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Haematology and Serum Biochemical Profile of Weaner Rabbits Fed Yam Peels at Graded levels as a Replacement for Maize

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ABSTRACT

Serum haematology and biochemical profile of weaner rabbits fed graded levels of yam peels replacing maize were evaluated. The experiment which lasted fifty-six days using 15 weaner rabbits was laid in a randomized complete block design using five dietary treatments with three replications each. The dietary treatments evaluated were 5%, 10%, 15%, 20% and 0% inclusion level of yam peels replacing maize. Results revealed significant ($P < 0.05$) differences in all the parameters evaluated except for the white blood cells, lymphocytes and globulin. The results obtained did not follow any pattern except chloride levels which had significant ($P < 0.05$) decrease across all the treatments (88.00 – 72.00 mmol/L). Higher values were obtained from the control-based diet in the haematological and serum electrolytes profile. While higher values were obtained in animals fed 20% inclusion of the test ingredient for globulin (32.00 g/L), total cholesterol (3.00 mmol/L), high density lipoproteins (1.00 mmol/L), alkaline phosphatase (3.50 U/L), alanine amino transferase (8.00 U/L) and aspartate amino transferase (10.00 U/L). It is concluded that there is no adverse effects of the yam peels diet on the experimental animals across all dietary treatments. It is however recommended that more studies should be carried out on the optimum inclusion levels and its suitability in other classes of rabbit.

Keywords: Serum, Haematology, Weaner Rabbits, Yam Peels, Serum Electrolytes

I. INTRODUCTION

The problem of animal protein insufficiency in Nigeria and other developing nations has attained a deplorable status which calls for urgent remedy to avert the imminent protein malnutrition. This problem has been attributed to high cost of conventional ingredients for feed making which has made monogastric animal feed a major cost of production (Agbakoba *et al.*, 1995).

Iyeghe-Erakpotobor *et al.* (2002), reported that increased rabbit production is one sure way of meeting the animal protein requirements of the Nigerian populace and increased production of fryers and breeders. This can be ensured through proper nutrition and feeding of weaner rabbits.

Rabbit production is promising because as monogastric herbivores, they do not compete directly with Man for

both cereal and legume grains. Rabbit is also favoured because of its high fecundity, low cost of investment, short generation interval, as well as ability to utilize diverse forages (Taiwo *et al.*, 2004). The animal protein shortage facing Nigeria cannot be solved by large animals with their slow production cycle.

Rabbit farming is growing in many countries today, hence feeding problems associated with poultry and pig farming are now being encountered by rabbit breeders who depend solely on pellets and concentrates for their animals (Omole, 1992; Esonu and Udedibe, 1993). The escalating prices of pellets and concentrates for feeding rabbits in Nigeria constitute considerable constraints on the expansion of commercial rabbit production. Thus, there has been increasing research effort focused on the utilization of alternative cheap feed sources for rabbits.

The scarcity and high cost of cereal grains, especially maize, has necessitated research into alternative energy

sources for livestock feeding. Yam (*Dioscorea rotundata*) is produced in large quantities in Nigeria and form important energy sources for human and livestock feeding. The peels from the processing of these roots are readily available at cheap costs in many parts of the country because they have limited or no human food value. Yam peel meal (YPM) is reported to be a good source of protein but poor in energy (Diarra *et al.*, 2012). A readily available and fast means of assessing clinical and nutritional status of an animal on feeding trial may be the use of blood analysis (Olabanji *et al.*, 2009). Haematological parameters are important and reliable medium used in monitoring and evaluating health and nutritional status of animals (Babatunde *et al.*, 1992; Onifade and Tewe, 1993; Gupta *et al.*, 2007).

This experiment was thus conducted in order to evaluate the effect of yam peels on the haematology and biochemical profile of weaner rabbits fed graded levels as a replacement for maize.

II. METHODS AND MATERIAL

The experiment was conducted at the Rabbit unit of the Livestock Teaching and Research Farm of Bayero University Kano which lies on latitude 11°58.675' North and longitude 8°25.746' East on an elevation of 468m above sea level. It has a mean daily temperature which ranges between 30°C to 33°C and annual rainfall ranging between 787 and 960 mm (KNARDA, 2001). The rabbit unit was disinfected two weeks before the arrival of the rabbits.

Fifteen weaner rabbits of mixed sexes with an average initial weight of 0.70 kg of eight weeks age were sourced from the Rabbit Unit of the National Animal Production and Research Institute (NAPRI) Shika Zaria, Nigeria. The yam peels were shade dried for 5 days and were later crushed to a coarse consistency before been used in formulating the diets.

Five experimental diets were formulated and designated as treatments A,B,C,D and E. Treatment A was a maize based diet which served as the control without yam peels while treatments B, C, D and E were dietary treatments in which yam peels was used to replace maize at 5, 10, 15 and 20% respectively.

At the end of the feeding trial which lasted 12 weeks, two rabbits per treatment were randomly selected for blood evaluation. The rabbits were slaughtered by severing the jugular vein for blood collection. Five (5) ml of blood was collected separately from each animal into bottles containing EDTA (ethylenediamine tetraacetic acid) for haematological parameters and plain bottles without anticoagulant for biochemical indices.

Dry matter (DM), Crude Fiber (CF), Ether Extract (EE), Nitrogen Free Extract (NFE), Ash and Crude Protein (CP) were determined using the AOAC (2005) procedure while Acid-detergent fibre (ADF) and Neutral-detergent fibre of the dietary treatments were determined as described by Van Soest *et al.*,(1991).

The haematological parameters were determined using the Cell-DYN 3500 Hematology Analyzer (Abbott Diagnostic Division, Santa Clara CA). Recommended settings and calibration for rabbit hematology were applied according to the manufacturer's operation manual. Blood samples with EDTA anticoagulant were used for the determination of the selected haematological parameters (Archetti *et al.*, 2008).

The serum biochemical parameters were determined at 37 °C in a random-access clinical analyzer (SYNCRON CX5-DELTA, Beckman Coulter, and Fullerton, U.S.A.) using kits by the same firm. The parameters and the respective methods applied are: aspartate aminotransferase (AST) - Henry method; alanine aminotransferase (ALT) - Henry method; creatinine - colorimetric, Jaffè method; urea - enzymatic colorimetric, urease method; Inorganic phosphorus (Pi), - phosphomolybdate method. (Amadori *et al.*, 1997). Alkaline phosphatase was determined with the enzyme kits (Techon Diagnostics, Tarry-town, NY) as outlined by Hewitt *et al.* (1989).

Other parameters obtained were analyzed colorimetrically for total protein (TP) by the Biurette method with kits (Plasmatec; Plasmatec Laboratory products Ltd., UK). Albumin (Ab) concentration was determined by the bromocresol green (BCG) method (Peters *et al.*, 1982). Cholesterol concentration was determined using the Biurette method of Coles, (1986). Triglycerides were analyzed using the fluorometric

analysis methods, HDL and IDL were determined by ultracentrifugation, precipitation and electrophoresis (Cox and Garcia-Palmieri, 1990).

Bicarbonate was determined by the enzymatic method reported by Forrester *et al.* (1976) using phosphoenolpyruvate (PEP) as a reagent. Plasma electrolytes were determined electrochemically with Ektachem ion-selective electrode slides for chloride, sodium and potassium. Blood calcium was assayed with Calcium Ektachem slides. Appropriate calibrator (Eastman Kodak Co.) was used for the assay (Hewitt *et al.*, 1989).

Data collected were subjected to Analysis of variance (ANOVA) using the SAS (2001) statistical software. Least significant difference (LSD) were used to separate means at $P < 0.05$.

III. RESULTS AND DISCUSSION

Results with respect to haematological profile of weaner rabbits fed graded levels of yam peels replacing maize are presented in Table 1. There were significant ($P < 0.05$) differences in all the variables evaluated except for white blood cells and lymphocytes. Experimental animals placed on the control based diets had significantly ($P < 0.05$) higher haemoglobin, red blood cells, packed cell volume, mean corpuscular haemoglobin, and mean corpuscular haemoglobin concentration. The mean values obtained though statistically significant ($P < 0.05$) did not follow any particular trend.

The values of WBC obtained were all within the reference values provided by Burnett *et al.* (2006) and Van Praag, (2004). The obtained MCV values were all within the values reported by Hewitt *et al.* (1989) except for the control based diet and 15% inclusion levels of yam peels which were higher. All the values obtained for MCH were all within the range reported by Hewitt *et al.* (1989). Both the values for MCHC and Lymphocytes obtained were all within the reference range as reported by Van Praag, (2004). The values for Monocytes obtained were all higher than the range provided by Van Praag, (2004) except that of the control based diet. All the values obtained for the Neutrophils were slightly lower than the reference range provided by Van Praag, (2004) except for that of 5% levels of inclusion. Values

obtained for the platelets were all within the reference range reported by Hewitt *et al.* (1989).

The difference in the value for haemoglobin between the control based diet and the other treatments might be attributed to the anti-nutritional factors present in the test ingredient. The value for the haemoglobin resulted to the occurrences of higher values for PCV, MCV and MCHC in treatment A (the control based diet).

Table 2 presents results with respect to blood chemistry of weaner rabbits fed graded levels of yam peels replacing maize. There were significant ($P < 0.05$) differences in all the variables evaluated except for globulin. Experimental animals placed on 20% inclusion of yam peels had significantly ($P < 0.05$) higher values for total cholesterol, urea, high density lipoproteins, alkaline phosphatase, alanine amino transferase and aspartate amino transferase.

The mean values obtained did not follow any specific trend across the treatments. Values obtained for globulin and total protein fell within the normal reference range values reported by Van Praag, (2004). The values of albumin for animals fed 5% inclusion level of yam peels was within the normal rabbit reference value reported by Van Praag, (2004), while others were slightly lower. The values for total cholesterol obtained for 5%, 10%, and 15% inclusion levels of yam peels were within the reference range reported by Hewitt *et al.* (1989) while that of the control based diet and 20% inclusion levels of yam peels were higher. Values obtained for urea, ALP, ALT and AST were all below the reference values reported by Hewitt *et al.* (1989); Van Praag, (2004); Burnett *et al.* (2006).

Table 3 presents results with respect to serum electrolytes of weaner rabbits fed graded levels of yam peels replacing maize. There was significant ($P < 0.05$) differences in all the variables evaluated. Experimental animals placed on the control based diet had significantly ($P < 0.05$) higher Ca, Cl⁻, K and Na values. The mean values obtained did not follow any specific pattern except that of chloride which had significant ($P < 0.05$) decrease across the treatments. All the values obtained were all lower than the normal reference values reported by Burnett *et al.* (2006); Hewitt *et al.* (1989);

Van Praag, (2004) except for sodium which fell within the value range provided by Burnett *et al.* (2006). All these might be attributed to either the environment or the laboratory analysis techniques being used because the values obtained in the control based diet were as well low.

Table 1. Haematological profile of weaner rabbits fed graded levels of yam peels as a replacement for maize.

Haematological Indices	Treatments					LSD
	A (0%)	B (5%)	C (10%)	D (15%)	E (20%)	
Haemoglobin (g/dL)	18.05 ^a	12.35 ^{cd}	12.95 ^{bc}	11.55 ^d	13.35 ^b	0.909
Red blood cell (10 ⁶ /uL)	6.48 ^a	6.14 ^a	5.97 ^a	4.58 ^b	6.12 ^a	0.909
White blood cell (10 ³ /uL)	6.60	6.55	6.60	7.10	6.95	4.45
Packed cell volume (%)	55.50 ^a	43.95 ^c	49.35 ^b	36.90 ^d	49.00 ^b	4.24
Mean corpuscular volume (mm ³)	81.45 ^b	70.55 ^c	78.05 ^c	87.05 ^a	74.75 ^d	0.909
Mean corpuscular haemoglobin (pg/cell)	26.95 ^a	19.45 ^c	20.95 ^b	27.05 ^a	21.15 ^b	0.909
Mean corpuscular haemoglobin concentration (g/dL)	33.05 ^a	27.85 ^c	26.86 ^d	30.95 ^b	28.25 ^c	0.909
Lymphocytes (%)	69.60	56.20	77.10	73.75	60.45	24.30
Monocytes (%)	2.95 ^d	6.65 ^c	10.75 ^a	8.55 ^b	8.35 ^b	0.909
Neutrophils (%)	29.05 ^{ab}	40.60 ^a	17.40 ^b	21.85 ^{ab}	32.25 ^{ab}	19.39
Platelets (10 ³ /uL)	598.00 ^b	588.00 ^b	736.00 ^a	474.00 ^c	475.00 ^c	18.18

Means with different superscripts denotes significant (p<0.05) difference across rows.

Table 2. Blood chemistry of weaner rabbits fed graded levels of yam peels as a replacement for maize.

Index	Treatments					LSD
	A (0%)	B (5%)	C (10%)	D (15%)	E (20%)	
Albumin (g/L)	22.00 ^b	26.00 ^a	24.00 ^{ab}	21.00 ^b	23.00 ^{ab}	3.64
Total protein (g/L)	50.50 ^c	58.50 ^a	55.50 ^b	56.00 ^b	55.00 ^b	1.82
Globulin (g/L)	28.00	32.00	26.00	29.00	32.00	10.28
Total cholesterol (mmol/L)	2.55 ^b	2.00 ^c	2.00 ^c	2.00 ^c	3.00 ^a	0.364
Urea (mmol/L)	2.20 ^a	1.50 ^b	2.20 ^a	2.00 ^a	2.00 ^a	0.364
Creatinine (mmol/L)	19.00 ^c	35.00 ^a	15.00 ^d	32.00 ^{ab}	30.00 ^b	3.64
Triglycerides (mmol/L)	1.11 ^b	1.11 ^b	1.00 ^b	1.50 ^a	1.21 ^{ab}	0.364
HDL (mmol/L)	0.83 ^{ab}	0.80 ^{ab}	0.50 ^b	0.80 ^{ab}	1.00 ^a	0.364
IDL (mmol/L)	1.56 ^a	1.00 ^b	1.40 ^a	0.90 ^b	0.86 ^b	0.364
ALP (U/L)	2.50 ^{ab}	2.50 ^{ab}	1.50 ^b	1.50 ^b	3.50 ^a	1.82
ALT (U/L)	6.00 ^{ab}	8.00 ^a	7.00 ^{ab}	4.00 ^b	8.00 ^a	3.64
AST (U/L)	8.00 ^{ab}	9.00 ^a	8.00 ^{ab}	5.00 ^b	10.00 ^a	3.64

Means with different superscripts denotes significant (p<0.05) difference across rows

Table 3. Serum electrolyte profile of weaner rabbits fed graded levels of yam peels as a replacement for maize.

Electrolytes	Treatments					LSD
	A (0%)	B (5%)	C (10%)	D (15%)	E (20%)	
Bicarbonate (mmol/L)	14.00 ^{cd}	17.00 ^{bc}	18.00 ^{ab}	21.00 ^a	13.00 ^d	3.64
Calcium (mmol/L)	1.61 ^a	0.91 ^b	1.13 ^b	1.15 ^b	1.11 ^b	0.364
Chloride (mmol/L)	88.00 ^a	85.00 ^a	81.00 ^b	75.00 ^c	72.00 ^c	3.64
Inorganic Phosphate (mmol/L)	0.72 ^b	0.22 ^c	0.91 ^{ab}	1.11 ^a	0.80 ^{ab}	0.364
Potassium (mmol/L)	2.00 ^a	1.70 ^a	1.20 ^b	2.00 ^a	2.00 ^a	0.364
Sodium (mmol/L)	129.00 ^a	125.00 ^{bc}	123.00 ^c	128.00 ^{ab}	117.00 ^d	3.64

Means with different superscripts denotes significant (p<0.05) difference across rows.

IV. CONCLUSION

It is concluded that replacing maize with yam peels up to 20% inclusion level did not have any adverse effect on the weaner rabbits in terms of the haematology and blood biochemical profiles. Thus, cost of production with respect to feeding can be reduced using yam peels as a substitute for maize. It is however recommended that further studies on the optimum level of inclusion of yam peels to be established. Yam peels should be included in other categories of rabbits to ascertain its suitability.

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Sub Compatible and Sub Sequentially Continuous Maps in Intuitionistic Fuzzy Metric Space

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ABSTRACT

The present paper introduces the new concepts of sub compatibility and sub sequential continuity in intuitionistic fuzzy metric spaces which are weaker than occasionally weak compatibility and reciprocal continuity. We also establish a common fixed point theorem four maps using sub compatibility and sub sequential continuity. Our results particularly extend and generalize the result of M. Alamgir Khan et al [28]

Keywords: Fuzzy Sets, Fuzzy Metric, Fuzzy Metric Space, Intuitionistic Fuzzy Sets, T-Conorm, Cauchy Sequence

I. INTRODUCTION

The concept of fuzzy sets was introduced by *zadeh* [13] following the concept of fuzzy sets, fuzzy metric spaces have been introduced by kramosil and michlek [9] and George and veeramani [6] modified the notion of fuzzy metric space with the help of continuous t-norms.

As a generalization of fuzzy sets, Atanassov [14] introduced and studied the concept of intuitionistic fuzzy sets park[11] using the idea of intuitionistic fuzzy sets defined the notion of intuitionistic fuzzy metric spaces with the help of continuous t-norm and continuous t co-norm as a generalization of fuzzy metric space due to George & veeramani [6] had showed that every metric induces an intuitionistic fuzzy metric every fuzzy metric space is an intuitionistic fuzzy metric space and found a necessary and sufficient condition for an intuitionistic fuzzy metric space to be complete choudhary[15] introduced mutually contractive

sequence of self maps and proved a fixed point theorem kramosil & michlek [9] introduced the notion of Cauchy sequences in an intuitionistic fuzzy metric space and proved the well-known fixed point theorem of Banach [4], Turkoglu et al [12] gave the generalization of jungek's common fixed point theorem [19] to intuitionistic fuzzy metric spaces, they first formulate the definition of weakly commuting and R- weakly commuting mapping in intuitionistic fuzzy metric spaces and proved the intuitionistic fuzzy version of pant's theorem[20].

The present paper introduces the new concepts of sub compatibility and sub sequential continuity in intuitionistic fuzzy metric spaces which are weaker than occasionally weak compatibility and reciprocal continuity. We also establish a common fixed point theorem four maps using sub compatibility and sub sequential continuity. Our results particularly extend and generalize the result of M. Alamgir Khan et al [28].

II. METHODS AND MATERIAL

Definition 2.1 [7]. A binary operation $*$: $[0,1] \times [0,1] \rightarrow [0,1]$ is called a continuous t-norm if $([0,1], *)$ is an abelian topological monoid with the unit 1 such that $a * b \leq c * d$ whenever $a \leq c$ and $b \leq d$ for all $a, b, c, d \in [0,1]$. Examples of t-norms are $a * b = ab$ and $a * b = \min\{a, b\}$

Definition 2.2 [7]. A binary operation \diamond : $[0,1] \times [0,1] \rightarrow [0,1]$ is continuous t-conorm if \diamond is satisfying the following condition

2.2.1 \diamond is commutative and associate

2.2.2 \diamond is continuous

2.2.3 $a \diamond 0 = a$ for all $a \in [0,1]$

2.2.4 $a \diamond b \leq c \diamond d$ Whenever $a \leq c$ and $b \leq d$ for all $a, b, c, d \in [0,1]$

Definition 2.3 [4]. the 3-tuple $(X, M, *)$ is called a fuzzy metric space (FM-space) if X is an arbitrary set $*$ is a continuous t-norm and M is a fuzzy set in $X^2 \times [0, \infty]$ satisfying the following conditions for all $x, y, z \in X$ and $t, s > 0$.

2.3.1 $M(x, y, 0) > 0$

2.3.2 $M(x, y, t) = 1, \forall t > 0$ iff $x = y$

2.3.3 $M(x, y, t) = M(y, x, t)$,

2.3.4 $M(x, y, t) * M(y, z, s) \leq M(x, z, t + s)$

2.3.5 $M(x, y, \cdot): [0, \infty] \rightarrow [0,1]$ is continuous.

Remark 2.1 since $*$ is continuous, it follows from (2.3.4) that the limit of a sequence in FM-space is uniquely determined

Definition 2.4 [16]. A five –tuple $(X, M, N, *, \diamond)$ is said to be an intuitionistic fuzzy metric space if X is an arbitrary set $*$ is a continuous t – norm, \diamond is a continuous t-conorm and M, N are fuzzy sets on $X^2 \times (0, \infty)$ satisfying the following conditions for all $x, y, z \in X, s, t > 0$

2.4.1 $M(x, y, t) + N(x, y, t) \leq 1$

2.4.2 $M(x, y, t) > 0$

2.4.3 $M(x, y, t) = M(y, x, t)$

2.4.4 $M(x, y, t) * M(y, z, s) \leq M(x, z, t + s)$

2.4.5 $M(x, y, \cdot): (0, \infty) \rightarrow (0,1)$ is continuous

2.4.6 $N(x, y, t) > 0$

2.4.7 $N(x, y, t) = N(y, x, t)$

2.4.8 $N(x, y, t) \diamond N(y, z, s) \geq N(x, z, t + s)$

2.4.9 $N(x, y, \cdot): (0, \infty) \rightarrow (0,1]$ is continuous

Then (M, N) is called an intuitionistic fuzzy metric on X , the function $M(x, y, t)$ and $N(x, y, t)$ denote the degree of nearness and the degree of non- nearness between x and y with respect to t respectively

Remark 2.1. every fuzzy metric space $(X, M, *)$ is an intuitionistic fuzzy metric space form $(X, M, 1 - M, *, \diamond)$ such that t-norm $*$ and t-conorm \diamond are associated ie $x \diamond y = 1 - ((1 - x) * (1 - y))$ for any $x, y \in [0,1]$ but the converse is not true

Example 2.1. Induced intuitionistic fuzzy metric space [1]

Let (X, d) be a metric space denote $a * b = ab$ and $a \diamond b = \min\{1, a + b\}$ for all $a, b \in [0,1]$ and let $M,$ and N be fuzzy sets on $X^2 \times (0,1)$ defined as follows

$$M(x, y, t) = \frac{t}{t+d(x,y)}$$

$$N(x, y, t) = \frac{d(x,y)}{t+d(x,y)} \text{ Then}$$

$(X, M, N, *, \diamond)$ is an intuitionistic fuzzy metric space. We call this intuitionistic fuzzy metric induced by a metric d the standard intuitionistic fuzzy metric

Remark 2.2. note that the above example holds even with the t-norm $a * b = \min\{a, b\}$ and the t-conorm $a \diamond b = \max\{a, b\}$

Example 2.2. Let $X = \mathbb{N}$ define $a * b = \max\{0, a + b - 1\}$ and $a \diamond b = a + b - ab$ for all $a, b \in [0, 1]$ and let M and N be fuzzy sets on $X^2 \times (0, \infty)$ as follows

$$M(x, y, t) = \begin{cases} \frac{x}{y} & \text{if } x \leq y \\ \frac{y}{x} & \text{if } y \leq x \end{cases}$$

$$N(x, y, t) = \begin{cases} \frac{y-x}{y} & \text{if } x \leq y \\ \frac{x-y}{x} & \text{if } y \leq x \end{cases}$$

For All $x, y \in X$ and $t > 0$ then $(X, M, N, *, \diamond)$ is an intuitionistic fuzzy metric space

Remark 2.3. Note that in above example, t-norm $*$ and t-conorm \diamond are not associated, and there exist no metric d on X satisfying

$$M(x, y, t) = \frac{t}{t+d(x,y)},$$

$$N(x, y, t) = \frac{d(x,y)}{t+d(x,y)}$$

Where $M(x, y, t)$ and $N(x, y, t)$ are defined in above example, also note that the above functions (M, N) is not an intuitionistic metric with the t-norm and t-conorm defined as $a * b = \min\{a, b\}$ $a \diamond b = \max\{a, b\}$

Definition 2.5 [1]. let $(X, M, N, *, \diamond)$ be an intuitionistic fuzzy metric space then

(a) A sequence $\{x_n\}$ in X is said to be convergent to x in X if for each $\varepsilon > 0$ and each $t > 0$ there exists $n_0 \in \mathbb{N}$ such that

$$M(x_n, x, t) > 1 - \varepsilon$$

and

$$N(x_n, x, t) < \varepsilon \text{ For all } n \geq n_0$$

(b) An intuitionistic fuzzy metric space in which every Cauchy sequence is convergent is said to be complete

Definition 2.6 [19]. let A and B maps from a Intuitionistic fuzzy metric space $(X, M, N, *, \diamond)$ into itself. The maps A and B are said to be compatible (or asymptotically commuting) if for all $t > 0$

$$\lim_{n \rightarrow \infty} M(ABx_n, BAx_n, t) = 1$$

and

$$\lim_{n \rightarrow \infty} N(ABx_n, BAx_n, t) = 0$$

Whenever $\{x_n\}$ is a sequence in X such that $\lim_{n \rightarrow \infty} Ax_n = \lim_{n \rightarrow \infty} Bx_n = z$ for some $z \in X$

Definition 2.7[21]. Two mappings A and B of a intuitionistic fuzzy metric space $(X, M, N, *, \diamond)$ into itself are R -weakly commuting provided there exists some real number R such that

$$M(ABx, BAx, t) \geq M(Ax, Bx, t/R)$$

and

$$N(ABx, BAx, t) \leq N(Ax, Bx, t/R) \text{ For each } x \in X \text{ and } t > 0$$

Definition 2.9 .Two self maps A and B on a set X are said to be owc if and only if there is a point $x \in X$ which is a coincidence point of A and B at which A and B commute. i.e., there exists a point $x \in X$ such that $Ax = Bx$ and $ABx = BAx$

Definition 2.10 .Two self maps A and B on an IFM-space $(X, M, N, *, \diamond)$ are said sub compatible if and only if there exist a sequence $\{x_n\}$ in X such that $\lim_{n \rightarrow \infty} Ax_n = \lim_{n \rightarrow \infty} Bx_n = z$, $z \in X$ and which satisfy $\lim_{n \rightarrow \infty} M(ABx_n, BAx_n, t) = 1$ and $\lim_{n \rightarrow \infty} N(ABx_n, BAx_n, t) = 0$ for all $t > 0$

Obviously two occasionally weakly compatible maps are sub compatible maps, however the converse is not true in general as shown in the following example

Exmpla 2.11 .Let $X = [0, \infty)$ with usual metric d and define

$$M(x, y, t) = \frac{t}{t+d(x,y)} \text{ and } N(x, y, t) = \frac{d(x,y)}{t+d(x,y)} \text{ for all } x, y \in X \text{ and } t > 0.$$

Define the maps A, B: X → X by setting

$$Ax = \begin{cases} x^2, & x < 1 \\ 2x - 1, & x \geq 1 \end{cases}, \quad Bx = \begin{cases} 3x - 2, & x < 1 \\ x + 3, & x \geq 1 \end{cases}$$

Define a sequence $x_n = 1 - \frac{1}{n}$, then $Ax_n = (1 - \frac{1}{n})^2 \rightarrow 1$, $Bx_n = 3(1 - \frac{1}{n}) - 2 = 1 - \frac{3}{n} \rightarrow 1$

$$ABx_n = A\left(1 - \frac{3}{n}\right) = \left(1 - \frac{3}{n}\right)^2 = 1 + \frac{9}{n^2} - \frac{6}{n} \text{ and}$$

$$BAx_n = B\left(1 - \frac{1}{n}\right)^2 = 3\left(1 - \frac{1}{n}\right)^2 - 2 = 3\left[\left(1 + \left(\frac{1}{n}\right)^2 - \frac{2}{n}\right)\right] - 2 = 1 + \left(\frac{1}{n}\right)^2 - \frac{6}{n} \text{ and}$$

$$\lim_{n \rightarrow \infty} M(ABx_n, BAx_n, t) = 1$$

and

$$\lim_{n \rightarrow \infty} N(ABx_n, BAx_n, t) = 0$$

Thus, A and B are sub compatible but A and B are not owc maps as ,

$$A(4) = 7 = B(4) \text{ and } AB(4) = A(7) = 13 \neq BA(4) = 10.$$

Now , we aim at our second objective which is to introduce a new notion called sub sequential continuity in IFM-space by weakening the concept of reciprocal continuity

Definition 2.12 . Two self maps A and S on an IFM-space are called reciprocal continuous if $\lim_{n \rightarrow \infty} ASx_n = At$ and $\lim_{n \rightarrow \infty} SAX_n = St$ for some $t \in X$. whenever $\{x_n\}$ is a sequence in X such that $\lim_{n \rightarrow \infty} Ax_n = \lim_{n \rightarrow \infty} Sx_n = t \in X$.

Definition 2.13 . Two self maps A and S on a fuzzy metric space are said to be sub sequentially continuous if and only if there exists a sequence $\{x_n\}$ in X such that $\lim_{n \rightarrow \infty} Ax_n = \lim_{n \rightarrow \infty} Sx_n = t$ for some $t \in X$ and satisfy $\lim_{n \rightarrow \infty} ASx_n = At$ and $\lim_{n \rightarrow \infty} SAX_n = St$.

Remark 2.14. If A and S are both continuous or reciprocally continuous then they are obviously sub sequentially continuous.

The next example shows that there exist sub sequentially continuous pairs of maps which are neither continuous nor reciprocally continuous.

Exmpla 2.11 .Let $X = \mathbb{R}$, endowed with usual metric d and define

$$M(x, y, t) = \frac{t}{t+d(x,y)} \text{ and } N(x, y, t) = \frac{d(x,y)}{t+d(x,y)} \text{ for all } x, y \in X \text{ and } t > 0.$$

Define the maps A, S: X → X by setting

$$Ax = \begin{cases} 2, & x < 3 \\ x, & x \geq 3 \end{cases}, \quad Sx = \begin{cases} 2x - 4, & x \leq 3 \\ 3, & x > 3 \end{cases}$$

Define a sequence $x_n = 3 + \frac{1}{n}$, and $Ax_n = (3 + \frac{1}{n}) \rightarrow 3$, $Sx_n = 3$

$SAX_n = S\left(3 + \frac{1}{n}\right) = 3 \neq S(3) = 2$. Thus A and S are not reciprocally continuous but if we consider a sequence

$$x_n = 3 - \frac{1}{n}, \text{ then } Ax_n = 2, Sx_n = 2\left(3 - \frac{1}{n}\right) - 4 = \left(2 - \frac{2}{n}\right) \rightarrow 2$$

$$ASx_n = A\left(2 - \frac{2}{n}\right) = 2 = A(2), SAx_n = S(2) = 0$$

Therefore, A and S are sub sequentially continuous.

Lemma 2.1[1]. In intuitionistic fuzzy metric space X, $M(x, y, \cdot)$ is non decreasing and $N(x, y, \cdot)$ is non increasing for all $x, y \in X$

Lemma 2.2(1). Let $(X, M, N, *, \diamond)$ be an intuitionistic fuzzy metric space if there exist $k \in (0, 1)$ such that

$$M(x, y, kt) \geq M(x, y, t)$$

and

$$N(x, y, kt) \leq N(x, y, t) \text{ for all } x, y \in X$$

$$\text{Then } x = y$$

Proof: $\because M(x, y, kt) \geq M(x, y, t)$

and

$$N(x, y, kt) \leq N(x, y, t)$$

Then we have

$$M(x, y, t) \geq M(x, y, \frac{t}{k})$$

and

$$N(x, y, t) \leq N(x, y, \frac{t}{k})$$

By repeated application of above inequality as we have

$$M(x, y, t) \geq M(x, y, \frac{t}{k}) \geq M(x, y, \frac{t}{k^2}) \geq \dots \geq M(x, y, \frac{t}{k^n}) \geq \dots$$

and

$$N(x, y, t) \leq N(x, y, \frac{t}{k}) \leq N(x, y, \frac{t}{k^2}) \leq \dots \leq N(x, y, \frac{t}{k^n}) \leq \dots$$

For $n \in \mathbb{N}$ which tends to 1 and 0 as $n \rightarrow \infty$ respectively thus

$$M(x, y, t) = 1$$

and

$$N(x, y, t) = 0$$

For all $t > 0$ and we get $x = y$

Implicit relation let Φ_4 and Ψ_4 denote the set of all continuous functions from $[0, 1]^4 \rightarrow \mathbb{R}$ Satisfying the conditions

Φ_1 : Φ is non-increasing in second and third argument and

Φ_2 : $\Phi(u, v, v, v) \geq 0$ $u \geq v$ for $u, v \in [0, 1]$

and

Ψ_1 : Ψ is non-decreasing in second and third argument and

Ψ_2 : $\Psi(u, v, v, v) \geq 0, \Rightarrow u \leq v$ For $u \in [0, 1]$

Example $\Phi(t_1, t_2, t_3, t_4) = t_1 - \max\{t_2, t_3, t_4\}$

and

$$\Psi(t_1, t_2, t_3, t_4) = \min\{t_2, t_3, t_4\} - t_1$$

III. RESULTS AND DISCUSSION

Theorem 3.1. Let f, g, h and k be four self maps on an Intuitionistic fuzzy metric space $(X, M, N, *, \diamond)$. If the pair (f, h) and (g, k) are sub compatible and sub sequentially continuous, then (3.1) f and h have a coincidence point, (3.2) g and k have a coincidence point.

Further, if

$$(3.3) \varphi \left(M(fx, gy, kt), \frac{M(hx, ky, t) + M(fx, hx, t)}{2}, \frac{M(gy, ky, t) + M(hx, gy, t)}{2}, M(ky, fx, t) \right) \geq 0$$

and

$$\Psi \left(N(fx, gy, kt), \frac{N(hx, ky, t) + N(fx, hx, t)}{2}, \frac{N(gy, ky, t) + N(hx, gy, t)}{2}, N(ky, fx, t) \right) \geq 0$$

For all $k \in (0,1)$ $x, y \in X, t > 0$, and $\varphi \in \Phi_4$ and $\Psi \in \Psi_4$. Then f, g, h and k have a unique common fixed point in X .

Proof. Since the pairs (f, h) and (g, k) are sub compatible and sub sequentially continuous, therefore, there exist two sequences $\{x_n\}$ and $\{y_n\}$ in X such that

$\lim_{n \rightarrow \infty} fx_n = \lim_{n \rightarrow \infty} hx_n = u$ for some $u \in X$ and which satisfy

$$\lim_{n \rightarrow \infty} M(fx_n, hx_n, t) = M(fu, hu, t) = 1,$$

and

$$\lim_{n \rightarrow \infty} N(fx_n, hx_n, t) = N(fu, hu, t) = 0$$

$\lim_{n \rightarrow \infty} gy_n = \lim_{n \rightarrow \infty} ky_n = v$ for some $v \in X$ and which satisfy

$$\lim_{n \rightarrow \infty} M(gy_n, ky_n, t) = M(gv, kv, t) = 1,$$

and

$$\lim_{n \rightarrow \infty} N(gy_n, ky_n, t) = N(gv, kv, t) = 0$$

Therefore, $fu = hu$ and $gv = kv$. i.e., u is the coincidence point of f and h and v is a coincidence point of g and k .

Now, using (3.3) for $x = x_n$ and $y = y_n$, we get

$$\varphi \left(M(fx_n, gy_n, kt), \frac{M(hx_n, ky_n, t) + M(fx_n, hx_n, t)}{2}, \frac{M(gy_n, ky_n, t) + M(hx_n, gy_n, t)}{2}, M(ky_n, fx_n, t) \right) \geq 0$$

and

$$\Psi \left(N(fx_n, gy_n, kt), \frac{N(hx_n, ky_n, t) + N(fx_n, hx_n, t)}{2}, \frac{N(gy_n, ky_n, t) + N(hx_n, gy_n, t)}{2}, N(ky_n, fx_n, t) \right) \geq 0$$

Letting $n \rightarrow \infty$,

$$\varphi \left(M(u, v, kt), \frac{M(u, v, t) + 1}{2}, \frac{1 + M(u, v, t)}{2}, M(u, v, t) \right) \geq 0$$

and

$$\Psi \left(N(u, v, kt), \frac{N(u, v, t) + 0}{2}, \frac{0 + N(u, v, t)}{2}, N(u, v, t) \right) \geq 0$$

Since φ is non-increasing in second and third argument, and Ψ is non-decreasing in second and third argument, therefore we have

$$\varphi \left(M(u, v, kt), M(u, v, t), M(u, v, t), M(u, v, t) \right) \geq 0$$

and

$$\Psi \left(N(u, v, kt), N(u, v, t), N(u, v, t), N(u, v, t) \right) \geq 0$$

Therefore by using the property of φ and Ψ we have

$$M(u, v, kt) \geq M(u, v, t) \text{ and } N(u, v, kt) \leq N(u, v, t)$$

Therefore by lemma 2.2 we have $u = v$.

Again using (3.3) for $x = u$, and $y = y_n$, we obtain

$$\varphi \left(M(fu, gy_n, kt), \frac{M(hu, ky_n, t) + M(fu, hu, t)}{2}, \frac{M(gy_n, ky_n, t) + M(hu, gy_n, t)}{2}, M(ky_n, fu, t) \right) \geq 0$$

and

$$\Psi \left(N(fu, gy_n, kt), \frac{N(hu, ky_n, t) + N(fu, hu, t)}{2}, \frac{N(gy_n, ky_n, t) + N(hu, gy_n, t)}{2}, N(ky_n, fu, t) \right) \geq 0$$

Letting $n \rightarrow \infty$,

$$\varphi \left(M(fu, v, kt), \frac{M(fu, v, t) + 1}{2}, \frac{1 + M(fu, v, t)}{2}, M(fu, v, t) \right) \geq 0$$

and

$$\Psi \left(N(fu, v, kt), \frac{N(fu, v, t) + 0}{2}, \frac{1 + N(fu, v, t)}{2}, N(fu, v, t) \right) \geq 0$$

Since φ is non-increasing in second and third argument, and Ψ is non-decreasing in second and third argument, therefore we have

$$\varphi \left(M(fu, v, kt), M(fu, v, t), M(fu, v, t), M(fu, v, t) \right) \geq 0$$

and

$$\Psi \left(N(fu, v, kt), N(fu, v, t), N(fu, v, t), N(fu, v, t) \right) \geq 0$$

Therefore by using the property of φ and Ψ we have

$$M(fu, v, kt) \geq M(fu, v, t) \text{ and } N(fu, v, kt) \leq N(fu, v, t)$$

Therefore by lemma 2.2 we have $fu = v = u$.

Therefore $u = v$ is a common fixed point of f, g, h and k .

For uniqueness, let $w \neq u$ be another fixed point of f, g, h and k .

Then from (3.3) we have

$$\varphi \left(M(fu, gw, kt), \frac{M(hu, kw, t) + M(fu, hu, t)}{2}, \frac{M(gw, kw, t) + M(hu, gw, t)}{2}, M(kw, fu, t) \right) \geq 0$$

and

$$\Psi \left(N(fu, gw, kt), \frac{N(hu, kw, t) + N(fu, hu, t)}{2}, \frac{N(gw, kw, t) + N(hu, gw, t)}{2}, N(kw, fu, t) \right) \geq 0$$

i.e.

$$\varphi \left(M(fu, gw, kt), \frac{M(fu, gw, t) + 1}{2}, \frac{1 + M(fu, gw, t)}{2}, M(kw, fu, t) \right) \geq 0$$

and

$$\Psi \left(N(fu, gw, kt), \frac{N(fu, gw, t) + 0}{2}, \frac{N(fu, gw, t) + 0}{2}, N(gw, fu, t) \right) \geq 0$$

Since φ is non-increasing in second and third argument, and Ψ is non-decreasing in second and third argument, therefore we have

$$\varphi \left(M(fu, gw, kt), M(gw, fu, t), M(gw, fu, t), M(gw, fu, t) \right) \geq 0$$

and

$$\Psi \left(N(fu, gw, kt), N(gw, fu, t), N(gw, fu, t), N(gw, fu, t) \right) \geq 0$$

Therefore by using the property of φ and Ψ we have

$$M(fu, gw, kt) \geq M(gw, fu, t) \text{ and } N(fu, gw, kt) \leq N(gw, fu, t)$$

Therefore by lemma 2.2 we have $fu = gw$ and hence the theorem

Corollary 3.2. Let f and h be self maps on an intuitionistic fuzzy metric space $(X, M, N, *, \diamond)$. Such that the pair (f, h) is sub compatible and sub sequentially continuous, then

(3.1) f and h have a coincidence point,

Further, if

$$(3.2) \varphi \left(M(fx, fy, kt), \frac{M(hx, hy, t) + M(fx, hx, t)}{2}, \frac{M(fy, hy, t) + M(hx, fy, t)}{2}, M(hy, fx, t) \right) \geq 0$$

and

$$\Psi \left(N(fx, fy, kt), \frac{N(hx, hy, t) + N(fx, hx, t)}{2}, \frac{N(fy, hy, t) + N(hx, fy, t)}{2}, N(hy, fx, t) \right) \geq 0$$

For all $k \in (0,1)$, $x, y \in X$, $t > 0$, and $\varphi \in \Phi_4$ and $\Psi \in \Psi_4$. Then f , and h have a unique common fixed point in X .

Corollary 3.3. Let f, g and h be self maps on an intuitionistic fuzzy metric

space $(X, M, N, *, \diamond)$. Such that the pair (f, h) and (g, h) are sub compatible and sub sequentially continuous, then

(3.1) f and h have a coincidence point,

(3.2) g and h have a coincidence point,

Further, if

$$(3.3) \varphi \left(M(fx, gy, kt), \frac{M(hx, hy, t) + M(fx, hx, t)}{2}, \frac{M(gy, hy, t) + M(hx, gy, t)}{2}, M(hy, fx, t) \right) \geq 0$$

and

$$\Psi \left(N(fx, gy, kt), \frac{N(hx, hy, t) + N(fx, hx, t)}{2}, \frac{N(gy, hy, t) + N(hx, gy, t)}{2}, N(hy, fx, t) \right) \geq 0$$

For all $k \in (0,1)$, $x, y \in X$, $t > 0$, and $\varphi \in \Phi_4$ and $\Psi \in \Psi_4$. Then f, g and h have a unique common fixed point in X .

Exempla 2.11 .Let $X = \mathbb{R}$, equipped with usual metric d and define

$$M(x, y, t) = \frac{t}{t+d(x,y)} \text{ and } N(x, y, t) = \frac{d(x,y)}{t+d(x,y)} \text{ for all } x, y \in X \text{ and } t > 0.$$

Define the maps f, g, h and $k: X \rightarrow X$ by setting

$$f(x) = \begin{cases} x, & x \leq 1 \\ 3x + 1, & x > 1 \end{cases}, \quad h(x) = \begin{cases} 2x - 1, & x \leq 1 \\ 5x - 1, & x > 1 \end{cases}$$

$$g(x) = \begin{cases} 3 - 2x, & x \leq 1 \\ 3, & x > 1 \end{cases}, \quad k(x) = \begin{cases} 2, & x < 1 \\ 3x - 1, & x > 1 \end{cases}$$

Define a sequence $\{x_n\} = \{y_n\} = 1 - \frac{1}{n}$.

Then clearly fx_n, gx_n, hx_n and $kx_n \rightarrow 1$.

$$fh(x_n) = f\left(1 - \frac{1}{n}\right) = \left(1 - \frac{1}{n}\right) \rightarrow 1 = f(1) \text{ and } hf(x_n) = h\left(1 - \frac{1}{n}\right) = \left(1 - \frac{1}{n}\right) \rightarrow 1 = h(1)$$

Thus (f, h) is sub compatible and sub sequentially continuous.

Again,

$$gk(x_n) = g\left(1 - \frac{1}{n}\right) = 3 - 2\left(1 - \frac{1}{n}\right) = \left(1 + \frac{2}{n}\right) \rightarrow 1 = g(1)$$

$$kg(x_n) = g\left(1 + \frac{1}{n}\right) = 3\left(1 + \frac{1}{n}\right) - 2 = \left(1 + \frac{3}{n}\right) \rightarrow 1 = k(1),$$

Which shows that (g, k) is sub compatible and sub sequentially continuous.

Also the condition (3.3) of our theorem satisfied and '1' is unique common fixed point of f, g, h and k .

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Predicting Teens Stress According to Behavioural Activity of Parents Using Naive Bayes Classifier

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ABSTRACT

In today world, depression is a major issue for teenagers. Even depression leads to committing suicides or to addict for drugs or leads to any illegal activities etc., For the successful future of teenagers parents should have more responsibility. In this paper the work is carried out to find the stress level of teenagers if parents are working (Father & Mother). Researchers are using classifier techniques in the field of Medical, Academic, Bioinformatics, Bio computing etc. Using the supervised learning techniques to evaluate the teenagers from the dataset given. Based on the Evaluation to find the teenagers stress level according to parent's behavior. This research will be useful to control or avoid stress factors among teenagers. We can also improve the parental care to teenagers. Using the classification algorithm we can predict the stress level of teenagers.

Keywords: Supervised Learning, Classification Algorithm, Naive Bayes

I. INTRODUCTION

We live in a world where large amount of data are collected daily. Analysing such data is an important task. So we need Knowledge discovery, is an essential process where intelligent methods are used to extract data from large amount of database. Knowledge discovery is known as the process of monitoring new and innovative information from database. In this proposed system, we predict the stress level of teenagers based on the attributes. The attributes are mainly focuses on parents behavior. The attributes are classified in training sets. Classification is the process of assigning new objects to predefined categories or classes. In this approach, the given data sets are learned and classified into groups. Whether which type of teenagers (mother working or housewife) is more stressful. It is a statistical approach to find the stress level. Naïve Bayes classifier is the base algorithm for this research.

II. METHODS AND MATERIAL

A. Naive Bayes Classifier

A Naive Bayes Classifier is a simple probabilistic classifier based on applying Bayes' theorem with strong (naïve) independence assumptions. A more descriptive term for the underlying probability model would be "independent feature model".

In simple terms, a naive Bayes classifier assumes that the presence (or absence) of a particular feature of a class is unrelated to the presence (or absence) of any other feature. For example, a fruit may be considered to be an apple if it is red, round, and about 4" in diameter. Even if these features depend on each other or upon the existence of the other features, a naïve Bayes classifier considers all these properties to independently contribute to the probability that this fruit is an apple.

Depending on the precise nature of the probability model, naive Bayes classifier can be trained very

efficiently in a supervised learning setting. In many practical applications, parameter estimation for naive Bayes model uses the method of maximum likelihood; in other words, one can work with the naive Bayes model without believing in Bayesian probability or using any Bayesian methods.

An advantage of the naive Bayes classifier is that it only requires a small amount of training data to estimate the parameters (means and variances of the variables) necessary for classification. Because independent variables are assumed, only the variances of the variances of the variables for each class need to be determined and not the entire covariance matrix.

The naive Bayes probabilistic model

Abstractly, the probability model for a classifier is a conditional model

$$p(C/F1, \dots, Fn)$$

over a dependent class variable C with a small number of outcomes or classes, conditional on several feature variables $F1$ through Fn . The problem is that if the number of features n is large or when a feature can take on a large number of values, then basing such a model on probability tables is infeasible. We therefore reformulate the model to make it more tractable.

Using Bayes' theorem, we write

$$P(C/F1, \dots, Fn) = p(C)p(F1, \dots, Fn/C) / p(F1, \dots, Fn)$$

In plain English the above equation can be written as

$$\text{Posterior} = \frac{\text{prior} \times \text{likelihood}}{\text{evidence}}$$

In practise we are only interested in the numerator of that fraction, since the denominator does not depend on C and the values of the features Fi are given, so that the denominator is efficiently constant. The numerator is equivalent to the joint probability model

$$p(C, F1, \dots, Fn)$$

This can be rewritten as follows, using repeated applications of the definition of conditional probability:

$$\begin{aligned} & p(C, F1, \dots, Fn) \\ &= p(C)p(F1, \dots, Fn/C) \\ &= p(C)p(F1/C)p(F2, \dots, Fn/C, F1) \\ &= p(C)p(F1/C)p(F2/C, F1)p(F3, \dots, Fn/C, F1, F2) \end{aligned}$$

$$\begin{aligned} &= p(C)p(F1/C)p(F2/C, F1)p(F3 \\ & \quad /C, F1, F2)p(F4, \dots, Fn/C, F1, F2, F3) \\ &= p(C)p(F1/C)p(F2/C, F1)p(F3/C, F1, F2) \dots p(Fn \\ & \quad /C, F1, F2, F3, \dots, Fn - 1 \end{aligned}$$

Now the "naïve" conditional independence assumptions come into play: assume that each feature Fi is conditionally independent of every other feature Fj for $j \neq i$. this means that

$$p(Fi/C, Fi) = p(Fi/C)$$

For $i \neq j$, and so the joint model can be expressed as

$$\begin{aligned} p(C, F1, \dots, Fn) &= p(C)p(F1/C)p(F2/C)p(F3/C) \dots \\ &= p(C) \prod_{i=1}^n p(Fi/C). \end{aligned}$$

This means that under the above independence assumptions, the conditional distribution over the class variable C can be expressed like this:

$$p(C/F1, \dots, Fn) = \frac{1}{Z} p(C) \prod_{i=1}^n p(Fi/C)$$

Where Z (the evidence) is a scaling factor dependent only on $F1, \dots, Fn$, i.e., a constant if the value of the feature variables are known.

Models of this form are much more manageable, since they factor into a so-called class prior $p(C)$ and independent probability distribution $p(Fi/C)$. If there are k classes and if a model for each $p(Fi/C = c)$ can be expressed in terms of r parameters, then the corresponding naive Bayes model has $(k - 1) + nrk$ parameters. In practice, often $k = 2$ (binary classification) and $r = 1$ (Bernoulli variables as features) are common, and so the total number of parameters of the naive Bayes model is $2n + 1$. Where n is the number of binary features used for classification and prediction.

Evaluating classification algorithms

- I tell you that it achieved 95% accuracy on my data.
- Is your technique a success?

Types of errors

- But suppose that
 - The 95% is the correctly classified pixels
 - Only 5% of the pixels are actually edges
 - It misses all the edge pixels

Types of Errors

	Prediction	
	Edge	Not
Edge	True Positive	False Negative
Not Edge	False Positive	True Negative

B. Data Processing for Proposed Methodology

Stress level of students can be measured using the following attributes. Each attribute, assign scaling. In this Research work for each attribute the scaling differs. The attributes are

1. Spending time with mother
2. Playing with mother
3. Sharing information regarding school
4. Sharing family problems
5. Outing with parents
6. Comparison with siblings
7. Comparison with friends
8. Parents understanding
9. Watching tv with parents
10. Family background
11. Type of family
12. Academic performance
13. Getting advices
14. Type of child
15. Favorite place (home/School)
16. Favorite person (parents / friends)
17. Future Decision

Similarly in this research work 39 attributes are used to predict the teenagers stress level. According to this pruning can be done to get a good result.

C. Proposed Methodology

Step 1 : The initial step in supervised learning is the collection of dataset. If the expertise is available then data on the informative features can be collected.

Step 2: The data preprocessing step involves reducing noise by instance selection. There are several methods available to handle missing data.

Step 3 : The training set is defined by feature subset selection , in which the irrelevant and redundant features are removed.

Step 4 : The algorithm is trained using a training data set.

Step 5 : The algorithm is tested with a test data set . Once the evaluation from the preliminary testing is satisfactory, then the classifier can be used for prediction. The classifier is evaluated based on accuracy.

Step 6 : If the accuracy is not satisfactory then the process needs to return a previous step re- examine certain attributes. The re-examine factors are

- Relevant features are missing for the problem
- Requirement of larger data set
- Selected algorithm may be inappropriate
- Attribute tuning needed

Using Naive bayes classification algorithm the independent data are used to find the accuracy of results. The expected results are to find each teen ager stress level. The stress levels are

Types of stress	Range
Positive stress	0.7 - 1.0
Early stress	0.4 - 0.69
Negative stress	Below 0.4

Classification algorithm will be useful for supervised learning and also to predict the stress level. The computational cost and accuracy will be efficient.

III. CONCLUSION

In this research work, using classification algorithm to predict the stress level of teenagers according to behavioral activity of parents. Counseling can be provided to each teenagers and also parents to improve the performance of their children's behaviour in both physical and mental activities. It will help to avoid suicides and control illegal activities.

Further we can do this work for employee stress level according to managerial behavioral or women stress level if working.

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Solar, Rains, Wind, Charged Cloud, Lightning, Thunder Energies Integrating Electrical Power Generation System

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ABSTRACT

An inventing electrical power generation system is developed by integrating simultaneously solar energy, rains energy, wind energy, charged cloud energy, lightning energy, thunder energy which are assigned as non-conventional or renewable energy sources. All the natural wastage energies are used for production of electricity. Electrical power is accomplished with a minimum cost and pollution free to anywhere in the world at all times. This process reveals a unique step in electricity generation and availability from natural resources without hampering the ecological balance. We can have an uninterrupted power supply irrespective of the natural condition without any sort of environmental pollution. Moreover, this process yields the least production cost for electricity generation. Utilization of charged cloud and lightning with thunder energies for generation of electricity reveals a new step. In this paper, pollution and accident free integrated green electricity generation system is described to safe guard the world in a unique way from electrical power crisis.

Keywords: Charged cloud electric power generation system, Hydroelectric power plant, Lightning electric power generation system, Non-conventional energy sources, Nuclear electric power plant, Rains electric power generation system, Solar electric power generation system, Solar-rains-wind-charged cloud-lightning-thunder energies – integrating electrical power generation system, Thermal electric power plant, Thunder electric power generation system, Wind electric power generation system.

I. INTRODUCTION

At present it is indispensable to find out the renewable or the harvesting electricity (electrical power) sources for domestic as well as commercial purposes. At present in world, more than 50% of people and in India 60% of people are not getting electricity in their daily life. For electricity such as lighting, cooking, moderate machine operating etc. people are extremely depending on oil like kerosene, diesel, petrol, bio-oils, gas and other bio-materials like trees, extracts of food grains etc. These firing of oils or bio-materials cause extreme pollution to nature [1]-[3]. Secondly our conventional power generating station like thermal electric power plants [3], [10]-[11], hydroelectric power plants [9], [10]-[11], nuclear electric power plants [10]-[11] etc. are causing heavy pollution to nature and living world. Dust, ashes and disposals (outcome) of these electric power stations are extremely harmful to the living world, the radioactive ashes of the nuclear electric power plants are

not only rejecting immediate harmful materials, but it has a long lasting action also, since it emits radioactive radiations (α , β , γ -rays) for a long time. Coal and other burning materials ashes, numerous poisonous gases like CO, CO₂, methane and hydrocarbons etc. are the disposals of thermal electric power stations which are the most popular and highly electric power generation method adopted throughout the world at present. Thus the thermal electric power plants are causing extreme pollution to our mankind and nature. Lot of diseases with handicapped effect are the fruit of these electric power plants.

Also natural resources like coal, oil, radioactive materials etc. will come to shortage stage or an end in near future. The other electric power generating systems like hydroelectricity power plants cannot afford much power, although these cause less pollution. Thus it needs urgent invention to go for non-conventional or renewable energy resources. The main advantages of the

renewable electric power generation systems are that no carbon (CO, CO₂, CH₄, hydrocarbon etc.) emission in the atmosphere takes place, i.e., environmental pollution is nil, and no raw materials (coal, nuclear fuel etc.) are exhausted. The most popular non-conventional electric power resources are solar energy electric power generation system which converts solar energy or solar heat to electricity. Solar electric power system has some drawback also, that is, it cannot generate electric power in cloudy or rainy days. Therefore, people using this solar system have to remain without electricity (power) after battery or accumulator circuit gets discharged during the rainy season or the sun's shortcomings, since it is totally depended on appearance of the sun in the sky. Moreover, it has very much limited capacity. We cannot capture all available solar energy in a place, because it is urgently required in all other fields also, e.g., biological body or health care, agriculture, chemical reactions, industries etc. Therefore, we have to search all other renewable electrical power sources from the nature such as rains water, wind flow, charged cloud, lightning, and thunder energies which can be easily converted as a good and reliable electrical energy source. By converting the natural energies into electricity, the natural balance and harmony is maintained.

II. METHODS AND MATERIAL

A. Solar Electric Power Generation System

The sun is a continuous fusion reactor in which hydrogen combines to form helium and evolving huge amount of heat energy as per the following reaction:



This heat energy from the sun [1]-[8] is emitted in the universe and the earth by transmission of tiny bundles of energy particles called photons which move with finite speed (almost speed of light). When photons strike an atom, they interact with the electrons by transferring their energy and hence they are absorbed. The Sun rays are composing of different wavelength spectrum from the low to the very high ranges, but UV (ultra-violet) radiation, other low and very high range wavelength radiations are absorbed by ozone, oxygen, nitrogen, watervapors etc. lying above the earth's atmosphere. Thus the sun rays consist of wavelength (λ) radiation between 0.29 μm to 2.3 μm (approximately).

A solar cell [2]-[8] consists of a basic element, named photovoltaic (PV) generator, usually as doped semiconductor materials, e.g., photodiode, phototransistor etc. Photovoltaic (e.m.f.) generation is caused by the sun light radiation, i.e., the photons absorption that separate positive and negative charge carriers in the absorbing semiconductor materials. These charges, constitute an electric voltage, can afford a current for use in external circuit or load.

Different types of solar cell materials are single crystal, polycrystalline and amorphous silicon, and compound of thin film semiconductor materials. Variety of semiconductor compounds such as CuInSe₂, CdS, CdTe, Cu₂S, InP etc. are used to manufacture thin film solar cells. The combinations of different band gap (E_g) materials lead to photovoltaic generator of much higher efficiencies.

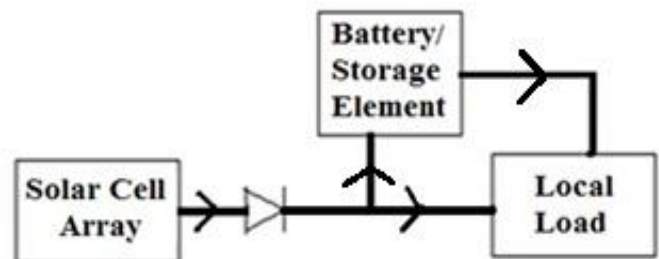


Figure 1: Basic solar (photovoltaic) electric power generation system

The solar electric power generation system is planned accordingly Fig. 1. The solar cell array or panel consists of an appropriate number of solar cell modules connected in series or parallel to provide the required voltage and current. Storage batteries as shown in Fig. 1 provide the backup power during no sun shine period by storing the excess electric power or some portion of electric power from the solar arrays. This solar electric power generating system is used for private power consumption, meteorological stations, Radio or TV relay stations, entertainment places like cinema, hotel, restaurant, villages and islands.

The small size solar array or panels are fitted in addition on the roof or the earth to the wall, the sunsets, the balcony etc. of a building or a structure, such that full solar energy falling on the building can be utilized. Making this type arrangement, inside of the building will remain in very moderate temperature even in hot summer times.

B. Rains Electric Power Generation System

In this system the energy of water is utilized to drive the turbine [1]-[3], [9]-[11] which in turn runs the power generator to produce electricity. Rains falling on the earth's surface have potential energy relative to the oceans level. This potential energy is converted to shaft work or rotate, in which the water falls through an appreciable vertical distance (minimum 9 feet). The hydraulic power obtained from the rains water is thus a naturally available renewable energy source. It is expressed as $P = \rho g Q H$ watt, where P is the hydraulic power in watt, g is 9.81 m/s^2 (the acceleration due to gravity), ρ is the water density ($\rho = 1000 \text{ kg/m}^3$), Q is the flow or discharge in m^3/s and H is the height of fall of water in m. The electrical energy produce in kwh is written like this, $W = 9.81 \times 1000 \times Q \times H \times \eta \times t$ kwh. Here t is the operating time in hours and η is the efficiency of the turbine generator assembly which varies 0.5 to 0.9. The rains power developed thus depends on Quantity (Q) and Head (H) of water. The circuit diagram of the rains power generation system is the same as that of the solar system which is shown in Fig. 1. The only difference is that in place of the solar array, we apply the rains power generator having turbine assembly.

In rainy times, the rains water are collected in a reservoir or roof top which are kept at a certain height like the height of a building or on a hill or above usual water tank etc., this collected water is allowed to fall from that height (at least 9 feet to 15 feet or more) to the blades of small turbine whose shaft fed to a dynamo (small type). The current, develops in the dynamo due to rotation of light turbine blades, is supplied to the local load as well as charging the batteries or storing in the accumulator circuit which consists of capacitors and inductors or integrated circuits (ICs) etc. While the sun appears, the local load and the batteries can be fed by the solar panel. Therefore, the electric power from these renewable energy sources like the solar or the rains is available all times in a day, also in the night period when the rain falls. This power generation system does not produce any kind of environmental pollution.

C. Wind Electric Power Generation System

The wind energy [7], [11] is a renewable source of energy. It is used to run a windmill which in turn drives

a wind generator or a wind turbine to produce electricity. Practically it is observed that the flexible three blades propeller about 35 m in diameter, in a 60 km/hr wind pressure with a rotation speed of 47 rpm produce maximum power 12 MW. For small wind power generation system, multiple blade type (3 to 5 number blades) or Darrieus type (Curved Blade 3 to 5 numbers) is highly suitable. The main drawback of this system is that as the wind speed or velocity is not constant with respect to time, i.e., fluctuating; hence the electric power thus obtained is also not having predetermined value like varying nature. Thus it is better to feed the wind electricity to the battery or any power storage device, i.e., accumulator circuit which supply to the load later on accordingly, rather directly supply to the load as shown in Fig. 2.

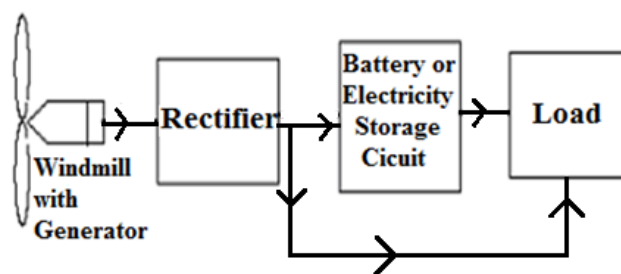


Figure 2: Block diagram of windmill electric power generation system

In wind electric power generation system, the electric power increases in proportion to the cube of the wind speed. Thus it is highly enhanced in rainy and stormy period when the wind speed is excellent to produce electricity. This electric power generation system is pollution free pure ecologically balanced one. Small size wind mill with generator either horizontal or vertical or inclined with a certain angled blades can be placed on the wall, the sunsets etc. of a building for utilizing the maximum power of wind in all directions. Making this event, inside of the building will remain under sweet temperature with smooth environment.

D. Charged Cloud and Lightning Electric Power Generation Systems

In this proposed electric power generation systems, the static electric charge containing a lightning [11] or before lightning by a charged cloud are stored. There are several ways in which a charged cloud or a lightning energy can be stored as electrical energy, and subsequently it can use as a source for electric supply. Especially this huge amount of electrical energy

obtained from a charged cloud or a lightning is a remarkable green electrical energy sources with the least cost for production, transmission and maintenance etc. An average lightning carries current about 50 kA, charge 30 coulombs and energy 1 GJ. Lightning is accompanied by thunder which is high intensity deep sound. Therefore, thunder (loud sound) energy can be converted to electricity also. This is described elaborately in different procedures below.

It is seen that cause of rains, lightning and thunder is clouds that carry the charge either positive or negative nature. Today it is the subject of scientific research that how a cloud becomes statically charged? We observe that the lightning, which creates by the collision of charged clouds in the sky, falls on the earth causing huge destruction to living and non-living properties.

Generally the clouds are consisting of water vapors with other chemical atoms in much cooled ice stage moving in the sky. Gradually the clouds collect electrostatic charge either positive or negative by frictional collisions among the tiny particles of ice, water droplets and other materials, different radiations with various frequencies in the sky, such as, cosmic rays, ultraviolet rays, electromagnetic waves etc. Whenever two or more clouds having different charges like positively and negatively charged clouds collide with each other, then the heavy spark generates which is named as lightning followed with thunder. It is clearly explained in Fig. 3. The heat generated in the clouds by this collision produce rains, i.e., ice of the clouds are melted by this frictional and electrical heat, and accordingly rains appear as per humidity present in the surrounding air. Again the remaining clouds after collision possess very less charge, because most of the charges in the clouds are neutralized.

The intensity of the lightning and the thunder depends on so many parameters (factors) of the colliding clouds like charge carrying, mass, velocity, frictional area, different elements and compounds present etc. Therefore, the clouds hold electrostatic charge either positive (+) charge or negative (-) charge, i.e., voltage. There are two types of lightning known as positive lightning and negative lightning. When the more amounts of positive charged cloud strikes with the less amounts of negative charged cloud, then positive lightning happens; and when the more amounts of negative charged cloud

collides with the less amounts of positive charged cloud, negative lightning falls. Positive lightning is often considered more dangerous than negative lightning, because its electrical field is stronger. In case of a positive lightning the flash duration is typically longer, and its peak charge can be much greater than a negative strike. Also a lightning can have 100 million to 1 billion volts and contains billion of watts. Thus it assures a giant source of electrical energy.

Therefore, these charged clouds are trying to release the charge by hook or crook. Also when this charge on the clouds is sufficiently high enough to break down the insulation of air, this heavy electrical energy (charge) drops to the earth as lightning and thunder. Whenever this electrostatic charge on the clouds is not released, the clouds hold the charge moving hither and thither with charged condition either positively charged or negatively charged. This phenomenon is called wait state of the charged cloud.

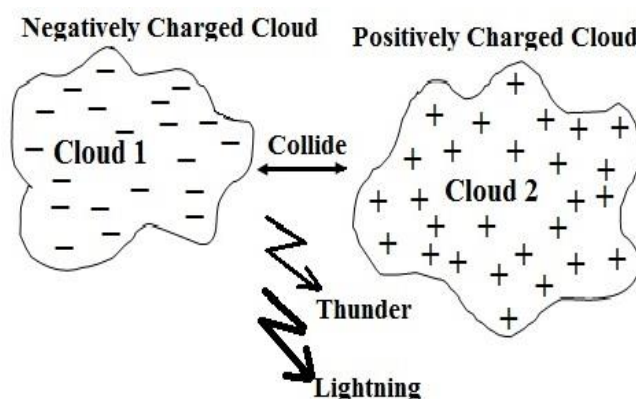


Figure 3: Collision of the clouds

i First Technique for Charged Cloud and Lightning Electric Power Generation

Lightning source possesses huge amount of electricity. This renewable lightning electric power generation is designed to capture lightning first time for human use. Generally during raining and thunder-storm time, lightning is a daily affair which causes casualties and natural disasters. The large number of lightning arrestors or catchers in a locality at the top of high rise buildings, trees and structures for antenna mounting (tower) etc. are fitted. Each of the lightning arrestors is connected to a common collection resource or transducer placed at a central location by good and sufficient thickness (gauge) conducting wire like copper or any alloy made. Generally clouds are moving in the sky with charged

condition either positively charged or negatively charged. Whenever this charged cloud comes nearer to the lightning arrester, they induce opposite charge to the lightning arrester. Since the lightning arrester on the top is designed like spike, the induced charge on the spike charges the surrounding air. This charged air (same type as induced in the lightning arrester) is attracted or rushed towards the charged cloud. As the two charges are opposite, the charge on the cloud will be neutralized by the charge of the air. Since the lightning arrester is induced charge by wait state of the charged cloud, so this charge on the lightning arrester can be converted or stored to electrical energy as voltage and current.

Again at the time of charged cloud or lightning, the lightning arrestors catch electrical energy which is a.c. electric nature mixed with sufficient quantity d.c. also, i.e., huge amount of electricity flows through the conducting feeder wire or cable and associated circuitry. The electrical energy captured by the lightning arrestors either at the time of charged cloud or lightning is passed through high duty rectifier circuit to convert all types of electrical energy in d.c. form. If the charged cloud or the lightning is consisting of very high voltage which are incapable of handling by the rectifier circuit, this high voltage charged cloud or lightning is grounded by the arrangement made in the rectifier circuit. Then rectifier output d.c. electric voltages are passed to the n number of capacitors, connecting parallel marked as $C_1, C_2, C_3, \dots, C_n$, which is shown in Fig. 4.

Each capacitor is having very high capacitance range like hundreds of farad which are generally used in high tension line or power electronics circuit. If capacitor with high capacitance is not available, then a block of parallel capacitors is used instead of single capacitor for providing high equivalent capacitance. The capacitors are connected parallel due to their equivalent or total capacitance is within high value range, such that, they can accept the total charge (voltage) carrying by the charged cloud or the lightning. The total or equivalent capacitance (C_{eq}) for n number of parallel connected capacitors $C_1, C_2, C_3, \dots, C_n$ is expressed as, $C_{eq} = C_1 + C_2 + C_3 + \dots + C_n$.

When the total charge (Q) is fed to the n number parallel connected capacitors, this total charge (Q) is divided among the capacitors like $Q_1, Q_2, Q_3, \dots, Q_n$. Since $Q = C_{eq} \times V$ coulomb, where C_{eq} is a constant,

here as total capacitance of the capacitors in farad, and all parallel connected capacitors will be charged up to the supplied voltage V volt. As C_{eq} is having very high value due to all capacitors connected parallel, the voltage (V) developed across the each capacitor is within reasonable value, for that the capacitors are not damaged or burnt. If the capacitors are connected in series, the total capacitance is having very low value, and the charging voltage will be very high value; as a result they may not withstand such high voltage.

Reactance offered by a capacitor having capacitance 'C', to an a.c. voltage of radian frequency ω rad/s is given by, $X_C = \frac{1}{\omega C}$, and the instantaneous current (i) and the instantaneous voltage (v) across a capacitor are expressed as, $i = \frac{dQ}{dt} = C \frac{dV}{dt}$, $v = \frac{1}{C} \int idt$. In case of a d.c. voltage source, since d.c. is having very low frequency, i.e., $\omega = 0$, $X_C = \infty$ [infinity], $i = 0$, no current flows through the capacitors, only the capacitor's terminals (plates) will be charged by the applied d.c. voltage.

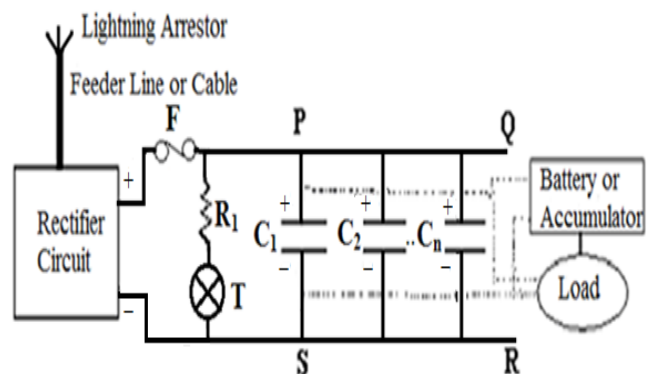


Figure 4: Circuit diagram of Charged Cloud and Lightning electric power generation system by parallel capacitors connected parallel with a rectifier circuit.

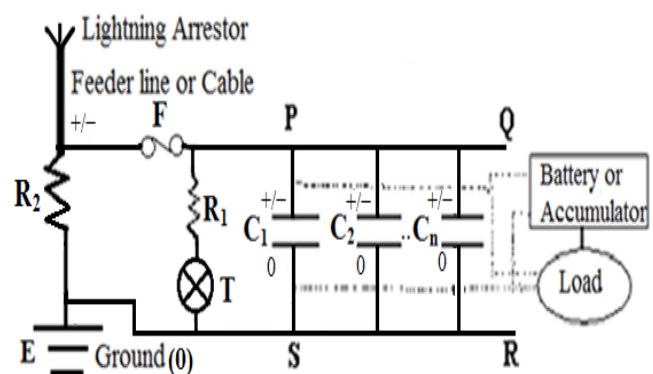


Figure 5: Circuit diagram of Charged Cloud and Lightning electric power generation system by parallel connected capacitors directly.

The maximum voltage of the capacitors may be up to the supplied d.c. voltage. If high duty rectifier is not able to manufacture or very costly, then it can be curtailed or eliminated from the lightning electricity circuit, in this case the lightning arrestors are directly fed to the parallel capacitors connecting with a resistance R_2 in parallel as shown in Fig. 5, and these parallel connected capacitors become charged to their maximum voltage.

A lamp or bell (T) fitted with resistance (R_1) indicates the presence of a charged cloud or a lightning. When the lamp or the ringer (T) activates, it means that a charged cloud or a lightning appears. After charging the capacitors, they are disconnected from the lightning arrestor circuit, then this charge (voltage) on the capacitors act as electrical energy source to the connected load; or set of storage batteries like jelly filled batteries or accumulator circuit are charged by these charged capacitors for permanent storing of electrical energy or voltage, otherwise the charge on the capacitors will be leakage, i.e., discharge automatically. Hence the charged capacitors or the charged batteries or the charged accumulator circuit act as a d.c. voltage source and they can easily fed to the load as an electric power or voltage source. Again we can convert this d.c. voltage and current to a.c. voltage and current by an inverter circuit manufactured by thyristors and integrated circuit (ICs) chips as per our requirement.

In Fig. 5, the lightning arrestors are directly connected to the n number of parallel capacitors $C_1, C_2, C_3, \dots, C_n$, through fuse or circuit breaker F, the resistance R_2 is connected parallel to the capacitor's circuit such that the resistance value of R_2 is more than the total impedance (resistance) value of the capacitor's circuit. Therefore, under normal condition the charged cloud or the lightning energy (charge or voltage) will pass through the parallel capacitors only, hence the capacitors will be charged to available voltage.

Thereafter, these charged capacitors deliver electric power or voltage to the load or to store in the battery or the accumulator circuit. When high duty fuse or circuit breaker (F) will fire or cut due to heavy charge (voltage) containing in the charged cloud or the lightning, then the charged cloud or the lightning is grounded or earthed (E) through resistance R_2 to safe guard the whole circuit as well as the surrounding medium.

ii Second Technique for Charged Cloud and Lightning Electric Power Generation

Another procedure for deriving electricity from a charged cloud or a lightning source is achieved by any electrical power transducer circuit, i.e., converting electrical energy to the other form of energy, e.g., heat energy or mechanical energy or any other form of energy etc.

Then this transformed energy like heat or mechanical or other form energy etc. is converted to electrical energy. The transducers, using for charged cloud or lightning electric power storing, convert this huge amount of electrical energy either to heat energy by suitable metal or alloy plates, e.g., nichrome (Ni-Cr) alloy, ceramic alloy, thermocouple etc. or to mechanical energy by motor, rotor etc. or to any other energy. Subsequently this heat energy or mechanical energy or transformed energy is converted to electrical energy acting as power resources which is delineated in Fig. 6.

In Fig. 6, V and I are the total voltage and the total current received from the charged cloud or the lightning source. Then this V is subdivided into three or more voltage quantities like V_1, V_2, V_3 etc., when the transducers are connected in series, and this I is subdivided into three or more current quantities like I_1, I_2, I_3 etc., when the transducers are connected in parallel. Now these divided voltages and currents supply three or more transducer plates for converting these voltages and currents to heat or mechanical or any other energy. Thereafter, these heat or mechanical or changed energy quantities are further converted to electrical energy by suitable transducers as shown in Fig. 6. Finally, the output electric power as derived from the charged cloud or the lightning source is employed for use in variety of purposes from domestic to commercial. T is a lightning indicator either lamp or bell type fed with very high resistance (R_1) to the rectifying or the direct output for indicating the presence of electric power in the circuit as shown in Fig. 6.

This process is done by the following procedure. Three sets of capacitors, as each set in the panel PQRS of Fig. 4 or Fig. 5, are taken. Each set of capacitors is connected with one series resistance from R_3, R_4, R_5 where R_3, R_4, R_5 may be equal or not. If the impedances of the set of capacitors connected with the respective resistances are

equal, then the voltages and the currents in different sets of the capacitor circuits are same, otherwise they differ. Therefore, these sets of capacitors with the resistances tunnel the total charge (voltage and current), and accordingly they are charged. After completely charging, the charged capacitors are disconnected from the lightning arrester circuit. Now they are discharged electrical energy to heat or mechanical or any other form of energy by the transducers arrangement, later on this heat or mechanical or any other form of energy is converted to electrical energy by another set of transducers, finally this electrical energy (electricity) is supplied either to the load or the battery for storing. For discharging the capacitors it requires some time, i.e., the rate of discharge depends on our requirement. Thus for further picking up a charged cloud or a lightning source by the same circuit, the lightning arrestors circuit is switched over to another set of fully discharged capacitors or activate transducers. Hence, the same lightning plant is safely used for frequent appearance of the charged cloud or the lightning.

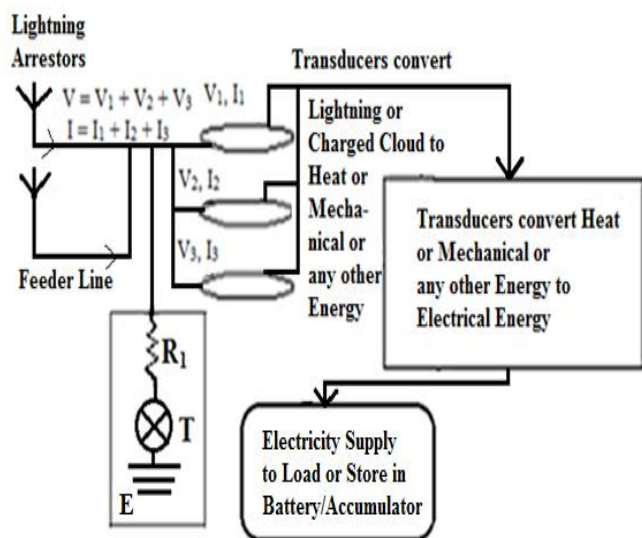


Figure 6: Block diagram of Charged Cloud and Lightning electric power generation system with parallel plate transducers.

iii Third Technique for Charged Cloud and Lightning Electric Power Generation

Generally more numbers of different parallel capacitors circuits (PQRS), say 5 numbers, as designed in Fig. 4 or Fig. 5 are taken. Each parallel capacitors circuit is connected with one resistance in series from the resistors R_3 , R_4 , R_5 , R_6 and R_7 as shown in Fig. 7. Now the

lightning arrester line is connected parallel with these different sets of parallel capacitors (e.g. 5 sets) in which each set is connected one resistance in series from R_3 , R_4 , R_5 , R_6 and R_7 respectively.

The lightning arrester line is directly connected to ground through resistance R_2 which is parallel to the each set of capacitors. The resistance value of the connecting resistors R_2 to R_7 are chosen as $R_2 > R_3 > R_4 > R_5 > R_6 > R_7$; so that, R_2 has the highest resistance value and R_7 has the lowest resistance value. The parallel capacitors used in each set of circuits are equal number and same type. Therefore, the impedance of each set of capacitors is constant, i.e., same with the other set of capacitors. When each set of capacitors is connected to one resistance in series like R_3 or R_4 or R_5 or R_6 or R_7 , the difference of the impedances among the sets of capacitors are equal to the difference of the corresponding resistances connected to the sets of capacitors. Therefore, the charged cloud or the lightning carrying electrical energy (voltage and current) always seek less impedance or resistive path to pass through a circuit. Normally maximum charge or voltage will go through R_3 to R_7 connected capacitors circuits, provided these capacitors circuits are in good workable condition.

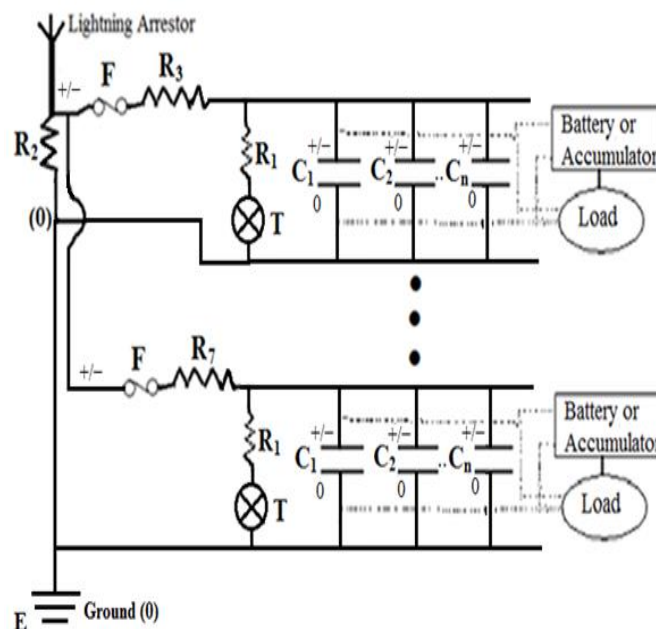


Figure 7: Circuit diagram of Charged Cloud and Lightning electric power generation system by different sets of parallel connected capacitors with changing impedance values.

When all the capacitors circuits connecting by R_3 , R_4 , R_5 , R_6 and R_7 respectively are disconnected from the lightning arrester by operation of the fuse or the circuit

breaker (F) due to consisting of very high electric charge in the charged cloud or the lightning, that very high charge or voltage is safely grounded through resistance R_2 . The resistances R_3 , R_4 , R_5 , R_6 and R_7 are selected such as they are comfortable for the fuse or the circuit breaker for safe guard the circuit. After being fully charged, the charged capacitors are separated from the lightning circuit. Then the charged capacitors are either connected to the load directly or to the charging circuit of the batteries or the accumulator circuit for permanent storing the electrical charge or voltage.

iv Fourth Technique for Charged Cloud and Lightning Electric Power Generation

In this technique, the lightning arrestors with the capacitors circuits are fitted on the solar panels using in rural and urban areas as shown in Fig. 8.

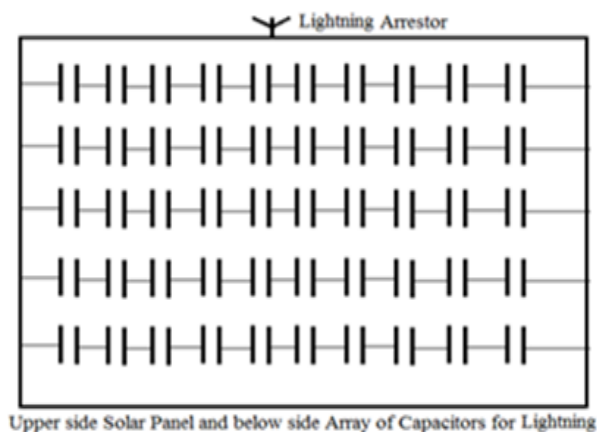


Figure 8: Charged Cloud and Lightning electric power generation system installed in the solar panel

The parallel sets of capacitors are kept below the solar panel such that in case of picking a charged cloud or a lightning, the capacitors become charged. After charging the capacitors, the capacitors are discharged either through the same solar circuit or separate discharging circuit, since during the charged cloud or the lightning time generally the solar system is not working. Therefore, we do not construct separate network to supply the electrical energy to the load or store in the battery for a charged cloud or a lightning appearance.

The normal electric supply transmission network or power grid line with a stipulated distance can be applied to bring the charged cloud or the lightning energy to the lightning plant located at a central place. Hence it covers

a huge area for capturing charged cloud or lightning energy. This high tension commercial electric power supply line can be used as lightning arrestor after disconnecting from the commercial generators and transformers, especially in cloudy rainy and thunderstorm times, when a charged cloud and a lightning is highly predicted. Then the charged cloud or the lightning can be captured by the lightning arrestors fitted on the transmission lines, and this charged cloud or lightning energy charges the sets of capacitors connected parallel to each other. Hence, the above described electrical power generation techniques from the charged cloud or the lightning produce reliable good amount of electricity.

E. Thunder Electric Power Generation System

After each lightning, nearby areas are trembled or jerked with deep sound called thunder. This high intensity thunder energy can be converted to electricity (voltage and current) using suitable transducer. Now-a-days piezoelectric crystals are more popular to convert sound energy to electrical energy. When this piezoelectric crystals are subjected to pressure or force on the two opposite faces, positive and negative electric charges (potential difference or voltage) are produced on these two opposite faces; the signs of these charges (voltage) are reversed if the pressure is replaced by tension. If such piezoelectric crystals are subjected to an electric potential, an alteration in size of the crystals is taking place. Thus the pressure on the opposite two faces of a piezoelectric crystal is increased; electrical voltage develops on the faces. Since a piezoelectric crystal is able to offer very low voltage while stressed or pressurized, so lot of piezoelectric crystals are used to store thunder energy from a lightning.

These huge numbers of piezoelectric crystals are connected in series, i.e., positive voltage terminal of one crystal is connected to negative voltage terminal of other crystal, such that, the total available voltage is the sum of all individual voltages offering by the piezoelectric crystals. Therefore, by using piezoelectric crystals with diaphragms which activate pressure on the piezoelectric crystals, we can have good amount of electricity from a thunder. This electrical energy derived from the thunder is either fed to the load or storing in the battery or the accumulator circuit.

F. Solar, Rains, Wind, Charged Cloud, Lightning, Thunder Energies – Integrating Electrical Power Generation System

To eliminate the above drawbacks of individual renewable power generation system derived from solar or rains or wind or charged cloud or lightning or thunder energy, a new electrical power generating system by integrating all the renewable power sources available from natural resources simultaneously is designed, so that, power supply remains continuous without any sort of interruptions or load shedding. This solar-rains-wind-charged cloud-lightning-thunder energies integrating electrical power generation system can offer requisite amount of power suitable for household as well as commercial purposes in all times. Thus we have not to depend on certain environmental (natural) condition, i.e., the sun or the rains or the wind speed or the charged cloud or the lightning or the thunder appearance at all.

We see, if the sun does not appear throughout a day or appear for lesser time in a day, then the probability of appearing rains with charged cloud, lightning and thunder are too much high in that day. Most of the cases the rains fall in that day with or without the lightning and the thunder obviously. Therefore, we consider that there are two conditions of environment in a day, i.e., either the sunny times or the rainy times. Also in the rainy times, generally wind flow, i.e., speed of the wind is increased and probability of the charged cloud or the lightning is higher. Therefore these six natural non-conventional sources are intelligently used for electrical power generation. So, all the resources in the nature like solar, rains, wind, charged cloud, lightning and thunder energies are integrated in a unique way. This is done first time.

Generally at present solar power system, full charged battery or storage circuit cannot supply the requisite power to the load more than two consecutive days, then these two conditions, i.e., the sunny time or the rainy time will appear in major time period and in between these two conditions, cloudy time remains very short period, i.e., cloudy time (when there is no sun or no rains) may be overlooked in a day. If we able to supply electricity to the load or charge the battery or store electrical power during the rainy times, we have the power sources without interruptions. This is done by

integrating several renewable energies as delineated in Fig. 9.

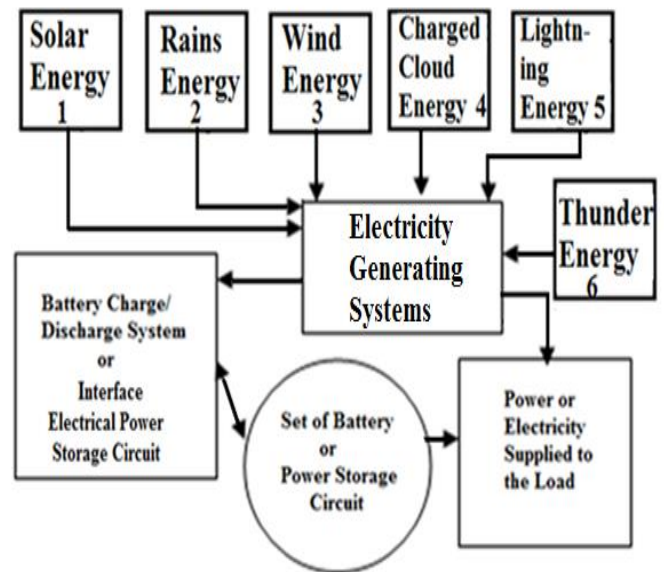


Figure 9: Electrical power generation system integrating Solar-Rains-Wind-Charged Cloud-Lightning-Thunder energy sources

Similar to the construction of individual non-conventional power system as described above, this solar-rains-wind-charged cloud-lightning-thunder power integrating generation system is designed as shown in Fig. 9. The only difference is that it has some special equipment to charge the battery or the power storage (accumulator) circuit by solar, rains, wind, charged cloud, lightning, thunder etc. This is clearly described in the block diagram of Fig. 9. Control circuit ad-joint with electric power generating system provides necessary control functions such as adding or summing up electric power obtained from more than one sources at a time, i.e., solar-wind electric power systems simultaneously, rains-wind electric power systems simultaneously, rains-wind-lightning-thunder electric power systems simultaneously etc., over voltage protection, amount of electric power directed to the load and the battery.

Thus by implementing solar-rains-wind-charged cloud-lightning-thunder energies integrating electrical power generation system in a compact package, we have an uninterrupted power supply at the minimum cost to all places at all times. Moreover, we can avoid accidental risk and effect by a lightning to human and nature both. This method ensures a highly practical oriented pollution free and accident free inventory for electrical power generation system. The electrical power afforded by this system is completely pure and secured form without any sort of environmental pollution. Also it does not produce any greenhouse effect or acid rain or emit any kind of poisonous gases or radiation etc.

III. CONCLUSION

This integrating solar-rains-wind-charged cloud-lightning-thunder energies electrical power generation system will be highly effective in all places, especially in rural areas where the commercial electricity has not reached or undelivered. It causes no side or bad effect on nature (emits no carbon or radiation), i.e., pollution free, at the same time not prone to any kind of accident due to lightning. It is highly suitable for domestic as well as commercial purposes. It is also useful to urban and city areas, simultaneously with the commercial power supply to minimize power supply load, i.e., cut short power charge. By using this system, people can save electricity charge. Also very less maintenance charge to this equipment is required. No raw materials are depleted. The electricity cost per unit is a petite amount. The designing of this equipment is done in such a way that it is very compact and acts as user friendly. When it is manufactured in a large scale, cost of this integrated natural resources electric power generation system is affordable. Moreover, there is no electric power failure or load shedding situation at any times. Therefore, it is the most reliable renewable electrical power resources with the least expenditure in the globe.

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Enhancing the Data Centre Performance and QoS in Cloud Execution

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ABSTRACT

In this, we will present the analytical model based on filtering the images that is scalable to model systems composed of thousands of the images and flexible to represent different policies and cloud specific strategies. Several performances filtering of images are defined and evaluated to analyse the behaviour of a cloud data centre, Utilization, Waiting Time, Ideal Time, Availability, Responsiveness and Scalability. Cloud data centre management is a key problem due to numerous and heterogeneous strategies that can be applied ranging from the cloud to other cloud. The performance evaluation of cloud computing infrastructure is required to predict the cost benefit of a strategy and the corresponding Quality of Service (QoS) experienced by users. A analysis is also provided to take into load balancing, finally a general approach will presented that starting from the concept of system capacity will help system managers to opportunely set of data centre parameter under different images filtering environment like grey scale, sepia etc.

Keywords: Cloud Computing, Resilience, Responsiveness, Image Filtering Technique.

I. INTRODUCTION

Cloud computing aims to power next generation data centre and enable application service to provide requirements. System size is challenging problem to tackle. Cloud computing delivers infrastructure, platform, and software as services, which are made available as subscription based services in a pay as you go model to costumers. So that users are access and deploy applications from anywhere on demand at competitive costs depending on users Quality of Service requirements. It offer significant benefit to software companies by freeing them from the low level task to setting up basic hardware and software infrastructure and thus enabling more focus on innovation and creation of business values[2]. Cloud computing is an emerging alternative to traditional computing and software services such as grid computing and online payment. The cloud computing resources and software are no longer hosted and operated by the user, but instead leased from large scale data centre and service specialists strictly when needed ideally, clouds should provide services such as running user computation with

performance equivalent to that of dedicated environments with similar characteristics [3].

Data centre and cloud computing environments are emerging as platforms for provision of web services [4]. Clouds are a lowered alternative to supercomputers and specialized clusters, a much more reliable platform than grids, and a much more scalable platform than largest of commodity clusters [5]. Cloud Computing is a novel paradigm for provision of computing infrastructure, which aim to shift the location of the computing infrastructure to the network in order to reduce cost of management and maintenance of the hardware and software resources. We assume that any task sent to data centre is serviced within a suitable facility node upon finishing the service, the task leaves the centre. A facility node contains different computing resources such as web servers, database servers, directory servers, and others.

The cloud centre differs from traditional queuing systems in a number of important aspects:

- A cloud centre can have a large number of facility server in order of hundreds or thousands traditional queuing analysis rarely consider system of size.
- Task service times must be modelled by a general, rather than the more convenient exponential, probability distribution.

Due to the dynamic nature of cloud environments, diversity of users requests and time dependency of load, the data centre must provide expected quality of service at widely varying loads.

Cloud based service is different from basic web service due to scalability, complexity and type of automation required for service delivery. The user perspective, service availability and response time are two important quality of service metrics. These service quality measures are perform ability measures as the effects of failure recovery as well as contention and queuing for resources are considered simultaneously [7]. In a Distributed Computing System programs data files are distributed among several processing units which may contribute to the simultaneous execution of a single program or alternatively several programs can be executed concurrently [8].

Cloud computing is promising technology able to strongly modify and storage resources. In order to integrate business requirements and QOS Key role to manage system to effect of resources in the data centre functioning and predict cost/benefit High level abstraction allows to implement resources management techniques such as image processing Even if it transparent to final user considered in design of performance model to understand behaviour of system Provide the elastic properties Scalable and flexible system Image processing exhibit above mentioned feature It reduces idle time of system Its scalable because you can add nodes on the fly during execution It used Encoding and Decoding achieve encryption It will not produce the redundant data . It compared the among nodes and decide which one idle It uses load balancing technique to distribute the task It used Intranet technique to connect with nodes. It process the data which is the post processed by the another nodes.

II. LITERATURE SERVEY

Order to integrate business requirements and application level needs, in terms of Quality of Service. The cloud service provisioning is regulated by service Level Agreement contracts between clients and providers that express price for service, quality of service levels required during service provisioning. On the field experiments are mainly focused on the offered Quality of service, they are based on a black box approach that makes difficult to correlate obtained data internal resource management strategies implemented by the system provider. They present a stochastic model based Stochastic Reward Nets, that exhibits the above mentioned features allowing to capture the key concepts of an IaaS cloud system. Virtual Machine multiplexing is easily integrated with cloud based actions such as federation, allowing investigating different mixed strategies. Different working conditions are investigated and a resiliency analysis is provided to take into account the effects of load bursts. Stochastic Reward Nets allow us to define reward functions that can be associated with a particular state of the model in order to evaluate the performance level reached by the system during the state.

On the basis of Base Paper we refer the following papers:

The architectural elements that form the basis for Cloud computing. It also represents requirements of various applications need scale across multiple geographically distributed data centres owned by one or more service providers. The development of resource application scaling techniques and their performance evaluation under various operational scenarios in real Cloud environment is difficult and hard to repeat, they propose use of simulation as an alternate approach for achieving the same. cloud service providers are unable to predict geographic distribution of users consuming their services, hence load coordination must happen automatically and distribution of services must change in response to changes in the load behaviour, service oriented Cloud computing architecture consisting of service consumer brokering and providers coordinator services support utility driven inter networking of clouds[2].

The cloud computing comprises both the offering of infrastructure and software services. The cloud offering infrastructure services such computing cycles, storage

space acts as Infrastructure as a Service. The cloud offering platform services such as a runtime environment for compiled application code operating on virtualized resources acts as Platform as a Service and third category of cloud is Software as a Service, incorporate old idea of providing applications to users over Internet. In terminology a production cloud is a cloud that operates on market, it has real customers that uses its services. As operation examples, the EC2 provides three main operations for resource acquisition, resource release the resource status query through its services EC2 and S3. AWS rent infrastructure resources. The EC2 offering comprises number of virtual resources and S3 offering comprises 2 types of resources. To characterize the long term performance variability of cloud services we first build meaningful datasets from performance traces taken from production clouds and then analyse datasets and characterize the performance variability [3].

In this focuses on evaluation of web services in cloud computing infrastructures and recommends best practices based on evaluation results. An adequate real workload is needed. Look at performance evaluation techniques in web server environments Databases and shared memory concepts usually contain objects that allow only the execution of simple read and write operations on them. In scenarios where load balancing and fault tolerance are the objectives we can observe replication of objects that allow for more complex operations benchmark serves for performance measurement of systems. It typically includes workload and implementation rule Service oriented architecture is an architecture that combines software architecture and enterprise architecture. It is based on the interaction with interoperable services offer reusable business functionality via standardized interfaces [4].

In This Paper, they provide a background to analysing the performance of cloud computing services for scientific computing. They describe main characteristics of the common scientific computing workloads, based on previous work on analysing modelling of workload traces taken from PPIs and grids. They introduce cloud computing services that can be used for scientific computing select four commercial clouds whose performance they evaluate empirically. PPI workloads are dominated by parallel jobs, while grid workloads are dominated by small bags of tasks and sometimes by

small workflows comprising mostly sequential tasks. Scientific computing workloads are highly heterogeneous and have either one of CPU, I/O, memory and network as bottleneck resource [5].

In this paper, the distribution of response time was obtained for a cloud centre modelled as an $M=M=m=m$ μ r queuing system. Inter arrival service times were assumed to be exponentially distributed and system had a finite buffer of size $m \mu r$. The approximation was given in explicit form; its numerical computation is easier than when using earlier approximations, blocking probability and determines size of the buffer needed for the blocking probability to remain below a predefined value and analytical results are validated through discrete event simulation. The system under consideration contains m servers render service in order of task request arrivals (FCFS). The capacity of system is $m \mu r$ which means buffer size for incoming request is equal to r . As population size of a typical cloud centre is relatively high while probability that a given user request service is relatively small, the arrival process can be modelled as a Markovian process[6].

In this paper, IaaS cloud when a request is processed a prebuilt image is used to create one or more Virtual Machine instances. When VM instances are deployed, they are provisioned with request specific CPU, RAM and disk capacity. VMs are deployed on Physical Machines each of which be shared by multiple VMs. To reduce overall VM provisioning delays and operational costs, they assume PMs are grouped into three servers pools, hot (i.e., running), warm (turned on, but not ready) and cold (turned off). In pure performance analysis, we compute performance measures under assumption that no failures resources to capture an end to end performance measure of a cloud service, they implement three CTMC based model resource provisioning decision model, VM provisioning model and run-time model[7].

In this paper, DCS can be represented by a graph $G(V,E)$, where set V of vertices correspond to nodes (computational resources) and set E , corresponds to communication links. Petri nets are graphical models used to represent and analyse complex systems with interdependent components. The nodes of a Petri net are referred to as places (circles) and transitions (bars) which represent conditions and events. A Stochastic

Petri Net (SPN) model associates with each transition an exponential firing time. This feature allows an isomorphism with Markov chains and thus, provides a useful interface in the case of models with a very large number of states. In this paper is the Stochastic Petri Net Package[8].

III. PROPOSED SYSTEM

In this we used cloud services i.e. SaaS and image filtering techniques. The proposed system uses Data Centre method with closed in memory executions. Everyday thousands of image processing to be computed. To computation required much time, memory and also take quality factor consideration. This system is based on Data Centre in memory cloud executions services.

One of the key feature of cloud computed load balancing processing is that at any number of time, we can dynamically add hardware hence machine cycles in the system. This feature is very useful for OLTP or E-Commerce systems where the system cannot be go offline and in case of load increases, the resources need to be plugged seamless.

In this system we maintain cloud for computing data which is possible to execute the system on single machine but there are two major disadvantages:

- It would be single point failure system which risk make application complete dead in case of hardware failure.
- It takes huge amount of machine cycles and time.

The number of user mode, connected that cloud and, get start the computation process firstly the most ideal system get start the execution. When first user node finished its computation. He simply stores its result data into the cloud, then next ideal system get start the next process and it stores its generated result into the cloud. In cloud there is, only one copy of the data where maintain that why its work on the distributed cloud environment and all the node who work to the only one copy of data at finally it should produces the output which will be needed.

The Characteristics of Proposed system:

- The data redundancy is avoided.
- System is scalable because you can add nodes on the fly during execution.

- System Reduces idle time of nodes.
- The computation and storage cost is, very Small.
- Fast computation because data is spread after different at the time of computation.
- The proposed system follows the load balancing concept.
- The system maintains Quality of service of the system.
- The system will support all the versions of the windows Operating System.
- The System is efficient and responsive.

In the proposed system we proposed that retrieve Data from the cloud and compute it. In memory cloud executions techniques used, In the Memory data only kept as the Scratch Data. The Scratch Data provide us the post filter images and which used for next process its makes our system execution parallel and less storage data usages.

We demonstrate our system with image filtering techniques in the parallel execution for cloud. The cloud Computation for image filtering techniques. The image filtering techniques have number of steps in executions is the large, that will need to executed in the parallel way to process image filtering. To enhance and get better Qos from the filtering. We will need to use data centre in the cloud. It is also reduce the idle time of the system to enhance the performance of it. System is scalable because you can add nodes on the fly during execution. In memory data only kept as scratch data, which will used to execute by the other nodes. In the image filtering different filters are used that is Grey scale, Inverse, Sepia, Carol, Blue Toned, X-ray etc. Image decoding and encoding used in the system to transfer the process over the cloud. The encoding and decoding Do Not store in the memory but in the store into the database that makes the system scalable, we can add nodes on the fly of execution. Encoding and Decoding is simple array byte code, which provide the security to the process or execution.

IV. SYSTEM ARCHITECTURE

The system architecture consist of mainly three parts. The first part is load balancing, second part is central storage which consist MsSQL database and task allocation pool and third part is processor engine.

The input is given in the form of images or data, that data or image is passed to load balancing layer. In load balancing layer load gets divided on the basis of idle time of system. Once the load balancing done that data or image get passed to the central storage. In central storage processes are stored in database and task allocation pool assign the task to different processor engine.

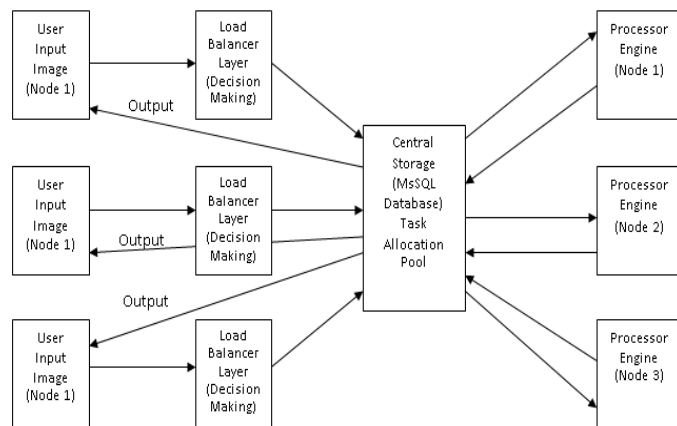


Figure 1: System Architecture

The processor engine takes the task from central storage and processes that allocated task. Once task gets over it will send back to the central storage. Central storage stores processed tasks to the database and central storage generate the output to respective node. Through load balancing get divided which lead to the efficient execution of the large processes and parallel computing makes faster execution of processes. System architecture allows dynamically attachment and allocation of node which is main aim of system.

V. CONCLUSION

Tradition systems works on $1 * X$ machine cycles for per process. Due to series execution, on thread cannot process multiple images due to dependency of result hence, keeping the execution in cloud along with load balancing logic, we have successfully utilized and demonstrated the idle machine cycles to work on no performed tasks.

VI. ACKNOWLEDGEMENT

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One Click Android Application for Shopping Based on Cloud

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ABSTRACT

This paper describes the design and development of an android shopping application for city. It elaborates and shows offers and deals of particular malls and local market. Application shows offers but also provide analytics to the seller. Whole application is organized on cloud. The three-tier architecture includes front-end, middle-ware and back-end. The front-end level consists of location-based mobile shopping application for android mobile devices, for purchasing miscellaneous products from malls and nearby local markets. Front-end level also displays association among the purchased items. The middle-ware level offers a web service to generate JSON (JavaScript Object Notation) yield from the relational database. It exchanges info and data between application and servers in cloud. The back-end level offers the Apache Tomcat Web server and MySQL database. This application is based on cloud that provides application as a service to user.

Keywords: Association Rule Mining, JSON, Agent Based Computing, Mobile Cloud Computing, Location-Based Services.

I. INTRODUCTION

Mobile shopping application contains mobile devices as electronic device. Improvement in smart phones results in the increased rate in its procedure and information anytime everywhere has become style mantra. But mobile devices have restricted memory and processing speed. Cloud in other hand offers large storage and speed for dense data. Increased need of processors and storage devices effects in the improvement of cloud computing. Mobile cloud computing is the region where three things are involved: Mobile devices, network and cloud as a server. Data storage and data processing is carried outside the mobile devices i.e. on cloud and outcomes are displayed through output devices like screen. GPRS, Gmail, Google Drive, and Google Maps are already being used are existing examples of mobile cloud computing. Thus, mobile cloud computing covers the drawbacks of mobile devices like short storage area and processing power.

This research covers these drawbacks and implements association rule mining on the data gathered from mobile application.

This application is specially designed for product purchasing in the city for malls and local market nearby

the customer location. It uses Wi-Fi and mobile network to get current position of the customer and displays any registered malls and markets on server from customer's location. Association rule mining as a technique of data mining is used to find the offers associated with products. Technically, data mining is the process of extraction of interesting information or patterns from data in large database. Association rule mining is widely used in market basket analysis. This method benefits retailers in numerous ways for marketing or planning shelf space.

A location-based mobile application for any product shopping was designed and developed to find nearby malls and stores in local markets, association among the products purchased, display association to customer side screen, post order, and it is deployed on cloud. The grouping of web map service API and association rule mining using mobile on cloud, it is potential to gather large scale shopping habit of people, with lower data collection cost.

The computing process solves the problem of inadequate computing power of smart devices. The requirements are organized in queue for the verification of order by the retailer. Web facilities are used to manage the connection between front-end and back-end.

Huge amount of data gathering will be possible using mobile as users can place order from anyplace and service delivery will be easier. Just one click and order will be placed. Also, both consumers as well as storekeepers can take the advantage of mined info for their own profit and also for promoting the products.

II. METHODS AND MATERIAL

A. Related Work

The application based on cloud has been implemented for bakery shopping products [2]. Graphical user interface (GUI) was designed by using location based services and association rule mining. This section discusses the existing projects related to these techniques.

a. Mobile Cloud Computing

Mobile cloud computing consists of three modules: mobile devices, communication network and cloud as a server. In mobile cloud computing assets are stable but application may move. The applications which are large can be decomposed to smaller ones to process concurrently. This method is called as application partition. Offloading is the process of transferring mobile application on cloud. This saves the device memory, processing power and ultimately battery consumption [1].

The classic facilities needed by a mobile cloud client are, synchronization, push i.e. updates the notifications sent by the cloud server, offline App automatically handles synchronization and notification, network, database, inter App Bus provides low level coordination between applications [3].

b) Association Rule Mining

In this paper [4], author proposes a framework the goes to reduce the communication overhead in existing mobile agent based distributed association rule mining (MAD-ARM). MAD-ARM is the Mobile Agent based distributed data mining framework. It contains of knowledge server which works on the generation of association rule and data coming are from different

remote sites. The item sets are always upgrading on remote sites at the immobile agent.

The authors of this paper [5], represented an environment for data analysis. This is clearly based on the environment where data stream mining process runs on user's android handset. As the data streams in continuously, possible concept drift is updated. There is specific central mobile decision agent which switches several others stream mining agents. Stream mining agents working on local mobile phones decides the best possible algorithm to run on local data. Algorithm is chosen dynamically at each handset.

c) Location-based services

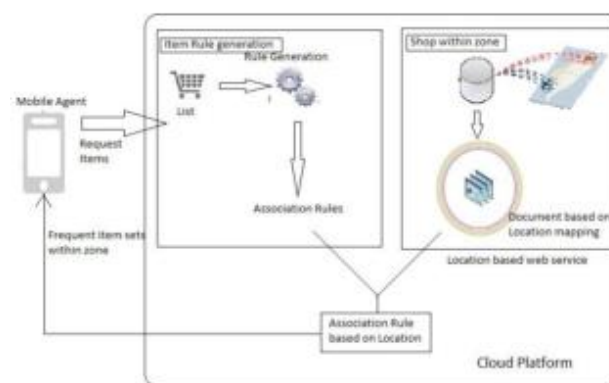


Figure 1: Existing system framework.

Any product or application that uses the location data of mobile subscriber is called as location based service. Location based services like GPS uses the latitude and longitude data. A context-based multimedia content management system (MCMS), whose several types of contents are easily collected from everywhere at any time using mobile phones, and stored in a web server as a multimedia database [6]. [7] Defines a location based text mining approach to categorize texts into numerous categories based on their geospatial features, with the goals to discovering relationships between documents and zones. There are three main modules in this framework, including geographic data group and reprocessing, mapping forms into corresponding regions, and framing maximize zones. Data mining and processing is takes place based on zones. Tourism industry has also takes the benefit of location based services. This application is designed and established using cloud based platform. It discovers out the location of tourists, where they are directed or looking. This is

conceivable by using the digital compass. It also computes distance between current location and places, it shows nearby spots, and provides direction. It was constructed on Amazon Web Services cloud platform [8].

B. System Architecture

The architecture of shopping application is divided into three parts as: Front end, Middle ware level and backend.

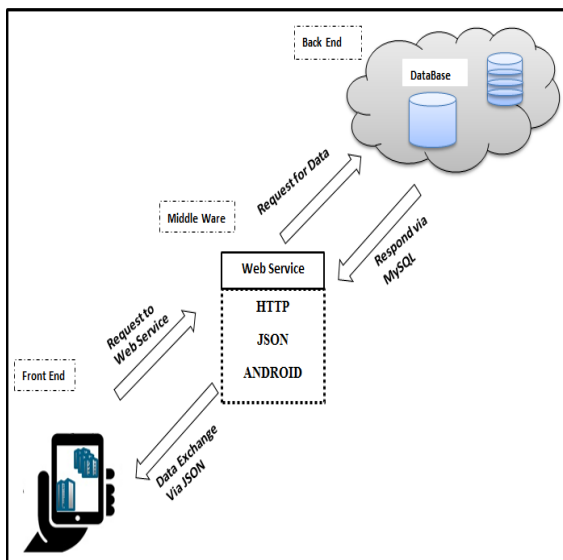


Figure 2: System Architecture.

The Android open source platform is used to design and develop the shopping application. For end user, in front-end user can able to select particular mall in the city and see the offers available in specific showroom at mall. It also provides offers of local market which are available in users nearby location .The registered retailers can upload and remove their own offers and advertisement from this application.

When user search for specific offers of showroom in mall, then the request is send to middleware level that is to the Web Service. Web service is act like interface for front-end and back-end. The data exchange between front-end and back-end of shopping application happens via middleware level. Android shopping application sends HTTP Request and Web Service will sends Query to fetch requested data from MySQL database located on cloud.

The output of query is the parsed at android application with the help of JSON. Language independency makes

JSON unique for data communication with any programming language. As shown in figure 2 JSON is present in middleware which runs in four steps. In first step, application send HTTP request to web service. Request is accepted in JSON format and in second step the response generated by MySQL, web service is also in JSON format. The query is send back to MySQL database to obtain data from back end. In the third step, Web service generates JSON response which is send to android application, JSON object needed to decode using String which is displayed on application screen. Using JSON, when it comes to mobile application it does not have any specific tag format, which avoids the bandwidth requirement.

Market Basket Analysis

Market Basket Analysis is a forming technique based upon the theory that if you buy a certain group of items, you are more likely to buy another group of items. MBA uses this information to:

- Understand why they make certain purchases.
- Products which are purchased together
- Products which might benefit from promotion.

This application has used the Market Basket Analysis method for analyzing the data. The following techniques are used in the analyzing process:

i Association Rules

Association rule is a technique which is looking for a relationship among an item with other items. Association rule is generally cast of 'if' and 'then' such as 'if X then Y and Z', this shows if X then Y and Z. To define the Association's rules, it needs to be stated the support and confidence to limit whether the rule is interesting or not.

- Support: A measure that shows how much the level of dominance of an item or item set of the overall transaction
- Confidence: A measure that shows the association between items in a conditional (e.g. how frequently purchased item Y if the person buying the item X).

ii Apriori Algorithm

- **Product_set:** a set of items

- **k-product_set:** an product_set which consists of k items
- **Frequent product_set (i.e. large product_set):** an product_set with sufficient support
- **L_k or F_k:** a set of large (frequent) k-product_sets
- **c_k:** a set of candidate k-product_sets
- **Apriori property:** if an item A is joined with item B, $\text{Support}(A \cup B) = \min(\text{Support}(A), \text{Support}(B))$

In the process of Apriori, the following explanations are needed:

Definition 1: Suppose $T = \{T_1, T_2, \dots, T_m\}$, ($m \geq 1$) is a set of transactions, $T_i = \{I_1, I_2, \dots, I_n\}$, ($n \geq 1$) is the set of items, and $k\text{-product_set} = \{i_1, i_2, \dots, i_k\}$, ($k \geq 1$) is also the set of k items, and $k\text{-product_set} \subseteq I$.

Definition 2: Suppose σ (product_set), is the support count of product_set or the frequency of occurrence of an product_set in transactions.

Definition 3: Suppose C_k is the candidate product_set of size k, and L_k is the frequent product_set of size k.

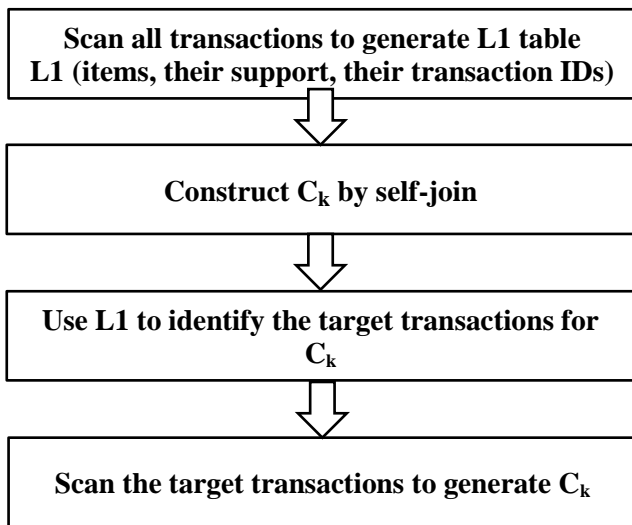


Figure 3: Steps for C_k generation

In the proposed approach, scan all transactions to create L_1 which contains the products, their support count and Transaction ID where the products are found. And then use L_1 later as a helper to generate $L_2, L_3 \dots L_k$. When to create C_2 , make a self-join $L_1 * L_1$ to construct two product_set $C(x, y)$, where x and y are the products of C_2 . Before scanning each transaction records to count the support count of every candidate, use L_1 to get the transaction IDs of the least support count between x and y , and thus scan for C_2 only in these specific transactions. The same thing for C_3 , construct three

product_set $C(x, y, z)$, where x, y and z are the products of C_3 and use L_1 to get the transaction IDs of the least support count between x, y and z , then scan for C_3 only in these specific transactions and repeat these steps until no new frequent product_sets are identified. The whole process is shown in the Figure 3.

III. CONCLUSION

We designed and established a location-based mobile shopping application for malls and local markets for android platform. This application shows nearby local markets and mall's stores that are registered to the application. The main objective of marketing is achieved at a very low cost in comparison of advertisements, announcements, ground level marketing etc. Data exchange among different levels of structural design are operated using web service station and that generated JSON format for data transfer. The server is assembled in cloud by using net in India hosting services. With the service of mobile cloud computing mobile processing and storage is transmitted to cloud as a server, which helps in saving battery consumption and expands the performance or speed of execution. Use of the location based services gives elasticity and eye-catching looks to the application. No additional charges are applied; application can be downloaded and used in regular data charges.

Association between products gives the attraction information of various malls and local markets. Data about often purchased shopping products can help in cross advertising. The development of the project is in such a manner that application can be utilized for any store system.

IV. FUTURE WORK

In future works we can focus on small organization more precisely. Application can feature more options for live stations such as for farmers and small house hold business. A deep market survey is need to done in order to provide marketing and sells for such developers and products.

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The Indicators of Evaluate Children with Mathematics Learning Disabilities in Khartoum State-Sudan

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ABSTRACT

This study was conducted during (2014- 2015) in special educational center in Khartoum state, Sudan. The study aimed to evaluate children with mathematics learning disabilities. Researcher used descriptive methods, applied evaluating children with mathematics learning disabilities questionnaire, and was designed by researcher. The community of this study consisted teachers of learning disabilities (53) teachers. Sample was chosen randomly included (22) teachers, including (8) mails and (14) females. Researcher used statistical package for social sciences (SPSS) depends on T-test for one sample, Pearson correlation coefficient. the results are as following: The indicators of evaluate children with mathematics learning disabilities is positive, the level of visual perception disorder among children with mathematics learning disabilities, is significant, the level of visual discrimination disorder among children with mathematics learning disabilities , is significant and the level of auditory processing disorder among children with mathematics learning disabilities , is significant.

Keywords: *Visual Perception Disorder, Visual Discrimination Disorder, Auditory Processing Disorder.*

I. INTRODUCTION

The quality of teaching strategies among children with learning disabilities is very important, because it enhancing building useful learning. The study of Brian R. Evans (2013) suggested that a challenge for new teachers enrolled in alternative certification programs is to ensure that all of their students are receiving a high-quality education, particularly in mathematics education. As teachers enter classrooms in less affluent urban schools with majority African American and Latina/o students, it is imperative teachers be fully prepared to teach these students with high-quality instruction. teaching in mathematics should be “rooted, in part, in the belief that all children should have access to rich, rigorous mathematics that offers opportunities and self-empowerment for them to understand and use mathematics in their world” . On one level there are important variables for teacher quality, such as content

knowledge, teacher attitudes and beliefs, and teacher efficacy. All of these variables are necessary, but not sufficient, for quality teachers to possess. On another level there are important variables necessary for quality teaching including social justice orientations, cultural responsiveness, connecting the mathematics to lives of the students, and fostering an atmosphere of trust and care in the classroom. The study of (Evers. T, 2013) suggested that a brief review of the evolution of specific learning disability since its emergence as a disability category in the 1960 provides the context for wisconsin's revised specific learning disabilities rule. Historically, the concept of specific learning disabilities has been associated with disorders in cognition and learning existing within an individual resulting in delays in academic and school performance skills such as reading, math, and language. These delays occur despite adequate instruction and have been referred to as unexpected underachievement. The study of Gersten. S & et al (2007) suggested that though the research into

early mathematics assessment is in its infancy, an emerging knowledge base is permitting us to draw important conclusions that can help guide further research and practice in the field. The study of Jordan. c. Nancy & et al (2009) Suggested that investigating instances of mathematics difficulties mathematics difficulties and disabilities in elementary school-aged students continues to receive increasing amounts of attention. Differences in student performance between struggling learners and their high achieving counterparts are evident as early as kindergarten, and without proper implementation of effective and research based intervention strategies and initiatives, the achievement gap will continue to widen. Moreover, causal links between the early numbers sense cultivated in the primary years and the successful completion of advanced mathematics courses in high school and college have been established through research. The study of Gooding. S (2009) suggested that children's poor performance with mathematical word problems is a trend that I became aware of very early on in my teaching career and one that an interest has been taken in by many who are involved in mathematics education [5].

1.1 Why quality mathematics education?

The study of Tang. Q (2012) suggested that quality mathematics education should enable pupils to form a positive and appropriate image of mathematics. For that to be possible, it must be faithful to mathematics, both in its content and practices. It should enable pupils to understand which needs are met by the mathematics that they are taught and that mathematics forms part of a long history linked to the history of humanity. Learning mathematics also entails acquiring the means of gaining access to this cultural heritage. Mathematics education should thus enable pupils to understand that mathematics is not a static corpus of knowledge but, on the contrary, a living and expanding science, whose development is nourished by that of other nourishes them in turn. It should also enable pupils to see mathematics as a science that can and must contribute to the solution of today's major world problems, which were mentioned in the joint introduction. Quality mathematics education must thus be sustained by a vision of mathematics as a living science, grappling with the real world, open to relations with other disciplines and not disciplines only. In particular, it must enable pupils to understand the power of mathematics as a tool

for mounding understanding and in uencing the world . The study of Gibbs. G (2010) suggested that the conception of quality: Quality is such a widely used term that it will be helpful first to clarify the focus of this report, also relevant when examining the validity of student judgments of the quality of teaching, where what they may want teachers to do may be known from research evidence to be unlikely to result in educational gains. What is focused on here is not necessarily, what students like or want, but what is known to work in terms of educational effectiveness. The study of Bradley. K & et al (2006) suggested that the Australian association of mathematics teachers has identified three domains for quality: (a) professional knowledge, (b) professional attributes, and (c) professional practice. Professional knowledge includes vast, general knowledge for use in professional work. Professional attributes include enthusiasm and commitment to various communities with continual desire for improvement, both personally and for students. Professional practice consists of intentional techniques that lead to positive learning outcomes for students. These domains provide a relevant and useful framework for conceptualizing a quality teacher. The study of Tang. Q (2012) suggested that mathematical activity is a multifaceted human activity, very different from the stereotypes often attached to it in popular culture. Quality mathematics education must therefore, that diversity in the different mathematics content gradually encountered by pupils. The study of Colclough. C & et al (2005) suggested that how can quality be studied in light of these very different approaches? One way is to return to basics: the objectives of cognitive development and nurturing of particular sets of values, attitudes and skills that are important aims of all education systems. A review of the main elements of education systems and how they interact provides a useful map for efforts to understand, monitor and improve quality. The study of Tang. Q (2012) suggested that many misunderstandings also affect people's view of mathematical activity, owing to their perceived image of mathematicians. Mathematics is still often perceived as an almost exclusively solitary activity, cut off from the Problems of the real world and independent of technology. Furthermore, it is often still seen as a purely deductive activity in which perfectly rigorous formal proofs are used to produce theorem after theorem. Finally, it is often considered that mathematics is a science that is not for everyone and that girls, in particular, are likely to

encounter more difficulties than boys in learning mathematics.³ these many misunderstandings affect teaching and raise barriers to quality mathematics education for all. The study of Colclough. C et al (2005) suggested that how can quality be studied in light of these very different approaches? One way is to return to basics: the objectives of cognitive development and nurturing of particular sets of values, attitudes and skills that are important aims of all education systems. A review of the main elements of education systems and how they interact provides a useful map for efforts to understand, monitor and improve quality.

Researcher say that responsibility to provide high quality instruction to all students, we must become knowledgeable of and choose to employ techniques that make classroom instruction equally accessible to this unique population of learners.

1.2 Carrying Out the Mathematical Difficulties

The study of Hulme and Snowling (2009) suggested that can occur here with children's selection of, and aptitude with calculation strategies (for example formal algorithms, pencil and paper methods and calculators). The study of Gooding. S (2009) suggested that the context in which a word problem is given and the size of numbers involved can influence children's choice of a calculation strategy [5]. The study of Hulme and Snowling (2009) suggested that math's disorder' occurs quite frequently and that it is quite commonly associated with reading difficulties.

1.3 Math Difficulty

The study of Wai Lan. C. Winnie (2012) suggested that include understanding simple number concepts, (place-value concept), making sense of number facts and procedures, everyday tasks like (shopping, time planning), may "overcome" by rote-learning the procedures, primitive strategies without genuine understanding and Problematic for upper-grade learning. The study of Dowker. A (2009) suggested that any studies indicate that young primary school children often do use derived fact strategies, often without direct teaching, one of the earliest to emerge is the 'counting-on from-larger' or 'min' concrete addition strategy, whereby the child adds two numbers (e.g. $2 + 6$), by representing the larger number (e.g. with fingers) first,

and then 'counting-on' the smaller number: "6,7, 8 - it's 8!" this involves implicit use, with or without an explicit knowledge, of the commutatively Principle, by contrast, there are many sophisticated strategies involving the use of decomposition for multi-digit arithmetic, that appear late and appear to characterize unusually skilled mental calculators a key issue for consideration is whether the use of derived fact strategies is significantly worse in children with known mathematical difficulties than in unselected children. On the one hand, there is certainly evidence from some studies that children with mathematical difficulties often rely on counting strategies to the exclusion of both retrieval and derived fact strategies. Found that elementary school children with mathematical disabilities relied more on counting, made more counting errors and made less frequent use of derived fact strategies, from the 'min' strategy to decomposition strategies, less frequently than children without such difficulties. Such relative infrequency of derived fact strategies may be in part due to problems with working memory, which makes it harder for children to keep track of several steps of a problem in memory. Since the use of derived fact strategies involves keeping a known fact in memory while carrying out the strategy necessary to derive the new fact, it is likely to be impaired by working memory difficulties. Moreover, children with mathematical disabilities know fewer facts to start with. This could work in two directions. Knowing relatively few facts by heart may make it more necessary to use derived fact strategies, as direct retrieval is less often possible. The study of Rachel E. Pepper & et al(2012)suggested that when identifying such difficulties we define mathematics in a broad sense as encompassing not just calculations (algebra, performing integrals, taking derivatives) but also including thinking about geometry, symmetry, vector calculus, and integrals (both vector and scalar) and the interpretation of calculations .

1.4 The impact of Auditory Processing Disorders

The first research into auditory processing disorder began in 1954 with Helmer Myklebust's study, "auditory disorders in children. The study of Esplin. J & Wright. C. (2014) suggested that The impact or effect of auditory processing disorder can create difficulty in hearing, akin to a peripheral hearing loss, causing hearing and learning impairments. The negative impact auditory processing disorder can have on language and

reading has also been reported. Auditory processing disorder often occurs in conjunction with other disorders like dyslexia attention deficit hyperactivity disorder, language impairment, autism spectrum disorder and / or reading disorders. A well cited University of Auckland study found 94% of children with APD also had language impairment and/or a reading disorder. But it is not known about the cause and effect and if the language and learning difficulties may be caused by the auditory processing disorder. Causality is difficult to establish as research in auditory processing disorder is primarily based on cross-sectional rather than prospective longitudinal studies. The study of Brandstaetter. P & et al(2003) suggested that Children under the age of seven cannot be evaluated comprehensively, as language and auditory processes are still developing. Also, the presence of APDs cannot be legitimately evaluated when the child's primary language is not English. As with all students being considered for special education, the team must consider the needs of the whole child. If children with learning disabilities do perform better with clear than conversational speech, then detailed acoustic analyses of the naturally produced conversational-toclear speech transformation could provide valuable information about the underlying perceptual deficit by highlighting specific acoustic-phonetic features of the signal that are spontaneously enhanced by this listener oriented, stylistic variation in speech production.

1.5 What are Auditory Processing Disorders?

The study of Jay R. Lucker (2012) suggested that definition of auditory processing: Those things the central nervous system does when it receives auditory information and gets it to the brain where it eventually will form meaningful concepts .Thus, auditory processing disorders are: The various things that can breakdown in the central nervous system's task to process the information it receives through the auditory system. In addition problems people may have with auditory processing include are: Listening (noticed for a period of time), mishearing/discrimination problems, problems following directions, problems attending to oral messages, distracted by background noises, poor organization of verbal material, oral and written expression problems, remembering what they hear and learning to read. The study of Esplin. J & Wright. C. (2014) suggested that auditory processing disorders is heterogeneous and this should be reflected in testing and

intervention with remedial plans needing to be individualized. Evidence shows it is important that there are a range of intervention strategies used to meet the living and learning needs of the child. These include visual, environmental, teaching and learning strategies. Personal systems are reported as the intervention option to provide the most benefit, for the most children, but that they should not be used on their own without other inputs or strategies. Dominic. H ffytche et al (2010) suggested that Poor visual perception can cause confusion leading to self-doubt, reluctance and hesitation in classroom participation. Also, suggested that visual discrimination: Ability to identify and discriminate between letters, numbers, shapes or objects. Students need to understand and differentiate what they see as they have different meanings.

1.6 Literature Review

The study of Dowker. A(2009)suggested that in decade that 339 children aged 6 and 7 at Oxford primary schools took part in a study of arithmetic performance on the standardized arithmetic tests was independently affected by both Addition Performance Level and group membership (unselected children versus those with mathematical difficulties). Derived fact strategy use was affected by Addition Performance Level, but there was no independent effect of group membership. The study of Daher. W (2009) suggested that aims at describes pre-service teachers' perceptions of the use of applets in solving mathematical problems, indicate that, though most of the participants thought that mathematical problems could be solved without applets, they emphasized the role of applets as fostering, facilitating and clarifying mathematical problems' statement and solution. The participants pointed at applets as tools which learners enjoy working with, so they will be encouraged to solve mathematical problems using them. What influenced the participants' perception of the need to use applets for solving mathematical problems were their ability to solve problems using them, their ability to solve problems without them and the type of difficulties faced by them during the solving process. The study of Grehan. M & et al (2010) suggested that the study aims at carried out by the Mathematics department at the national university of Ireland Maynooth to determine why students do or do not engage with mathematics support, results indicate that the students' mathematical backgrounds do not appear to be the only major factor in

determining engagement. We found that both groups experienced similar difficulties and problems. However, the second group had several different strategies or coping mechanisms to enable them to get through. The study of Lowe.T & Hasson. R (2010) suggested that the aim of the assessments is to encourage and support learning. The style of assessment used is described together with details of their development and how they are integrated within the module teaching strategy. Data showing how the assessments were used by students on the first presentation of the module are given, together with some student feedback and issues encountered. Although the uptake of these assessments was not as great as hoped, the student experience has been generally positive. The study of Ní Fhloinn. E (2010) suggested that the programme aims to increase the confidence levels and mathematical standards of local secondary school pupils from disadvantaged areas, while raising the profile of mathematics within the schools, through an intervention in which Dublin City University students provide free, one-to-one mathematics tuition on a weekly basis. The feedback from both tutors and pupils was extremely positive, with both groups identifying significant personal benefits as a result, as well as the mathematics results of school pupils increasing overall. In addition, the school principal singled out the programme as having made third-level education seem like a reasonable expectation for students in school. Finally the aims of this study to determine the indicators of evaluate of children with mathematics learning disabilities, the level of visual discrimination disorder, the level of visual discrimination disorder and the level of auditory processing disorder among children with mathematics learning disabilities, of high quality and safe services, which meet the needs of children with learning disabilities throughout the life course. In addition to verify their aims by answer following question are:

1. What the indicators of evaluate of children with mathematics learning disabilities?
2. What the level of visual perception disorder among children with mathematics learning disabilities?
3. What the level of visual discrimination disorder among children with mathematics learning disabilities?
4. What the level of auditory perception disorder among children with mathematics learning disabilities?

II. METHODS AND MATERIAL

2.1 Study design

2.1.1 Research Method.

In a study, the researcher used descriptive method, depend on analytical technique. In addition, were consists of questionnaire adapted by the researcher.

2.1.2 Sample technic

It formed from male and female teachers of children with mathematics learning disabilities, in special education center, Khartoum, Sudan. The researcher used a simply random sampling method. The sample was consist of (22) teachers of learning disabilities.

2.1.3 Tools Technique

The questionnaire was conducted by the researcher, is formed from (19) phrases distributed into three dimensions, visual perception disorder includes (6) phrases, visual discrimination disorder includes (6) phrases, Auditory processing disorder includes (7) phrases, In order to ensure the validity and reliability of the questionnaire form, it distributed to four instructors who had completed their doctorates and this form developed in accordance with the opinions of the instructors, then pilot were conducted and the value of reliability was found. It was about (0.87) and after that, the questionnaire forms became ready for application.

2.1.4 Practical Procedures

The principle of voluntarism was the pre-condition of participating in questionnaire. For the questionnaire, an explanation was prepared. The goal of the research and how the study would be carried out were clearly stated in it. In addition, it was emphasized that the identities of the participants would remain confidential. During the questionnaire, written forms were used. Questionnaire took place between 1-6 month, and the researcher used E-mailing technique to answering the questionnaire.

2.1.5 Data Analysis

After collecting data, the researcher used many tests are T- test for one sample, T-test for independent samples test, pearson correlation coefficient to examine the study hypotheses depend to SPSS program. Materials and methods are written in this area. Describe in detail the

technic used, the Name and the references of laboratory materials used should be cited.

2.2 Study Group

It formed from male and female student with learning difficulties in special educational center, Khartoum, Sudan (67) of male and female teachers of children with learning disabilities. It included the age group between 27-42 years, with an average 35 year, distributed in different gender and economic level as in table1.

III. RESULTS

3.1. What the indicators of evaluate of children with mathematics learning disabilities? To answer this question, the researcher used (T) test for one sample, table1. showed the result. When we compare the mean respectively (80.05), with standard mean (66), we found the mean is greater than standard mean and the significant level (0.00) is greater than the sig value (0.00), this is means that the level of the appropriateness of the curriculum among mathematics learning disabilities is positive (high than normal level.

3.2 What the level of visual perception disorder among children with mathematics learning disabilities? To answer this question, the researcher used (T) test for one sample, table 2. showed the result. When we compare the mean respectively (44.42), with standard mean (21), we found the mean is greater than standard mean and the significant level (0.00) is greater than the sig value (0.00), this is means that the level of the appropriateness of teaching aids among mathematics learning disabilities is positive (high than normal level.

3.3 What the level of visual discrimination disorder among children with mathematics learning disabilities? To answer this question, the researcher used (T) test for one sample, table 3. showed the result. When we compare the mean respectively (30.33), with standard mean (18), we found the mean is greater than standard mean and the significant level (0.00) is greater than the sig value (0.00), this is means that the level of the appropriateness of the classroom environment the curriculum among mathematics learning disabilities is positive (high than normal level.

3.4 What the level of auditory processing disorder among children with mathematics learning disabilities?

To answer this question, the researcher used (T) test for one sample, table 4. showed the result. When we compare the mean respectively (13.82), with standard mean (9), we found the mean is greater than standard mean and the significant level (0.00) is greater than the sig value (0.05), this is means that the level of the appropriateness of the level of auditory processing disorder among children with mathematics learning disabilities, is significant.

Table1. showed the indicators of evaluate of children with mathematics learning disabilities.

Variable	Mean	Std	T	df	Sig
Mathematic	80.6	14.0	4.9	21	0.00

Table 2. Showed the level of Visual perception disorder among children with mathematics learning disabilities.

Variable	Mean	Std	T	df	Sig
Visual Perception	6.2	3.6	3.7	21	0.00

Table3. Showed the level of Visual discrimination disorder among children with mathematics learning disabilities.

Variable	Mean	Std	T	df	Sig
Visual Discrimination	13.9	3.1	7.4	21	0.00

Table 4. showed the level of Auditory processing disorder among children with mathematics learning disabilities.

Variable	Mean	Std	T	df	Sig
Auditory Processing	13.8	20.1	10.7	21	0.00

IV. DISCUSSION

1. The level of evaluating of children with mathematics learning disabilities is Significant, (positive). On line, the study of Ní Fhloinn. E (2010) suggested that the feedback from both tutors and pupils was extremely positive, with both groups identifying significant personal benefits as a result, as well as the mathematics results of school pupils increasing overall, the school principal singled out the programme as having made third-level education seem like a reasonable expectation for students in school. In addition, the study of Lowe.T & Hasson .R (2010) suggested that how the assessments were used by students on the first presentation of the module are given, together with some student feedback and issues encountered, although the uptake of these assessments was not as great as hoped, the student

experience has been generally positive. In addition, the study of Dowker. A(2009) suggested that 339 children aged 6 and 7 at Oxford primary schools took part in a study of arithmetic performance on the standardized arithmetic tests was independently affected by both addition performance level and group membership (unselected children versus those with mathematical difficulties). Derived fact strategy use was affected by addition performance level. In addition, the study of Grehan. M & et al (2010) suggested that the students' mathematical backgrounds do not appear to be the only major factor in determining engagement. We found that both groups experienced similar difficulties and problems. However, the second group had several different strategies or coping mechanisms to enable them to get through. In addition, the study of Kurtz, L. A. & NetLibrary. I (2006) suggested that student with poor visual have difficulty knowing what is important or unimportant on a page, work slowly compared to peers, experience difficulty completing work such as near or far copying tasks and experience difficulty finding items in their bags or pencil case. In addition. the study of Daher. W (2009) suggested that, though most of the participants thought that mathematical problems could be solved without applets, they emphasized the role of applets as fostering, facilitating and clarifying mathematical problems' statement and solution. The participants pointed at applets as tools which learners enjoy working with, so they will be encouraged to solve mathematical problems using them.

Researcher finding that Several factors are effect on mathematical disabilities, including poor motivation, deficits in verbal ability, automaticity deficits in basic arithmetic operations, genetic predisposition, in addition, it believes to enhance the level of motivation, the development of pupils ready and guidance about learning, making education more interesting and attractive to learners with mathematics learning disabilities.

2. The level of visual perception disorder among children with mathematics learning disabilities is significant. This means, the existence of visual perception disorder among students with mathematics learning disabilities, is highly, the study of Dominic. H ffytche & et al (2010) suggested that visual perceptual disorders are often presented as a disparate group of neurological deficits with little consideration given to

the wide range of visual symptoms found in psychiatric and neurodevelopmental disease. In addition, the study of Kurtz, L. A., & NetLibrary, I.(2006) suggested that student with poor visual have difficulty knowing what is important or unimportant on a page, work slowly compared to peers, experience difficulty completing work such as near or far copying tasks and experience difficulty finding items in their bags or pencil case. In addition, the study of Dominic. H ffytche & et al (2010) suggested that visual perception symptoms such as visual hallucinations, illusions and visual perceptual distortions or symptoms more likely to be found in psychiatric or neurodevelopmental disorders are typically only mentioned in passing or not at all in such schemes.

Researcher suggested that to a condition in individuals who once mastered mathematical ability but subsequently lost it, as a result of brain injury or developmental dyscalculia, refers primarily to a failure to develop mathematical competence. Researcher confirms the importance of visual perception in the teaching and learning processes, and focus on skill-based learning, and the use of effective instructional strategies, in addition researcher point that, children with mathematics learning disabilities, during the solving of simple arithmetic problems and simple word problems, use the same types of strategies (verbal counting) as typically achieving children, but they differ in the strategy mix and in the pattern of developmental change in this mix.

3. The level of Visual discrimination disorder among children with mathematics learning disabilities, is significant. on line, Gray, S. A. & et al(2012) suggested that adolescents in the working memory training group showed greater improvements in a subset of working memory criterion measures compared with those in the math-training group, but no training effects were observed on the near or far measures. Those who showed the most improvement on the working memory training tasks at school were rated as less inattentive/hyperactive at home by parents. Results suggest that working memory training may enhance some aspects of working memory in youths with learning disabilities. In addition, the study of the study of Kurtz, L. A., & NetLibrary, I.(2006) Suggested that student with poor visual discrimination they are faced difficulty learning the alphabet and recognizing

words/letters, confusion of similar shapes, letters and numbers, mistaking words with similar beginnings or endings, trouble writing and remembering letters and tending to use other senses to make what should be visual discrimination (tactile and verbal).

Researcher suggested that, visual discrimination is one of the processes necessary to learn, where the optic discrimination disorder significantly affect the ability of students with learning difficulties on visual focus, recognize the shape and the floor, control the visual input. And it must be given to educational environments for people with learning difficulties and reduce the factors that distract children in the resource room and Improve the level of academic achievement, In this climate of high-tech software solutions for education, simple, older technologies that provide users with electronic means to make calculations, simplify and solve mathematical expressions and algebraic equations, often adaptive calculators, allow the user to focus on the conceptual and problem solving aspects of math. Technologies of this type often adaptive calculator that serve as an equalizer in mathematics education and help students to more quickly and readily develop number sense, gain mathematical insight, and reasoning skills.

4. level of auditory processing disorder among children with mathematics learning disabilities, is significant. The study of Poelmans. H & et al (2011) suggested that, group comparisons demonstrated that children with dyslexia were less sensitive than normal-reading children to slow-rate dynamic auditory processing, speech-in-noise perception, phonological awareness and literacy abilities. Correlations were found between slow-rate dynamic auditory processing and phonological awareness, and speech-in-noise perception and reading [23]. In addition, the study of The study of Kurtz, L. A., & NetLibrary, I.(2006) suggested that there are classroom strategies for student with poor visual included, Remove glare by sitting away from direct sunlight and take regular breaks to decrease visual stress, Play hidden picture games such as 'i Spy' and 'where's wally', eliminate visually stimulating table as much as possible, complete simple crosswords, change positioning of student's seating to minimize distraction from other students, use red marker to outline boundaries of the specific area to cut or color, Play Scavenger Hunt, limit competing information from the visual field and use iPad apps (Little things and doodle find) [17].

Researcher suggested that, learning difficulties arising from disorders or cognitive processes expresses or reflects itself through three basic aspects, school failure, poor academic achievement, skills and motor difficulties and failure in the integration of cognitive and motor cognitive systems. In addition, auditory perception difficulties include phonological awareness, auditory discrimination, auditory memory, arrangement or audio sequencing, mixing or audio blending.

V. CONCLUSION

This study is modern and contemporary studies because conducted about the predicting of the relationship between memory difficulties and language disorder among pupils with mathematics learning disabilities, so that to enhance the quality of education with learning disabilities, by evaluating the level of availability of programs services very important, to promote abilities and build skills for learning disabilities pupils. Which helps educators and teachers on educational planning successful, towards a better future for this category among special groups which meet the needs of pupil with learning disabilities throughout the life course, Evaluate the quality of learning disabilities programs services is very important in special education field, to improving academic achievement. Finally, the study found that, the predicting of the relationship between memory difficulties and language disorder among pupils with mathematics learning disabilities is significant, the level of memory difficulties among children with mathematics learning disabilities is above moderate and the level of language disorder among pupils with mathematics learning disabilities, is above moderate.

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Enhanced File Security using Encryption and Splitting technique over Multi-cloud Environment

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ABSTRACT

Cloud computing is a field which has been fast growing over the last few years. The fact that cloud can provide both computation and storage at low rates makes it popular among corporations and IT industries. This also makes it a very captivating proposition for the future. But in spite of its promise and potential, security in the cloud proves to be a cause for concerns to the business sector. This is due to the out sourcing of data onto third party managed cloud platform. These concerns security also make the use of cloud services not so much flexible. We provide a secure framework to stored data to be securely in the cloud, at the same time allowing operations to be performed on data without compromising of the sensitive parts of the data. A combination of searchable encryption with Partial Homomorphism is proposed.

Keywords: Cloud Computing, Cloud Security, Homomorphic Encryption, Searchable Encryption, Secure Socket Layer

I. INTRODUCTION

Cloud computing has become the synonym of anything that involves delivering of services over the Internet. The impact of cloud services on the business sector is tremendous. With the increase in the end-users, there is an increasing growth in the number of Cloud Service Providers (CSP) as well. The CSP is a third party that maintains and manages information about another entity. As users of both private and public sectors become more and more aware of cloud and its plethora of services, they are searching for ways of making it more flexible and cost efficient. The strength of the cloud lies in that it offers both storage and computational power: a necessity for any company. Ideally, a company would want to use the CSP that provides the best package in their field of service. But as it happens, each CSP has different prices and strengths for each of their services and hence, a CSP who offers cheap storage may not offer good computation power. In such cases, a customer would opt to use multiple CSPs to make the best use of resources. Hence, in this scenario, one important factor that perhaps is given less importance is the security of data.

Ironically, the main reason for customers still opting out of cloud is the potential vulnerability of cloud when it

comes to security. The Cloud Security Alliance (CSA) [1] in a report has concluded that security threats like malicious insiders, data breaches, etc. still hamper the popularity of cloud. Major security concerns are privacy, integrity and confidentiality.

Even in a single cloud, security is a major concern. However, this risk is multiplied when multiple clouds are involved. If there is data breach of a cloud user using multiple clouds for operations, it would be near impossible to determine at which CSP the data breach occurred or which malicious insider at which CSP sold this data. Hence, a possible solution is needed such that user can make use of multiple CSPs without fear of security breaches. In this paper, we propose a new approach to enhance security in cloud that particularly suits this scenario, ensuring that user can be sure of the security and confidentiality of their data.

The major problem in cloud is that when the user's data is stored on the cloud, the data could be physically located anywhere in the globe and it is not possible for the user to keep track of who has access to their data. Added to this is also the fact that storing raw data in the cloud implies an easy access to hackers and rivals, as the CSP's security offering would be the only barrier

between these entities and the raw data. Since the cloud hosts millions of other users, it could be possible that one CSP could collude with any other person and sell users data stored on the cloud. Unfortunately, this stored data may contain sensitive information, which is vital to the user's company or clients. The user loses direct control of his data and due to the raw nature of the data trusting the CSP becomes a rather forced choice.

Data in cloud could be broadly tagged as either static or computational. On the storage cloud, the data is at rest and in order to protect this data, the obvious option is to encrypt it. Encrypting this static data means, jumbling it up into gibberish that is unreadable or non-understandable. Several encryption algorithms have been proposed to be used for this purpose, the most popular being AES-256 bit. However, the disadvantage of conventional encryption standards is the necessary to decrypt the data before searching the same for partial retrieval. This search may be based on a small part of the data, such as any word or record. However, if decryption at the CSP is to be avoided, the only option left to the user is to retrieve the whole encrypted dataset, decrypt it, search and retrieve the necessary data, re-encrypt the data and store the same back in the cloud. In situations where it is necessary to retrieve a single user record from a database, this method would cause high overhead, since it requires the transfer of the data twice with additional cost for encryption and decryption. This overhead can only be avoided if there is a way to search on the encrypted data. Normal encryption schemes do not have the ability to search on encrypted data. To solve this problem Searchable Symmetric Encryption (SSE) was introduced. The advantage of this idea is to allow users to search for a word or record on encrypted text and retrieve that record. This saves a huge amount of time and effort taken by user.

When computation is required to be performed on the data, data is said to be dynamic, in other words, the value changes with every operation. In such cases, the data is expected to be raw for calculation. But as discussed, raw data is highly volatile. Conventional encryption encrypts the data, making it obtuse for hackers. However, it does not allow operations on it. A huge breakthrough while hunting for a solution was the introduction of Homomorphic Encryption. The idea is that, data can be encrypted in such a manner that allows computation to be done on it. This computed encrypted

data upon decryption, returns the same answer as computations done on raw data.

Although solutions have been separately proposed for data at rest and data to be manipulated upon, it is important to identify a single system that handles both these cases simultaneously. This ensures the privacy of data in a multiple cloud environment. In this paper, it is proposed that it is enough to obscure only the sensitive part of the data, provided, the protection mechanism is strong. By doing so, even if a malicious user gets hold of the data, the document's integrity is not wholly lost, since the encrypted fields are not accessible.

We propose a solution that allows a user to search on Encrypted data, retrieve and perform some computations on it. This approach lets the users decide what parts of the data they are willing to reveal to the cloud while securely hiding the sensitive parts. A combination of Searchable Encryption along with Partial Homomorphic technique like Shamir's Secret Sharing Algorithm is chosen to support our proposal.

II. METHODS AND MATERIAL

A. Related Work

Searchable encryption can be achieved in two ways: Using an index or by sequential search. Dan Boneh et al. [2], Yanjiang Yang et al. [3] proposed related research in the Searchable Encryption field. Most of the work is based on creating an index of keywords for the searchable encrypted file and mapping the indexes to the words when searched. When data users input a keyword, a trapdoor is generated for this keyword and then submitted to the cloud server. A comparison between the trapdoor and index is executed by the cloud server when it receives the trapdoor. All the files/records, which this keyword is a part of, are sent to the data user. Sequential scan of encrypted data allows for controlled searching [4]. All practical implementations can be built using this scheme since it offers less complexity in search. Wang et al. [5] proposed an encryption technique using a secure ranked keyword search by combining inverted index with order - preserving symmetric encryption (OPSE). They employed numerical relevance scores technique to order the retrieved files. Although this method enhances system usability and saves communication overhead, it supports only single

keyword ranked search and hence is not very useful for many applications.

Homomorphic crypto-systems can be broadly divided into two types: Partial Homomorphic systems and Fully Homomorphic systems. Fully Homomorphic systems are those systems, which do not have any limitation on the type of operation nor the number of operations that can be performed on the cipher texts. This is an ideal type of system and was considered impractical and was not even theoretically proved until in 2009, Craig Gentry [6], using lattice-based cryptography showed that fully Homomorphic system are theoretically achievable. However, this scheme did not allow for its implementation to be used practically as the complexity and length of cipher texts keeps increasing with increase in security levels. The key generated is also, too large. Marten van Dijk, Craig Gentry, Shai Halevi and Vinod Vaikuntana [7] proposed the second Fully Homomorphic encryption scheme. This scheme uses many of the tools proposed in Gentry's construction, but does not require ideal lattices. This technique has almost the same efficiency as Gentry's original proposition. The HELib, a library released in GitHub [8], implements the Brakerski-Gentry-Vaikuntana (BGV) [9] Homomorphic encryption scheme, along with many optimizations to make Homomorphic evaluations run faster.

A Homomorphic system having a limitation on the type of operation or the number of operations that can be performed on the cipher texts is called Partially Homomorphic. Examples of some such systems are RSA [10], Paillier [11] and Elgamal. When an allowed operation on the encrypted data is restricted to only multiplication, it is said to be multiplicatively Homomorphic. Both Elgamal and Unpadded RSA are such systems. On the other hand Paillier is additively Homomorphic since addition operation can be performed on the encrypted data. Although original Elgamal is multiplicative, a variant of Elgamal [12] is proposed where it could be made additive. Like most Homomorphic encryption mechanisms this also has a restriction on the size of the data that can be encrypted. This characteristic of Homomorphic encryptions essentially restricts the use of these mechanisms. However, it is observed that these mechanisms work well when applied on a smaller size of the data. In our work, we have used RSA Encryption and we have

included the change to make RSA additively Homomorphic.

B. Proposed Work

This paper focuses on the problems related to the data security aspect of cloud computing. As information and data will be distributed with a third party. Cloud computing users desire to avoid an unreliable cloud provider. Protecting private and important information, such as patient's medical records or a credit card details from attackers or malicious insiders is of critical importance. In addition, the probable for relocation from a single cloud to a multi-cloud environment is examined and research related to security problems in single and multi-clouds in cloud computing is surveyed.

Advantages:

1. Service Availability.
2. Data Integrity.
3. The user runs custom applications using the service provider's resources.
4. Cloud service providers should verify the security of their customers data and should be responsible if any security threat affects their customers service infrastructure.

• Shamir's Secret Sharing Scheme

In this paper, we use Shamir's secret sharing scheme, is based on polynomial evaluations. On input secrets computation operations are performed and distributes the resulting shares to other parties. When the secret has to be reconstructed then parties give their shares to the dealer, which can then combine the shares and retrieve the secret.

With this Shamir's secret sharing scheme, an intruder needs to retrieve at least three values to be able to find out the real value that desire to hide from the intruder. This depends on Shamir's secret sharing algorithm with a polynomial function technique which declare that even with full knowledge of $(k, 1)$ clouds, the service provider will not have any knowledge of VS (VS is the secret value). The hackers need to retrieve all the information from the cloud providers to know the real value of the data in the cloud. If the attacker hacked one cloud providers password or even two cloud

providers passwords, they need to hack the third cloud provider (in the case where $k = 3$) to know the secret number which is the worst case scenario. Hence, for replicating data into multi-clouds use a multi-share technique, this may reduce the threat of data intrusion and increase data integrity.

Suppose that our secret is VS

We wish to divide the secret into 6 parts ($n = 6$), where any subset of 3 parts ($k = 3$) is sufficient to reconstruct the secret. At random we obtain 2 ($k - 1$)

Numbers: $R1$ and $R2$.

Our polynomial to produce secret shares (points) is therefore:

$$f(x) = VS + R1x + R2x^2$$

We construct 6 points from the polynomial:

$$(x_0, y_0)(x_1, y_1)(x_2, y_2)(x_3, y_3)(x_4, y_4)(x_5, y_5)$$

We give each participant a different single point (Both x and $f(x)$).

Reconstruction

In order to reconstruct the secret any 3 points are enough.

Let us consider any Three Parts

$$(x_0, y_0) ; (x_1, y_1) ; (x_2, y_2)$$

We compute Lagrange basis polynomials:

$$l_0 = \frac{x - x_1}{x_0 - x_1} \cdot \frac{x - x_2}{x_0 - x_2}$$

$$l_1 = \frac{x - x_0}{x_1 - x_0} \cdot \frac{x - x_2}{x_1 - x_2}$$

$$l_2 = \frac{x - x_0}{x_2 - x_0} \cdot \frac{x - x_1}{x_2 - x_1}$$

Therefore:

$$f(x) = \sum_{j=0}^2 y_j \cdot l_j(x)$$

So we get original polynomial

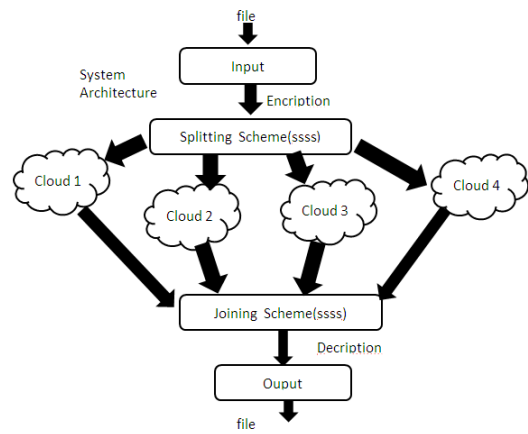


Figure 1: System Architecture

III. RESULTS AND DISCUSSION

ALGORITHM

A. Shamir's secret sharing scheme

Shamir's secret sharing scheme (ssss) is based on polynomial evaluations. The central party is the dealer that performs share compute operations on input secrets and distributes the resulting shares to other parties. When the secret has to be rebuild, the parties give their shares to the dealer, which can then combine the shares and retrieve the secret.

In Shamir's scheme shares are evaluations of a randomly generated polynomial. The polynomial f is generated in such a way that the evaluation $f(0)$ reveals the secret value. If there are enough evaluations, the parties can reconstruct the polynomial and compute the secret. Algorithm 1 states how shares are computed in Shamir's scheme.

Algorithm 1: Share computation algorithm for Shamir's scheme

Data: finite field \mathbf{F} , secret data $s \in \mathbf{F}$, threshold k , number of shares n

Result: shares s_1, \dots, s_n

Set $f_0 = s$

Uniformly generate coefficients $f_1, \dots, f_{k-1} \in \mathbf{F}$

Construct the polynomial $f(x) = f_0 + f_1x + \dots + f_{k-1}x^{k-1}$

Evaluate the polynomial: $s_i = f(i), (i = 1, \dots, n)$

Note that the indices of the shares start from one, as the author cannot output $s_0 = f(0)$, because it is the secret value. The resulting shares $s_1 \dots s_n$ can be distributed to their holders. If the original value needs to be retrieved, they need a subset of at least k shares. Note that it is

important to store the index i together with the share s_i , because it is later needed for reconstruction.

The classical algorithm of Shamir's scheme reconstructs the whole polynomial, whereas they describe versions optimized for reconstructing only the secret $f(0) = s$. They only need to compute $f(0)$ so for our purposes we can simplify the base polynomial's $b_i(x)$ as follows:

$$\beta_i = b_i(0) = \prod_{\substack{j=1 \\ i \neq j}}^k \frac{(-a_j)}{(a_i - a_j)}.$$

If the shares are computed using Shamir's scheme then algorithm 2 retrieves the secret value s .

Algorithm 2: Share reconstruction algorithm for Shamir's scheme

Data: finite field F , shares $s_{t_1}, \dots, s_{t_k} \in F$ where $t_j \in \{1, \dots, n\}$ are distinct indices

Result: secret data s

compute the reconstruction coefficients β_i according to equation (3)

compute $f(0) = s_{t_1}\beta_{t_1} + \dots + s_{t_k}\beta_{t_k}$

Return $s = f(0)$

B. Secure computation with shares

They will now show what can be done with the shares once they have been distributed. They will investigate the possibility of using the homomorphic property of the secret sharing scheme to perform operations with the shares. In the following assume that a k -out-of- n threshold scheme is used. Assume that we have n parties $p_1 \dots p_n$ and the dealer gives each one of them a share according to its index.

C. Addition

Assume that we have shared values $[u] = [u_1 \dots u_n]$ and $[v] = [v_1 \dots v_n]$. Because the evaluation mapping is a linear transformation, they can add the shares of $[u]$ and $[v]$ to create a shared value $[w]$ so that $u + v = w$. Each party k has to run the protocol given in Algorithm 3 to add two shared values.

Algorithm 3: Protocol for adding two Shamir shares for node k

Data: shares u_k and v_k

Result: share w_k that represents the sum of $[u]$ and $[v]$

Round 1

$w_k = u_k + v_k$

D. Multiplication with a Scalar

Assume that we have a shared value $[u] = [u_1 \dots u_n]$ and a public value t . They can multiply the shares u_i with t so that the resulting shares represent the value $[w] = t[u]$. Algorithm 4 shows the protocol for multiplication a share value by a scalar.

Algorithm 4: Protocol for multiplying Shamir shares by a scalar value for node k

Data: shares u_k and a public value t

Result: share w_k that represents the value of $t[u]$

Round 1

$w_k = tu_k$

E. Multiplication

Assume that they have shared values $[u] = [u_1 \dots u_n]$ and $[v] = [v_1 \dots v_n]$. Share multiplication, unfortunately, cannot be solved with the linear property of the transformation, as multiplying two polynomials with the same degree gives a polynomial with double the degree of the source polynomials. This means that they must use a k -out-of- n threshold scheme where $2k \leq n$ and the polynomials must have a degree of at most $2k$. By multiplying the respective shares, the miners actually compute a share that represents the polynomial storing the product of the secrets. However, they must reconstruct the secret stored in the product polynomial and reshare it to make further multiplications possible.

Otherwise, the multiplication of the product polynomial with another one will give us a polynomial with a degree larger than n and we cannot reconstruct the secret from such polynomials anymore.

They can use pre-computed values of the optimized base polynomials β_i needed in the protocol. This requires each node to know its number and also how many other nodes there are, but that is a reasonable assumption. Algorithm 5 gives the complete protocol for multiplying Shamir shares.

Algorithm 5: Protocol for multiplying two Shamir shares for node i

Data: shares u_i and v_i , precomputed value β_i

Result: share w_i that represents the value of $[u][v]$

Round 1

$$z_i = u_i v_i \beta_i$$

Share z_i to z_{i_1}, \dots, z_{i_n} using the same scheme as the dealer uses

Send to each other node $P_j, j \neq i$ the share z_{j_i}

Round 2

Receive shares $z_{j_i}, j \neq i$ from other nodes

$$w_i = z_i + \sum_{\substack{j=1 \\ j \neq i}}^n z_{j_i}$$

I. CONCLUSION

By implement the cloud based storage system that solves many business secure and safe storage issues. But on the other side many expert state that it is more dangerous to put the data over single cloud as it increase the adversary user attack prospect hence by designing the proposed system we are extending the storage cloud security by distributing and encrypting the data. A web portal which let the user manage his data and the managed data should be split over the multiple cloud drive as a small part of file along with encryption. Proposed system will be tested and demonstrate over a local network or on live storage cloud server.

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Reduction of Fractional Differential Equation (FDE) to Ordinary Differential Equation (ODE)

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ABSTRACT

In this paper, Will show that how the solution of the fractional differential equation system can be converted into a problem in ordinary differential equation in two method. With this method the only time the calculation fractional differential equation enters in to the picture is in the calculation of fractional derivatives of known functions. To reach this thing we will use the Laplace transformation in first method and the convolution of the concept of fractional green's function in the second method.

Keywords: Fractional Differential Equation, Ordinary Differential Equation

I. INTRODUCTION

Fractional differential equations arise in many engineering and scientific disciplines as the mathematical modeling of systems and processes in the fields of physics, chemistry, aerodynamics, electrodynamics of complex medium, polymer rheology, Bode's analysis of feedback amplifiers, capacitor theory, electrical circuits, electron-analytical chemistry, biology, control theory, fitting of experimental data, and so forth, and involves derivatives of fractional order. Fractional derivatives provide an excellent tool for the description of memory and hereditary properties of various materials and processes. This is the main advantage of fractional differential equations in comparison with classical integer-order models.

Integer-order impulsive differential equations have become important in recent years as mathematical models of phenomena in both physical and social sciences. There has been a significant development in impulsive theory especially in the area of impulsive differential equations with fixed moments. [2][3].

On the other hand, impulsive differential equations of fractional order play an important role in theory and applications. The fractional impulsive differential

equations have not been addressed so extensively and many aspects of these problems are yet to be explored. For example, the theory using Green's function to express the solution of fractional impulsive differential equations has not been investigated till now. in this paper, we shall study the expression of the solution of fractional impulsive differential equations by using Green's function.

We need definition some special functions:

1.1 The Mittag-Leffler Function:[2][3][4]

The Mittag-Leffler function is a direct generalization of the exponential function, e^x and it plays a major role in fractional calculus. The one and two-parameter representations of the Mittag-Leffler function can be defined in terms of a power series as

$$E_{\alpha}(x) = \sum_{k=0}^{\infty} \frac{x^k}{\Gamma(\alpha k + 1)}, \alpha > 0 \quad (1.1)$$

$$E_{\alpha,\beta}(x) = \sum_{k=0}^{\infty} \frac{x^k}{\Gamma(\alpha k + \beta)}, \alpha > 0, \beta > 0 \quad (1.2)$$

As a result of the definition given in (1.6), the following relations hold:

$$E_{\alpha,\beta}(x) = \frac{1}{\Gamma(\beta)} + x E_{\alpha,\alpha+\beta}(x). \quad (1.3)$$

And

$$E_{\alpha,\beta}(x) = \beta E_{\alpha,\beta+1}(x) + \alpha x \frac{d}{dx} E_{\alpha,\beta+1}(x). \quad (1.4)$$

Observe that (1.8) implies that

$$\frac{d}{dx} E_{\alpha,\beta+1}(x) = \frac{1}{\alpha x} [E_{\alpha,\beta}(x) - \beta E_{\alpha,\beta+1}(x)]. \quad (1.5)$$

So

$$\frac{d}{dx} E_{\alpha,\beta}(x) = \frac{1}{\alpha x} [E_{\alpha,\beta-1}(x) - (\beta - 1)E_{\alpha,\beta}(x)]. \quad (1.6)$$

The exponential series defined by (1.6) gives a generalization of (1.5). Note that $E_{\alpha,\beta}(0) = 1$. Also, for some specific values of α and β , the Mittag-Leffler function reduces to some familiar functions. For example,

$$E_{1,1}(x) = \sum_{k=0}^{\infty} \frac{x^k}{\Gamma(k+1)} = \sum_{k=0}^{\infty} \frac{x^k}{k!} = e^x. \quad (1.7a)$$

$$E_{1,2}(x) = \sum_{k=0}^{\infty} \frac{x^k}{\Gamma(k+2)} = \frac{1}{x} \sum_{k=0}^{\infty} \frac{x^{k+1}}{(k+1)!} = \frac{e^x - 1}{x}. \quad (1.7b)$$

1.2. The Mellin-Ross Function:[2][3][4]

The Mellin-Ross function, $E_t(v, a)$ arises when finding the fractional derivative of an exponential e^{at} . The function is closely related to both the incomplete Gamma and Mittag-Leffler functions. Its definition is given by

$$E_t(v, a) = t^v \sum_{k=0}^{\infty} \frac{(at)^k}{\Gamma(k+v+1)} = t^v E_{1,v+1}(at). \quad (1.8)$$

and the notation $E_t(v, a)$ is a solution of the ordinary

$$\text{differential equation } Dy - ay = \frac{t^{v-1}}{\Gamma(v)}$$

Basic definitions

Definition 2.1 : [2][3][4] Let $\alpha > 0$, The Riemann-Liouville left-side fractional integral $I_{a+}^{\alpha} f$ of order α with original at the point a is defined by:

$$I_{t+}^{\alpha} f(t) = \frac{1}{\Gamma(\alpha)} \int_a^t \frac{f(\tau)}{(t-\tau)^{1-\alpha}} d\tau, t > a, \quad (1.9)$$

Provided the integral exists. Here $\Gamma(\alpha)$ is the Gamma function, and I_{a+}^{α} is called an integral operator of order α .

Definition 2.2:[2][3][4] Let $n - 1 \leq \alpha \leq n, n \in \mathbb{N}$, The Riemann -Liouville fractional derivative $D_{a+}^{\alpha} f$ of order α with original at the point a is defined by:

$$D_{t+}^{\alpha} f(t) = D^n I_{t+}^{n-\alpha} f(t) = \left(\frac{d}{dt}\right)^n \frac{1}{\Gamma(n-\alpha)} \int_a^t \frac{f(\tau)}{(t-\tau)^{\alpha-n+1}} d\tau, t > a, \quad (1.10)$$

and D_{t+}^{α} is called the fractional differential operator of order α .

Definition 2.3:[6] The Laplace Transform

We recall that a function $y(t)$ defined on some domain J' is said to be of exponential order if there exist constants N, T such that $e^{-\alpha t} |y(t)| \leq N$ for all $t \geq T$. If $y(t)$ is of exponential order α , then $\int_0^{\infty} y(t) e^{-st} dt$ exists for all $\text{Re } s > \alpha$. The Laplace transform of $y(t)$ is then defined as in [6].

$$Y(s) = \mathcal{L}\{y(t)\} = \int_0^{\infty} y(t) e^{-st} dt \quad (1.11)$$

We say that $y(t) = \mathcal{L}^{-1}\{Y(s)\}$ is the (unique) inverse Laplace transform of $Y(s)$.

We also recall that the Laplace transform is a linear operator [1]. In particular, if $\mathcal{L}\{f(t)\}$ and $\mathcal{L}\{g(t)\}$ exist, then

$$\mathcal{L}\{f(t) + g(t)\} = \mathcal{L}\{f(t)\} + \mathcal{L}\{g(t)\} \quad \text{and} \\ \mathcal{L}\{cf(t)\} = c\mathcal{L}\{g(t)\} \quad (1.12)$$

For some elementary calculus example shows that for all $\mu > -1$ and

$$a \in \mathbb{R}, \mathcal{L}\{t^{\mu}\} = \frac{\Gamma(\mu+1)}{s^{\mu+1}}, \text{ and } \mathcal{L}\{e^{at}\} \quad (1.13)$$

One of the most useful properties of the Laplace transform is found in the convolution theorem. This theorem states that the Laplace transform of the convolution of two functions is the product of their Laplace transforms. So, if $F(s)$ and $G(s)$ are the Laplace transforms of $f(t)$ and $g(t)$ and, respectively, then where:[1]

$$f * g = F(s) G(s),$$

Where

$$f * g = \mathcal{L}\left\{\int_0^t f(t-z)g(z)dz\right\} \quad (1.14)$$

Now we put two new methods to transform the fractional differential equation to ordinary differential equation

II. METHODS AND MATERIAL

A. The Laplace transformation method

werecall the fractional integral of $f(t)$ of order is

$$I_t^{-\nu} f(t) = \frac{1}{\Gamma(\nu)} \int_0^t (t-x)^{\nu-1} f(x) dx$$

This equation is actually a convolution integral. So, using (1.12) and (1.13) we findthat :

$$\mathcal{L}\{I_t^{-\nu} f(t)\} = \frac{1}{\Gamma(\nu)} \mathcal{L}\{t^{\nu-1}\} \mathcal{L}\{f(t)\} = s^{-\nu} Y(s), \nu > 0 \quad (1.15)$$

Equation (1.15) is the Laplace transform of the fractional integral. As examples, we see for $\nu > 0, \mu > -1$ that

$$\mathcal{L}\{I_x^{-\nu} t^\mu\} = \frac{\Gamma(\mu+1)}{s^{\mu+\nu+1}} \text{ and } \mathcal{L}\{I_x^{-\nu} e^{at}\} = \frac{1}{s^\nu(s-a)} \quad (1.16)$$

We again recall that in the integer order operations, the Laplace transform of $y^{(n)}$ is given by:

$$\begin{aligned} \mathcal{L}\{y^{(n)}\} &= s^n Y - s^{n-1} y(0) - s^{n-2} y'(0) - \dots - y^{(n-1)}(0) \\ &= s^n Y(s) - \sum_{k=0}^{n-1} s^{n-k-1} y^{(k)}(0) \end{aligned} \quad (1.17)$$

Now from probability of fractional derivative [2] and by the fractional ofderivative $y^{(\alpha)}$ is

$$D_x^\alpha y(t) = D_x^n [D_x^{-u} y(t)] \quad (1.18a)$$

Where n , is the smallest integer greater than $\alpha > 0$, and

$$u = n - \alpha$$

we can write equation (1.18a) as:

$$D_x^\alpha y(t) = D_x^n [D_x^{-(n-\alpha)} y(t)] \quad (1.18b)$$

Now, if we assume that the Laplace transform of $y(t)$ exists, then by the use of (1.15) we have:

$$\mathcal{L}\{D_x^\alpha y(t)\} = \mathcal{L}\left\{D_x^n [D_x^{-(n-\alpha)} y(t)]\right\}$$

$$\begin{aligned} &= s^n \mathcal{L}\left\{D_x^{-(n-\alpha)} y(t)\right\} - \sum_{k=0}^{n-1} s^{n-k-1} D_x^k [D_x^{-(n-\alpha)} y(t)]_{t=0} \\ &= s^n [s^{-(n-\alpha)} Y(s)] - \sum_{k=0}^{n-1} s^{n-k-1} D_x^{k-(n-\alpha)} y(0) \\ &= s^\alpha Y(s) - \sum_{k=0}^{n-1} s^{n-k-1} D_x^{k-n+\alpha} y(0) \end{aligned} \quad (1.19)$$

In particular, if $n = 1$ and $n = 2$, we respectively have

$$\mathcal{L}\{D_x^\alpha y(t)\} = s^\alpha Y(s) - D_x^{-(1-\alpha)} y(0), 0 < \alpha \leq 1. \quad (1.20)$$

$$\mathcal{L}\{D_x^\alpha y(t)\} = s^\alpha Y(s) - s D_x^{-(2-\alpha)} y(0) - D_x^{-(1-\alpha)} y(0), 1 < \alpha \leq 2. \quad (1.21)$$

Table 1.1 gives a brief summary of some useful Laplace transform pairs. We will frequently refer to this Table. This function plays an important role when solving fractional differential equations.

Table 1.1. Laplace transforms pairs

$Y(s)$	$y(t)$
$\frac{1}{s^\alpha}$	$\frac{t^{\alpha-1}}{\Gamma(\alpha)}$
$\frac{1}{(s+a)^\alpha}$	$\frac{t^{\alpha-1}}{\Gamma(\alpha)} e^{-at}$
$\frac{1}{s^\alpha - a}$	$t^{\alpha-1} E_{\alpha,\alpha}(at^\alpha)$
$\frac{1}{s(s^\alpha - a)}$	$E_\alpha(-at^\alpha)$
$\frac{a}{s(s^\alpha - a)}$	$1 - E_\alpha(-at^\alpha)$
$\frac{1}{s^\alpha(s-a)}$	$t^\alpha E_{1,\alpha+1}(at)$
$\frac{s^{\alpha-\beta}}{s^\alpha - a}$	$t^{\beta-1} E_{\alpha,\beta}(at^\alpha)$
$\frac{s^{\alpha-\beta}}{(s-a)^\alpha}$	$\frac{t^{\beta-1}}{\Gamma(\beta)} F_1(\alpha;\beta;at)$
$\frac{1}{(s-a)(s-b)}$	$\frac{1}{a-b} (e^{at} - e^{bt})$

In this table, a and $a \neq b$ are real constants; α, β are arbitrary.

Example 1 : Let's solve $D_t^{\frac{3}{4}}y(t)$ where a is constant. Since $0 < \alpha = \frac{3}{4} \leq 1$, we will use (1.20). Taking the Laplace transform of both sides of the equation we have:

$$\mathcal{L}\{D_t^{\frac{3}{4}}y(t)\} = a\mathcal{L}\{y(t)\}$$

which implies that

$$s^{3/4}Y(s) - D_{t=0}^{-(1-3/4)}y(0) = aY(s) \quad (1.22)$$

The constant $D_{t=0}^{-(1-3/4)}y(0) = D_{t=0}^{-1/4}y(0)$ is the value of $D_t^{-1/4}y(t)$ at $t = 0$

If we assume that this value exists, and call it c_1 , then (1.22) becomes

$$s^{3/4}Y(s) - c_1 = aY(s)$$

Solving for $Y(s)$ we obtain

$$Y(s) = \frac{c_1}{s^{3/4} - a}$$

Finally, using Table 1.1 we find the inverse Laplace of $Y(s)$, and conclude that

$$y(t) = \mathcal{L}^{-1}\left\{\frac{c_1}{s^{3/4} - a}\right\} = c_1 t^{-1/4} E_{3/4, 3/4}(at^{3/4})$$

Example 2 : Let's solve $D_t^{3/2}y(t) = 0$

Since $0 < \alpha = 3/2 \leq 2$, we will use (1.21). Taking the Laplace transform of both sides of the equation we have:

$$\mathcal{L}\{D_t^{3/2}y(t)\} = 0$$

which implies that

$$s^{3/2}Y(s) - sD_{t=0}^{-(2-3/2)}y(0) - D_{t=0}^{-(1-3/2)}y(0) = 0 \quad (1.23)$$

we will assume that constants $D_{t=0}^{-(2-3/2)}y(0)$ and $D_{t=0}^{-(1-3/2)}y(0)$

exist and call them c_1 and c_2 , respectively. Then (1.23) becomes

$$s^{3/2}Y(s) - c_1s - c_2 = 0.$$

Solving for $Y(s)$ we obtain:

$$Y(s) = \frac{c_1s}{s^{3/2}} + \frac{c_2}{s^{3/2}}$$

Finally, using Table 1.1 we find the inverse Laplace of $Y(s)$ and conclude that

$$\begin{aligned} y(t) &= \mathcal{L}^{-1}\left\{\frac{c_1s}{s^{3/2}}\right\} + \mathcal{L}^{-1}\left\{\frac{c_2}{s^{3/2}}\right\} \\ &= \frac{c_1}{\Gamma\left(\frac{1}{2}\right)} t^{-1/2} + \frac{c_2}{\Gamma\left(\frac{3}{2}\right)} t^{1/2}. \end{aligned}$$

Before starting the second method we clarify some concepts:

B. Convolution of fractional green's functions

Now we will discuss some interesting results involving fractional green's functions. The first theorem proving that the convolution of two fractional green's functions is also a fractional green's functions.

Theorem 1[3]: let $x(t)$ be piecewise continuous on J' and

integrable and exponential order on J . let

$$[D^{nv} + a_1D^{(n-1)v} + \dots + a_nD^0]y(t) = x(t).$$

$$D^jy(0) = 0, \quad j = 0, 1, \dots, N-1. \quad (1.24)$$

be a fractional differential system of order (n, q) , where N is the smallest integer greater than nv . let

$p(x) = x^n + a_1x^{n-1} + \dots + a_n$. Be the indicial

polynomial and let $k(t) = \mathcal{L}^{-1}\{p^{-1}(s^v)\}$ be the fractional green's function then

$$y(t) = \int_0^t k(t-x)f(x)dx.$$

Theorem 2[3]: let

$$P(D^v) = D^{nv} + a_1D^{(n-1)v} + \dots + a_nD^0 \quad (1.25)$$

Be a fractional differential operator of order (n, q) with fractional green's function $K_P(t)$, and let

$$Q(D^v) = D^{mv} + b_1D^{(m-1)v} + \dots + b_mD^0 \quad (1.26)$$

be a fractional differential operator of order (m, q) with fractional green's function $K_Q(t)$, let

$$R(x) = Q(x)P(x) \quad (1.27)$$

and let

$$R(D^v) = D^{(m+n)v} + c_1D^{(m+n-1)v} + \dots + c_{n+m}D^0, \quad (1.28)$$

a fractional differential operator of order $(m+n, q)$ then If $K_Q(t)$ is a fractional green's function associated with $R(D^\nu)$,

$$K_R(t) = \int_0^t K_Q(t-x)K_P(x)dx. \quad (1.29)$$

Proof:[3] We know that

$$\mathcal{L}\{K_Q(t)\}\mathcal{L}\{K_P(t)\} = \frac{1}{Q(s^\nu)}\frac{1}{P(s^\nu)}$$

and

$$R(s^\nu) = Q(s^\nu)P(s^\nu).$$

But is $R^{-1}(s^\nu)$ a Laplace transform of $K_R(t)$. thus

$$\mathcal{L}\{K_Q(t)\}\mathcal{L}\{K_P(t)\} = \mathcal{L}\{K_R(t)\},$$

and by the convolution theorem of the Laplace transform,

$$K_R(t) = \int_0^t K_Q(t-x)K_P(x)dx. \quad (1.30)$$

Corollary 1[3]. If $P(D^\nu), Q(D^\nu),$ and $R(D^\nu)$ are the fractional operators of (1.25), (1.26), and (1.28) and K_P, K_Q and K_R are their respective fractional green's function, then

$$Q(D^\nu)K_R(t) = K_P(t) \quad (1.31a)$$

and

$$P(D^\nu)K_R(t) = K_Q(t). \quad (1.31b)$$

If $P(x)$ is a polynomial of degree $n \geq 1$, and if q is any positive integer, there exists a polynomial Q of degree $n(q-1)$ such that

$$Q(x)P(x)$$

is a polynomial of degree n in x^q .

We have

$$R(D^\nu) = Q(D^\nu)P(D^\nu),$$

and

$$R(D^\nu) = T(D) = D^n + d_1D^{n-1} + \dots + d_nD^0.$$

That is, $T(D)$ is an ordinary differential operator.

Let $H(t)$ be the one-sided green's function associated with T .

Then

$$H(t) = \int_0^t K_Q(t-x)K_P(x)dx. \quad (1.32)$$

Corollary 2[3]. if $P(D^\nu)$ is a fractional differential operator of order (n, q) , there exists a fractional differential operator $Q(D^\nu)$ of order $(n(q-1), q)$ such that the convolution of their fractional green's functions is a one-sided green's function of an ordinary differential operator of order n . In particular, corollary 1 implies that :

$$Q(D^\nu)H(t) = K_P(t) \quad (1.33a)$$

and

$$P(D^\nu)H(t) = K_Q(t) \quad (1.33b)$$

C. The techniques of transformation of second method [3]:

We explain the method to transformation from fractional differential equations to ordinary differential equation as following:

Suppose that we wish to solve the fractional differential system of order (n, q)

$$[D^{nq} + a_1D^{(n-1)q} + \dots + a_nD^0]y(t) = x(t) \quad (1.34a)$$

$$y(0) = D_y(0) = \dots = D^{N-1}y(0) = 0, \quad (1.34b)$$

Where N is the smallest integer with the property that $N \geq nq$, and $x(t)$ is piecewise continuous on J' , and of exponential order on J . let

$$P(x) = x^n + a_1x^{n-1} + \dots + a_n \quad (1.35)$$

Be the indicial polynomial. [Then we may write (1.34a) as

$$P(D^\nu) y(t) = x(t).]$$

Given a polynomial P of degree n in x , we may construct two polynomials, T and Q , such that

$$T(x^q) = Q(x)P(x), \quad (1.36)$$

Where Q is a polynomial of degree $n(q-1)$ in x , and T is a polynomial of degree n in x^q . Choose P as the $P(x)$ of (2.2). For the ordinary differential operator:

$$T(D) = D^n + d_1D^{n-1} + \dots + d_nD^0 \quad (1.37)$$

We may construct its one-sided green's function, say $H(t)$. Then from (1.33a) we see that

$$Q(D^\nu)H(t) = K_p(t) \quad (1.38)$$

Thus we have obtained the fractional green's function K_p of $P(D^\nu)$ by applying the fractional operator to the known function $H(t)$. Then the solution of (1.34) is given by

$$y(t) = \int_0^t K_Q(t-x)K_p(x)dx \quad (1.39)$$

So we see that the only place where we needed the fractional calculus was when we had to compute fractional derivatives of a known function.

Example3: consider the fractional differential system of order (2,3),

$$[D^{2\nu} - D^\nu + D^0]y(t) = f(t) \quad (1.40a)$$

$$y(0) = 0. \quad (1.40b)$$

(Here $N=1$.) Then

$$P(x) = x^2 - 4x + 4 \quad (1.41)$$

Is the indicial polynomial associated with (1.40a). Using

(1.41) as the polynomial "P(x)" we have

$$Q(x) = x^4 + 4x^3 + 12x^2 + 16x + 16$$

and

$$R(x) = Q(x)P(x) = x^6 - 16x^3 + 64$$

$$T(x) = R(x^\nu) = Q(x^\nu)P(x^\nu)$$

$$= x^{2\nu} - 16x + 64.$$

The one-sided green's function $H(t)$ associated with the ordinary differential operator

$$T(D) = D^{2\nu} - 16D + 64D^0.$$

Now recall that

$$D^\nu(te^{kt}) = tE_t(-\nu, k) + \nu E_t(1-\nu, k)$$

Hence

$$Q(D^\nu)H(t) = [D^{4\nu} + 4D^{3\nu} + 12D^{2\nu} + 16D^\nu + 16](te^{8t})$$

$$= t[E_t(-4\nu, 8) + 6E_t(-3\nu, 8) + 12E_t(-2\nu, 8) + 16E_t(-\nu, 8) + 4\nu[E_t(-\nu, 8) + E_t(0, 8) + 6E_t(\nu, 8) + 4E_t(2\nu, 8)]]$$

We see from (1.38) that the expression above is $K_p(t)$.

Therefore,

$$y(t) = \int_0^t \{(t-x)[E_{t-x}(-4\nu, 8) + 6E_{t-x}(-3\nu, 8) + 12E_{t-x}(-2\nu, 8) + 16E_{t-x}(-\nu, 8)] + 4\nu[E_{t-x}(-\nu, 8) + 3E_{t-x}(0, 8) + 6E_{t-x}(\nu, 8) + 4E_{t-x}(2\nu, 8)]\}f(x)dx.$$

$$(1.42)$$

is the solution given by (1.39)

III. CONCLUSION

In this paper, We prove that how the solution of the fractional differential equation system can be converted into a problem in ordinary differential equation in two method.

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Assessment of Sanitary Condition nearby Area of Solid Waste Disposal Site

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ABSTRACT

Environmental Impact Assessment (EIA) [4-5] describes a technique by which information about the environmental effects of a proposed project is collected from different sources, and then analyzed to make a judgment on whether proposed development should go ahead. By EIA we do a systematic analysis using this information. But the data so obtained are not always crisp or precise. Most of the data are not numeric, rather linguistic. Such type of imprecise data is fuzzy data [9] or intuitionistic fuzzy data [1]. In this paper we study a methodology to find out the overall environmental impact on the health of neighbours to a solid wastes disposal site where waste are dumping crudely. Here we use the application of fuzzy logic and its higher order fuzzy logic for such evaluation. To understand the methodology o, an hypothetical case study is presented here.

Keywords: EIA, Fuzzy Set, Intuitionistic Fuzzy Set, Fuzzy Number, Mean Fuzzy Set

I. INTRODUCTION

In many states of the world, the sanitary landfills are not practiced rather the vehicles engaged to carry the wastes from various sources of generation are dumping the wastes here & there in the landfill site where they felt suitable best [3]. There is no clear boundary in the dumping premises, nor are the vehicles heaping the wastes in sanitary manner, thereby creating hillocks of rubbish which are posing threat to nearby residential environment. This indiscriminate disposal of wastes has led to significant degradation of environment, leading to contamination of environmental resources and spread of diseases, increasing the risk of exposure to highly contagious and transmission prone disease vectors. With the increase of population and the changing character of generated wastes, solid waste management is becoming a felt problem, particularly in thickly populated rural areas. Though not fully aware of the potential health risks associated with solid waste management, people today are more concerned about the aesthetic aspects and possible health hazards. The disposal of wastes on land in open dumps or in low lying areas causes numerous adverse impacts on the environment such as:

- Ground water contamination by the percolation of leachate from waste body
- Surface water contamination by the run-off from the waste dump
- Odour generation, pests, rodents and wind-blown litter around the waste dump
- Epidemics through stray animals
- Acidity to the surrounding soil
- Generation of inflammable gas.

The environmental Impact Assessment (EIA) is a relatively new planning and decision making tool first enshrined in the United States in the National Environmental Policy Act of 1969. In India, the environmental action formally started with the participation of late Smt. Indira Gandhi in the UN Conference on Human Environment in Stockholm in 1972. It focuses the public views and comments on the periphery of the project (here it is disposal place of solid wastes). The general public attitude in a major project is often expressed as concern about the existence of unknown or unforeseen effect. The objective of EIA is mainly the following:

- i. Predict environmental impact of projects
- ii. Find ways and means to reduce adverse impacts
- iii. Shape project to suit local environment
- iv. Present the predictions and options to the decision-makers

Scoping (process of deciding on the impacts to be investigated) is an important and essential initial activity in any EIA. Involvement of public in scoping in many situations is helpful because EIA is a predictive exercise. Project data and the data on the existing environmental conditions are known as baseline data. In the next section we justify the necessity of intuitionistic fuzzy set theory in EIA.

A. Why Fuzzy Technique is to be Adopted?

An EIA involves prediction and thus uncertainty is an integral part. There are two types of uncertainty associated with EIA: that associated with the process and, that associated with predictions. In EIA, general public views and observation are collected as important information. viz. “good”, “very good”, “less amount”, “too much polluted”, “not less than 30%”, “30 to 40 nos. in average” etc. to list a few only out of infinity. Such type of imprecise data is fuzzy in nature. Thus evaluation of many objects here is not always possible with numerical valued descriptions. Because, some part of evaluation is often associated with unavoidable hesitation. Some part of the evaluation contribute to truthness, some part to falseness and the rest part remain indeterministic. Some data so obtained are not point valued rather may contribute to truthness in the form of interval of numbers. Consequently it is ideal to adopt a proper mathematical tool to do a proper judgment or evaluation. Certainly fuzzy mathematical tools are a suitable one for this purpose. Because of this obvious reason we will adopt the fuzzy logic & intuitionistic fuzzy logic as most important tools in the present work of EIA.

B. Preliminaries

In this section we present some preliminaries which will be useful to our work in the next section

i Crisp Set

A set can be described either by list method or by the rule method. We know that the process by which individuals from the universal set X are determined to be

either members or nonmembers of a set can be defined by a characteristic function or discrimination function.

For a given set A , this function assign a value $\mu_A(x)$ to every $x \in X$ such that

$$\begin{aligned} \mu_A(x) &= 1 && \text{iff } x \in A \\ &= 0 && \text{iff } x \notin A \end{aligned}$$

Thus in the classic theory of sets, very precise bounds separate the elements that belong to a certain set from the elements outside the set. In other words, it is quite easy to determine whether an element belongs to a set or not.

ii Fuzzy Set

Many sets encountered in reality do not have precisely defined bounds as in case of crisp sets that separate the elements in the set from those outside the set. That so the crisp characteristic function can now be generalized such that the values assigned to the elements of the universal set fall within a specified range and indicate the membership grade of these elements in the set in question. Such a function is called membership function and the set defined by it a fuzzy set. The membership function for fuzzy sets can take any value from the closed interval $[0,1]$. Fuzzy set A is defined as the set of ordered pairs $A = \{ x, \mu_A(x) \}$, where $\mu_A(x)$ is the grade of Membership of element x in set A . The greater $\mu_A(x)$, the greater the truth of the statement that element x belongs to set A .

Let $X = \{x_1, x_2, \dots, x_n\}$ be a finite discrete universe of elements $x_i, i = 1, 2, \dots, n$. A fuzzy set A defined over a set X is most often shown in the form $A = \{ (x_1, \mu_A(x_1)), (x_2, \mu_A(x_2)), \dots, (x_n, \mu_A(x_n)) \}$.

iii Intuitionistic Fuzzy Set

An intuitionistic fuzzy set (IFS) A in E is defined as an object of the following form.

$$A = \{ (x, \mu_A(x), \nu_A(x)) \mid x \in E \}$$

Where the functions:

$$\begin{aligned} \mu_A &: E \rightarrow [0,1] \\ \nu_A &: E \rightarrow [0,1] \end{aligned}$$

define the degree of membership and the degree of non-membership of the element $x \in E$, respectively, and for every $x \in E$ we have the relation $0 \leq \mu_A(x) + \nu_A(x) \leq 1$.

Let us call this condition $0 \leq \mu_A(x) + \nu_A(x) \leq 1$ by "Atanassov condition".

Obviously, each ordinary fuzzy set may be written as $\{ (x, \mu_A(x), 1-\mu_A(x)) \mid x \in E \}$ and thus every fuzzy set is an intuitionistic fuzzy set but not conversely.

The amount $\pi_A(x) = 1 - (\mu_A(x) + \nu_A(x))$ is also called the hesitation part (i.e. the degree of non-determinacy or uncertainty) of the element, and this amount may cater to either membership value or to non-membership value or to both. Clearly, in case of ordinary fuzzy sets (Zadeh's fuzzy sets) it is presumed that

$$\pi_A(x) = 0 \quad \text{for every } x \in E.$$

iv Concept of Fuzzy Numbers

Subjective estimation that deals with the imprecise object like

- (i) waiting time of a car or vehicle at a traffic signal, or
- (ii) Manufacturing cost of a flight etc.

can be expressed by a fuzzy sets. Based on experiences or institution, an expert or decision maker is able to state that waiting time of vehicle at a traffic signal is "around 20seconds", "not more than 20 seconds" etc. such type of subjective estimations are characterized by certainly values. Intuitively it is clear that a flight cost that is "approximately \$5,000" is certainly less than a flight cost of approximately \$6,000". In another terminology, the fuzzy numbers is fuzzy set that is convex and normalized. The figure shows the graph of fuzzy number "approximately 20":-

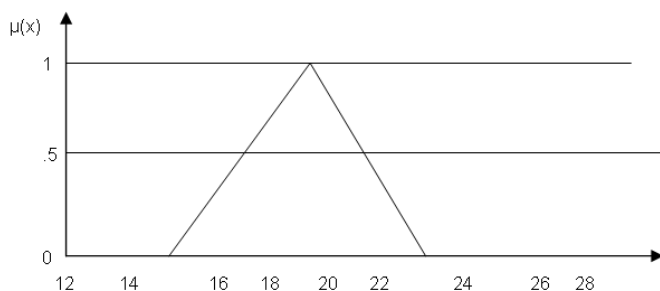


Figure 1: The fuzzy number "approximately 20 or approx.20

II. METHODS AND MATERIAL

In this section we present our proposal for common approach of fuzzy & intuitionistic fuzzy in EIA. First of all we present some definitions.

Definition 4.1 Attributes of the Assessment

The assessment is done by collecting information or values for certain attributes which are called the attributes of the assessment.

For example, consider a project of "EIA ON NEIGHBOURS NEAR TO THE SOLID WASTE DISPOSAL SITE", for which some relevant attributes could be "unusual number of mosquito breeding", "unusual number of fly breeding", "bad drainage system around the disposal site", "birds problems", "rodents problems" etc.

Definition 4.2 Universe of the Assessment

Collection of all attributes of the assessment is called the Universe of the Assessment.

Definition 4.3 Weighted Average of a Fuzzy Set

Let A be a fuzzy set of a finite set X . Suppose that to each element $x \in X$, there is an associated weight $W_x \in R^+$ (set of all non-negative real numbers). Then the 'weighted average' of the fuzzy set A is the non-negative number $a(A)$ given by

$$a(C) = \frac{\sum m(x_i) \cdot W_x i}{\sum W_x i}$$

where $m(x_i) = (l_i + u_i)/2 = m_i$ (say).

Definition 4.4 Mean Fuzzy Set of an IFS

Let E be an universe and X be an IFS of E . The mean fuzzy set of the IFS X is a fuzzy set m of E given by the membership function

$$m(x) = \frac{\mu_A(x) + 1 - \nu(x)}{2}$$

Definition 4.5 Weighted Average of an IFS

Let B be an IFS of a finite set X . Suppose that to each element $x \in X$, there is an associated weight $W_x \in R^+$ (set of all non-negative real numbers). Then the

weighted average of the IFS-B is the non-negative number $a(B)$ given by

$$a(B) = \frac{\sum m(x) \cdot W_x}{\sum W_x}$$

Definition 4.5 Weighted Average of Interval valued Fuzzy Set

Let $I_i = [l_i, u_i]$ be the interval valued assessment for the object $x_i \in X$ (if it happens not to be a point valued). With no loss of generality, for every object's assessment we choose I_i as a subset of $[0,1]$. A point valued number, say .4 could be regarded as the interval $[.4,.4]$ for the sake of presentation of our theory. Suppose that to each element $x_i \in X$, there is an associated weight $W_{xi} \in R^+$ (set of all non-negative real numbers). Then the 'weighted average' of the objects of C is the non-negative number $a(C)$ given by

$$a(C) = \frac{\sum m(x_i) \cdot W_{xi}}{\sum W_{xi}}$$

where $m(x_i) = (l_i+u_i)/2 = m_i$ (say).

In particular situation, if for an object the value I_i is not an interval but a number n_i just, then we take $m_i = n_i$.

Definition 4.6 Mean Weighted Average Of Universe

Let $a(A)$ be the weighted average of set-A, $a(B)$ be the be the weighted average of set-B, and $a(C)$ be the weighted average of set-C, then mean weighted average of universe will be

$$a(X) = [a(A) + a(B) + a(C)] / 3$$

Definition 4.7 Grading of Assessment Output

Depending upon the mean value of $a(X)$, the grading of overall output could be temporarily proposed as below:

- grade = A, if $.8 < a(A) \leq 1$
- grade = B, if $.6 < a(A) \leq .8$
- grade = C, if $.4 < a(A) \leq .6$
- grade = D, if $.2 < a(A) \leq .4$
- grade = E, if $0 \leq a(A) \leq .2$

In the next part we present the methodology by a hypothetical case study.

Algorithm

1. make the Universal set $X = \{ x_1, x_2, x_3, \dots, x_n \}$
2. compute the sub set A, B, and C of set X such that
 $A = \{ x_{f1}, x_{f2}, x_{f3}, \dots, x_{fn} \}$, $B = \{ x_{if1}, x_{if2}, x_{if3}, \dots, x_{ifn} \}$
 and, $C = \{ x_{iv1}, x_{iv2}, x_{iv3}, \dots, x_{ivn} \}$
 where, x_{fr} = all fuzzy data for $r = 1, 2, 3, \dots, n$
 x_{ifr} = all intuitionistic fuzzy data for $r = 1, 2, 3, \dots, n$
 x_{ivr} = all inter valued fuzzy data for $r = 1, 2, 3, \dots, n$
3. Calculate the weighted average individually, $a(A)$, $a(B)$, and $a(C)$ for the objects of sub set-A, sub set-B and sub set-C
4. Compute the mean weighted average for all objects of the universe by $a(X) = [a(A) + a(B) + a(C)] / 3$
5. Select the suitable grade of the assessment of the project.
6. Recommendation of the project
7. Stop.
- 8.

III. RESULTS AND DISCUSSION

Case Study

Consider a project of "ASSESSMENT OF SANITARY CONDITION NEARBY AREA OF SOLID WASTE DISPOSAL SITE". To do the assessment let us consider the following attributes (for the sake of simplicity in presenting the method we consider here twenty eight attributes with no loss of generality) :-

- x_1 = no. of vehicles disposing the wastes daily in landfill
- x_2 = no. of other vehicles plying daily nearby the disposal site
- x_3 = no. of scavengers working in the disposal site
- x_4 = unusual number of mosquito breeding in disposal site

- x_5 = unusual number of fly breeding in disposal site
- x_6 = poor drainage system around the disposal site
- x_7 = acute birds problems in disposal site
- x_8 = acute rodents problems in disposal site
- x_9 = unhygienic latrine in and around the disposal site
- x_{10} = inadequate water facilities in disposal site
- x_{11} = heavy rainfall intensity in disposal site area
- x_{12} = poor management for disposal of waste timely
- x_{13} = bad habit of neighbors in roaming around the disposal site
- x_{14} = poor awareness of sanitation among the neighbors
- x_{15} = poor awareness of sanitation among the scavengers
- x_{16} = easy accessibility of dogs, pigs, cows, etc. in the disposal site
- x_{17} = very crude dumping system of solid waste
- x_{18} = heavy production of vegetables & fishes around the disposal area
- x_{19} = poor barricade in between dumping area and neighbor
- x_{20} = bad habit to use the recyclable materials by the neighbors
- x_{21} = high mixing habit of scavengers and neighbors
- x_{22} = bad approach road around the disposal site
- x_{23} = huge quantity of solid waste dumping daily
- x_{24} = nos. of scavengers found daily in the neighbor's area
- x_{25} = huge amount of leachate found in outer open surface of landfill
- x_{26} = poor mechanical condition of carrying vehicles
- x_{27} = huge quantity of organic waste are dumping daily
- x_{28} = nos. of local people taking food from shop nearby disposal site

views from a good number of nearby inhabitants in addition to the scavengers found in the disposal site.

Let us suppose that the data collected from the above sources are categories in three sub sets A , B and C of the universal set X.

Where,

$A = \{ x_4, x_5, x_6, x_7, x_8, x_9, x_{16}, x_{18}, x_{19}, x_{21}, x_{22}, x_{27} \}$, based on all fuzzy data ,

$B = \{ x_{10}, x_{11}, x_{12}, x_{13}, x_{14}, x_{15}, x_{17}, x_{20}, x_{26} \}$, based on all intuitionistic fuzzy data ,

and

$C = \{ x_1, x_2, x_3, x_{23}, x_{24}, x_{25}, x_{28} \}$, based on all interval valued fuzzy data.

for subset-A

Let us suppose that the data collected from 100 people for an attribute x_i reveals that more or less 70 people are in support of the truthness of the attribute and the rest 30 are in support of falseness. We set for our fuzzy analysis that $\mu_A(x_i) = .7$.

Suppose that the data (hypothetical) collected are as shown below in a tabular form:

Attribute name	in support of truthness $\mu(x)$	in support of falseness $= (1-\mu(x))$	weight of the attribute W_x
x_4	.75	.25	35
x_5	.85	.15	35
x_6	.5	.5	40
x_7	.6	.4	60
x_8	.85	.15	65
x_9	.8	.2	50
x_{16}	.9	.1	65
x_{18}	.45	.55	25
x_{19}	.9	.1	15
x_{21}	.75	.25	40
x_{22}	.8	.2	10
x_{27}	.85	.15	15

These data leads to the fuzzy set A of the universe E, where

$$E = \{ x_1, x_2, x_3, x_4, x_5, \dots, x_{28} \},$$

And the fuzzy set A is given by

Now the job is to assign values of these attributes. This can be done either by direct observation or by collecting

$$A = \frac{x_4}{.75}, \frac{x_5}{.85}, \frac{x_6}{.5}, \frac{x_7}{.6}, \frac{x_8}{.85}, \frac{x_9}{.8}, \frac{x_{16}}{.9}, \frac{x_{18}}{.45}, \frac{x_{19}}{.9}, \frac{x_{21}}{.75}, \frac{x_{22}}{.8}, \frac{x_{27}}{.85}$$

We now calculate the weighted average $a(A)$ of this fuzzy set which is **.750**.

for subset-B

Let us suppose that the data collected from 100 people for an attribute x_i reveals that more or less 70 people are in support of the truthness of the attribute, 20 are in support of falseness and the rest 10 people are without any comment due to hesitation. We set the following for our intuitionistic fuzzy analysis :-

$$\mu_A(x_i) = .7 \quad \nu(x_i) = .2$$

Suppose that the data (hypothetical) collected are as shown below in a tabular form:

Attribute name	in support of truthness $\mu(x)$	in support of falseness $\nu(x)$	indeterministic part	weight of the attribute W_x
X10	.6	.1	.3	25
X11	.8	.1	.1	5
X12	.5	.5	0	45
X13	.4	.2	.4	50
X14	.8	.1	.1	70
X15	.7	.1	.2	20
X17	.8	0	.2	80
X20	.3	.4	.3	65
X26	.9	.1	0	35

These data leads to an IFS X of the universe E where

$$E = \{ x_1, x_2, x_3, x_4, x_5, \dots, x_{28} \},$$

Now calculate the mean fuzzy set m of the IFS X .

We find that

$$m = \frac{x_{10}}{.75}, \frac{x_{11}}{.85}, \frac{x_{12}}{.5}, \frac{x_{13}}{.6}, \frac{x_{14}}{.85}, \frac{x_{15}}{.8}, \frac{x_{17}}{.9}, \frac{x_{20}}{.45}, \frac{x_{26}}{.9}$$

We now calculate the weighted average of this IFS which is **.718**,

for subset-C

Let us suppose that all interval valued data (hypothetical) are as below in a tabular form:

Attribute name	Interval valued assessment I_i	The value m_i	weight w_{xi}
X1	[.7,.8]	.75	20
X2	[.82,.88]	.85	5
X3	[.6,.7]	.65	15
X23	.6	.6	5
X24	[.8,.9]	.85	10
X25	.8	.8	5
X28	.9	.9	30

We now calculate the weighted average $a(C)$ of this interval valued fuzzy set which is **.769**

Therefore the mean weighted average

$$A(X) = [.750+.718+.769] / 3 = .745$$

And consequently the grade to be awarded is “B”. Thus the assessment reveals that the health condition of neighbours to the solid waste disposal site is not in a good book.

IV. CONCLUSION

EIA has a vast potential role to play at early stages of a project. The study present that for any type of ‘Fuzzy EIA’ analysis, fuzzy set & intuitionistic fuzzy set tools can be suitably applied because of the fact that both have the tremendous power to tackle the uncertainty. Such analysis is appealing as great tool to an engineer because they provide assistance in trying to grasp the overall effect of the project in the sense of assessing the collective impart of the “good” and the “bad” of the project.

However, the overall assessment or summarization of the environmental impact should only serve as one of the parameters just or criteria to the decision makers. There could be other parameters hidden or not hidden

such as local politics, local constraints, etc which will influence the decision makers of the project.

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Effect of Variation of Copper and Zinc Contents in Aluminium-Zinc-Copper Alloy

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ABSTRACT

In this work, the effect varying the copper and zinc contents on mechanical properties and microstructure of sand cast Al-Zn-Cu alloy was investigated. The tensile specimens of the as-cast and homogenized alloys were exposed to a solution heat treatment at 4000C for 4 hrs, followed by natural ageing in the room temperature. There were six different alloys and were characterized for optical light microscope, tensiometer and Rockwell B hardness test. Tensile and hardness tests were carried out to examine the effect of varying Cu and Zn contents and influence of solution heat treatment on the precipitation behaviour of the alloys. The results obtained showed that the addition of Cu increase in strength and hardness. There was accelerated precipitation kinetics with increase of Zn contents. The microstructure changes of the alloys were investigated by optical light microscope. The results show that severe dendritic segregation exists in Al-Zn-Cu sand cast alloy. It reveals segregation ("cording") within the dendrites and intermetallic between the dendrites as Cu and Zn contents were altered. There were a lot of eutectic phases at grain boundary and the distribution of these elements varies along interdendritic region.

Keywords: Al-Zn-Cu Alloy, Solution Treatment, precipitation, Hardness, Dendrites Microstructure

I. INTRODUCTION

Aluminium and the aluminium alloys lend themselves to many engineering applications because of their excellent combination of lightness with strength, their high corrosion resistance, their thermal and electrical conductivity and heat and light reflectivity, and their hygienic and non-toxic qualities (A.M. Zahra et al, 1990 and Vadim S., et al, 2007). The variety of forms in which they are available also enhances their utility (Patricia et al, 2009). Aluminium alloys are widely used in constructions of light components at aerospace and automotive industry.

There are two main classes of aluminium alloys, they are wrought alloys and cast alloys. The 7xxx alloys are among the eight cast aluminium alloys that are used for aerospace and automotive applications. There are several alloys in the series that are produced especially for their high toughness, notably 7075, 7136, 7150, and 7475, both with controlled impurity level to maximize the combination of strength and fracture toughness. These alloys are heat treatable and among which are the

Al-Zn-Mg-Cu versions that provide the highest strengths of all aluminium alloys (ASM, 1991 and ASM 2004).

The 7000 series is made up of Al-Zn-Cu-Mg alloys where Zn is the strengthening component (Anikumar et al 2011 and Yin Dongsong et al 2009). High strength aluminium alloys of Al-Zn-Cu-Mg series are widely used in automotive and aerospace field due to their high specific strength, toughness and fatigue durability (Grard, 1920, Prabhu, et, al, 2011 and Yin Dongsong, et, al, 2009). The common feature of these alloys is high volume fraction of alloying elements, which leads to severe dendrite and grain boundary segregation in the as-cast alloy. It is well known that the type and intrinsic characteristic of residual phases will differ in different alloys and change with different heat treatment conditions. "Mondal and Mukhopadhyay" (Muzaffer Zeren, et, al, 2011) studied the phases in the as-cast and homogenized 7055 aluminium alloys, and revealed that the major residual phases were η ($MgZn_2$), T ($Al_2Mg_3Zn_3$), S (Al_2CuMg) and θ ($CuAl_2$). The microstructure of the cast 7050 alloy consists of dendrites, high angle grain boundaries, and inter-

dendritic eutectic regions containing phases such as Al₂CuMg, MgZn₂ and Mg₂Si (Verhoeven, 1975).

Despite detailed studies of microstructural evolution in the as-cast and homogenized 7050 and 7055 alloys, less attention has been paid to the evolution of eutectic structure in the Al-Zn-Cu-Mg-Sc-Zr alloy, and the transformation of primary eutectic structure to coarse residual particles is not yet clear.

Researches were conducted on complex aluminium alloys such as Al-Zn-Mg-Cu, Al-Zn-Cu-Mg-Sc-Zr, etc, but there was little research on Al-Zn-Cu alloys. The present study was therefore designed to examine the microstructural evolution of Al-Zn-Cu alloy. The main objective of this work was to investigate the effect of variation of Zn and Cu contents on the microstructure in heat treated condition and evaluate the mechanical properties of the alloys.

Commerce has become one of the vital parts of the modern life. Online payment is the supportive application for the payment of money for the products we buy. For the past years online security breach created a major problem and lots of money had been stolen. The proposed document deals by securing the payment through iris recognition [1]. This method also adds the method of using visual cryptography for securing the user credentials. This visual cryptography method was formerly invented by Moni Naor and Adi Shamir in 1994[6].

II. METHODS AND MATERIAL

Experimental Procedure

High purity Al (99.999%), Cu (99.999%) and Zn (99.999) were used for this study. Six different alloys were utilized for this study. Cylindrical specimens were cast using sand mould for different compositions of alloying elements. The chemical compositions of these alloys are shown in Table 1. As copper metal was melted, aluminium and zinc were added respectively. After melting these materials completely, the melt was sand cast into mould. The aluminium rods obtained from casting were machined on a lathe machine so as to prepare the samples for tensile testing. Tensile testing was done using Tensiometer. Hardness testing was done using Rockwell Hardness testing machine while the

microstructure was analyzed by optical microscopy. The specimens were prepared through a conventional grinding and polishing, followed by etching with Keller reagent. The solution heat treatment was performed at 4000C for 4 hrs then quenched in water followed by natural aging.

Table 1. Chemical Composition of alloys Used in this work (wt. %)

Alloy	Zn, (%)	Cu, (%)	Al, (%)
1	2	5	93
2	3	10	87
3	7	15	78
4	10	20	70
5	15	25	60
6	30	0	70

III. RESULTS AND DISCUSSION

3.1 Mechanical Properties

The mechanical properties of Al-Zn-Cu alloys are largely dependent upon both the compositions and heat treatment technology (solution and aging), during which a series of changes in microstructure occur. These changes significantly influence the mechanical properties because of the distribution of the precipitates during heat treatment. From this point of view, the composition and solution heat treatment are critical in determining the final microstructure and mechanical properties of the alloys (Yin Dongsong, et, al 2009) as observed in Figure 1 which shows the variation of tensile strength verse the composition of aluminium ternary alloy, but what is more interesting was result obtained from sample six (70%Al 30%Zn) indicating and confirming the strengthening effect of zinc. Results obtained during tensile tests shows that mechanical properties are affected by the structure. Coarse structure obtained worst and tensile strength in comparison with both finer microstructures.

The results from RockWell hardness testing machine for the six samples are shown in Fig. 2. The analysis of the data in Fig. 2 (87%Al,10%Cu,3%Zn) clearly indicates the highest hardness for sample 2 and the lowest hardness for sample 5 (60%Al, 25%Cu, 15%Zn). The

result shows that with increase of Cu content from more than 10%Cu there was a decrease in hardness and this relationship between hardness of the matrix confirms that the optimum % of Cu for this type of alloy should not exceed 10%Cu.

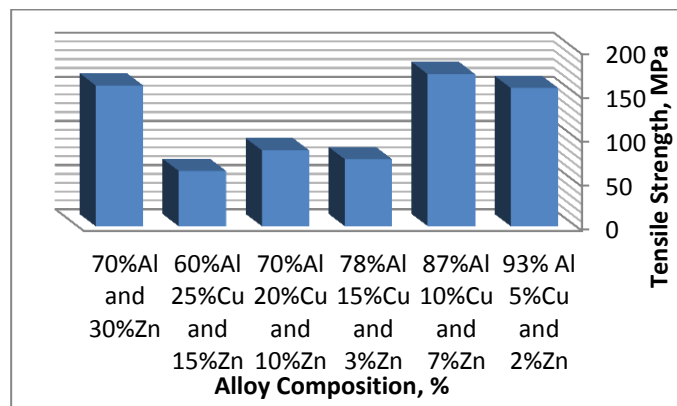


Figure 1: The Variation of Tensile Strength verse the Composition of Aluminium Ternary Alloy

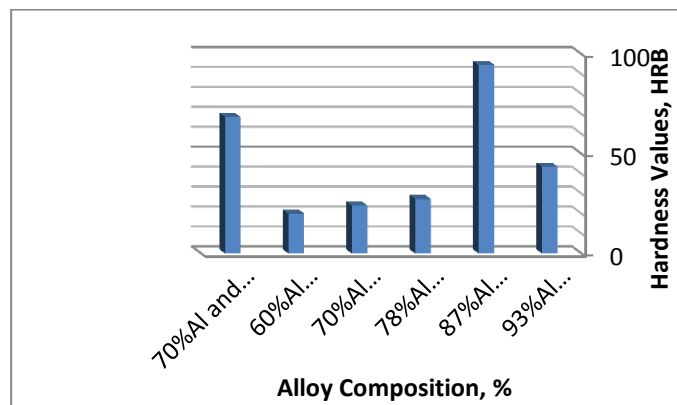
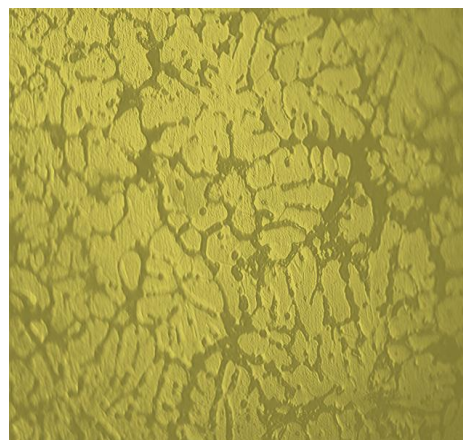


Figure 2: The Variation of Hardness Test verse the Composition of Aluminium Ternary Alloy.

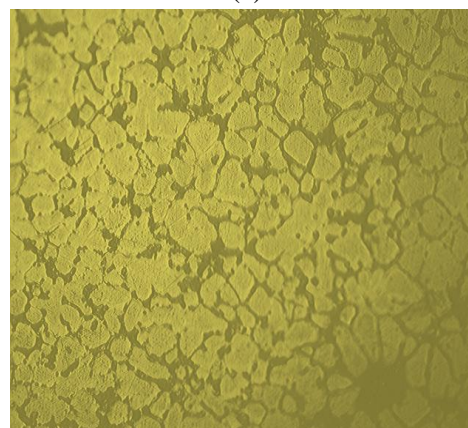
3.2 Microstructure and Phase Analysis

Figures 3a – 3f show the optical microstructures of Al-Zn-Cu alloy casted in sand mould. As observed, when the compositions changes, the microstructures changes adversely. There are some differences visible in form of microstructure morphology changes of the phases and precipitations occurred in the investigated samples. Figure 3a shows that the microstructure consists of α -Al dendrite (light green phase) and eutectic phase (α -Al + Cu) in the inter-dendrite region as observed in Fig. 3b. The microstructure consists of small grains, including the dendrites of Al matrix, interdendritic of the Al matrix and interdendritic network of eutectic Zn and Cu plates. Fig 3c shows optical microstructure consisting of coarsening of precipitates due to Ostwald ripening

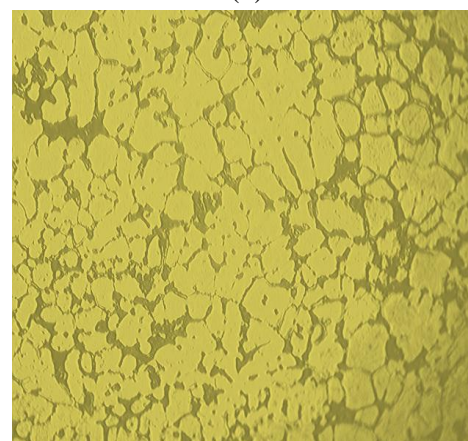
revealing Cu only partially dissolved in the course of solution heat treatment because of its higher concentration. Fig. 3d characterized by dendrite structure with a homogeneous distribution of eutectic of zinc.



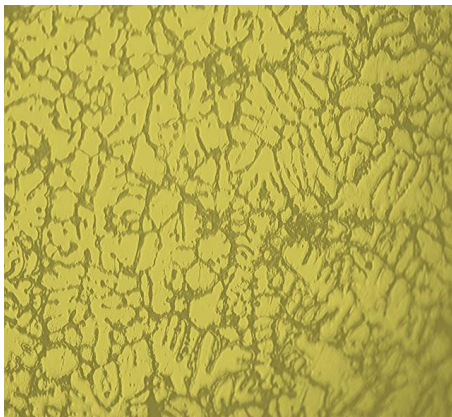
(a)



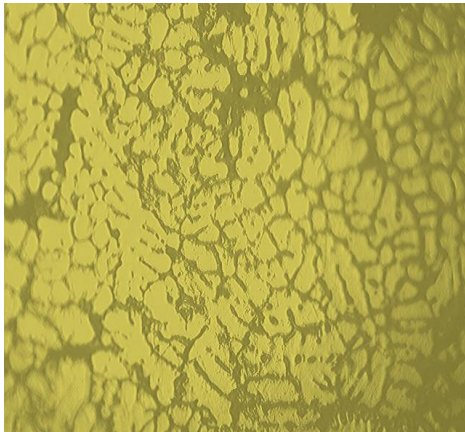
(b)



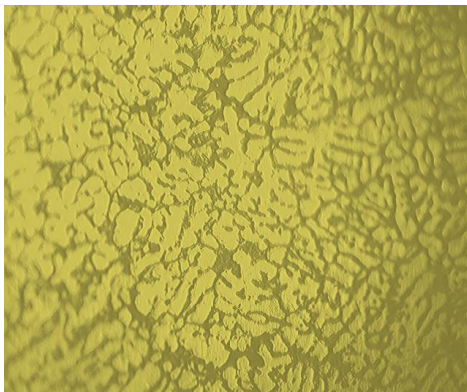
(c)



(d)



(e)



(f)

Figure 3: Optical Micrographs showing the effect of various content of Cu and Zn in Al-Zn-Cu alloys (refer to Table 1 on the composition of alloys).

IV. CONCLUSION

Experiments have been carried out to observe the effect of Zn additions (2 to 30 wt.%) and Cu additions (5 to 25 wt.%) in Al-Zn-Cu alloys and the following observations were made:

1. The mechanical properties of Al-Zn- Cu alloys largely depend on the heat treatment parameters and composition of the alloys as observed from the micrographs.

2. The characteristics of heat treatment and composition of the alloys greatly affect the mechanical properties and ultimately the microstructure of the alloys.
3. Addition of 10% Cu 3% Zn and 87%Al gave the optimum properties, but with increase of copper content above 10% decreases the mechanical properties.
4. Addition of 70%Al and 30%Zn shows appreciable strength than all other alloys except 10%Cu, 3%Zn, 87%Al. Thus Zn had shown strong strengthen effect. Both Zn and Cu contents in Al-Zn-Cu alloys affect the mechanical properties. With increasing Cu content, the tensile strength and hardness increase due to precipitation hardening.

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Structural Electronics Based on 3D Printing

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ABSTRACT

The use of advanced 3D printing technology enhanced with component placement and electrical interconnect deposition can provide electronic prototypes that now can be rapidly fabricated in comparable time frames as traditional 2D bread-boarded prototypes; however, these 3D prototypes include the advantage of being embedded within more appropriate shapes in order to authentically prototype products earlier in the development cycle. The fabrication freedom offered by 3D printing techniques, such as stereo lithography and fused deposition modeling have recently been explored in the context of 3D electronics integration referred to as 3D structural electronics or 3D printed electronics. Enhanced 3D printing may eventually be employed to manufacture end-use parts and thus offer unit-level customization with local manufacturing; however, until the materials and dimensional accuracies improve (an eventuality), 3D printing technologies can be employed to reduce development times by providing advanced geometrically appropriate electronic prototypes. This paper describes the development process used to design a novelty six-sided gaming die. The die includes a microprocessor and accelerometer, which together detect motion and upon halting, identify the top surface through gravity and illuminate light-emitting diodes for a striking effect. By applying 3D printing of structural electronics to expedite prototyping, the development cycle was reduced from weeks to hours.

Keywords: 3D printed electronics, additive manufacturing, direct-print, electronic gaming die, hybrid manufacturing, rapid prototyping, structural electronics, three-dimensional electronics.

I. INTRODUCTION

Additive Manufacturing (AM) was introduced in the late 1980's in order to rapidly prototype structures and allow manufacturers to circumvent the lengthy process of traditional prototyping by providing either a scaled-down or full-scale mechanical replica of the designed product. These devices were typically only conceptual models due to limitations of the AM technologies in which compromises were made in terms of material choices, surface finish and dimensional accuracies. For instance, stereo lithography (SL) provided high-accuracy and superior surface finish but with photo-curable materials that suffer from poor mechanical strength or durability and degrade or discolor with prolonged UV exposure, or alternatively, with fused deposition modeling (FDM) which offers robust thermoplastic materials but at the expense of reduced spatial resolution and anisotropic mechanical strength with a loss of performance in the

build direction. While AM technology continues to advance in terms of material properties and minimum features sizes, the technology until recently has remained best suited for manufacturing prototypes for conceptual modeling relegated to only satisfying the need for evaluation of form and t of the device casing or structural features. Until now, no option has existed for validation of both form and functionality simultaneously where functionality includes electronics, energy sources, sensors and displays all of which require additional lead times for bread-boarding, debugging and integration. This paper describes a project showcasing an enhanced 3D printing technology that dramatically reduced the full design cycle of an example electronic device: a novelty six-sided gaming die. The process - from concept, through prototyping, to the final manufactured part - is described noting the significant advantages of employing AM. In this example, form, t, aesthetics and functionality were explored by 3D printing several

versions of electronic devices as rapid, high duality prototypes prior to committing to traditional production. The eventual goal is for 3D printing to become the preferred manufacturing method for industries where the use of AM structures provides a real advantage, such as in the production of novelty toys, unmanned aerial vehicles (UAVs), satellites, and other low volume high value applications.

II. METHODS AND MATERIAL

2.1 Previous Work

AM techniques, since inception, have been extensively used for successful rapid prototyping of mechanical structures. These technologies were exceptionally well suited for the fabrication of complex geometries, which allowed designers to verify the t and form of a product within a few hours of completing the CAD design. Further, AM technologies have also been used to produce end-use parts in low volumes through rapid manufacturing techniques that proved to be economic because there was no need for tooling and logistics costs were decreased . However, in the context of prototyping electronic circuits, which are increasingly encased in 3D forms, rapid prototyping only provided t and form verification of the housing. In order to verify functionality, a separate bread boarding activity was required that did not integrate the verification of form with function two separate activities.

2.2 3D Printed Electronics Prototyping

Though typical methodologies like clay models, one-off samples handmade by skilled craftsmen, and more recently AM technologies have largely addressed the need for proto-types, these types of parts have been exclusively made to test appearance and t of the completed part. When the device included sophisticated electronics, these methodologies could not address the need for prototyping a fully functional part. When required, the traditional procedure to prototype electronics was to implement bread board prototypes and to accept the inherent delays that come with the normal process of electronics manufacturing, possibly weeks or even months. A newly developed 3D printing process of fabricating structural electronics provides an appealing alternative. This novel manufacturing, a hybrid of AM complemented with component placement

robotics and embedding of conductors can create prototypes that can perform practically the same function within the same form as the final product although possibly not fulfilling some of the other end-use characteristics such as reliability, surface finish, color, or texture.

A. 3D Printed Electronics Challenges

Although this new manufacturing technology allows for more complete evaluations with high fidelity prototypes, substantial challenges remain. The area of electronics design (e.g. schematic capture, simulation, and physical implementation of printed circuit boards PCBs) includes mature, commercially available software packages that allow for component placement and routing of wires to create electrical interconnect on a PCB. These programs however, operate under the assumption of the workspace being a predefined, two-dimensional surface for the circuit based on traditional PCB manufacturing. As a result, the component placement and routing for 3D printed designs has been done manually in 3D space using mechanical engineering CAD software like Solid Works without the inherent features for electronics functionality. As an example, Fig. 1 shows a circuit design that utilizes all available surfaces of a pre-defined volume to accomplish layout of components. The routing has likewise utilized all available surfaces as well as the internal volume of the device.

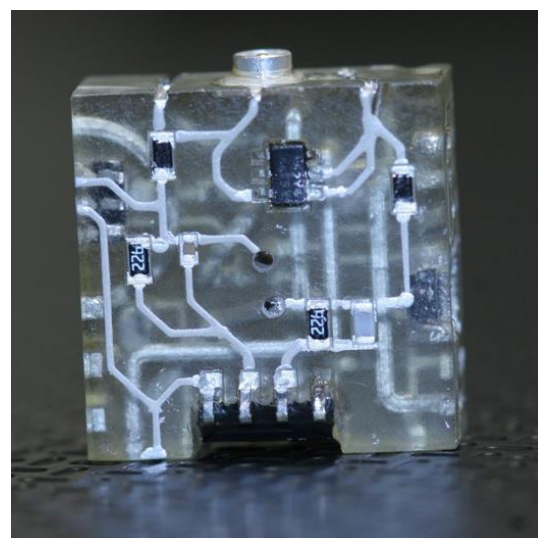


Figure 1: 3D Printed Signal Conditioning Circuit

The use of existing electronics CAD design software for layout and routing of 3D printed electronic devices is

possible when the 3D shape can be represented initially as a 2D surface and then “deformed” to a final intended 3D shape; such cases include a volume that can be represented as an “unfolded” outer surface (e.g. six sides of a cube) or a curved surface that has been “wrapped” about an axis of revolution (curved side of a cylinder).

Fig. 2(a) shows the application of the above-described methodology for a battery charge protection circuit that can be implemented on a 2D surface without cross-over points and thus only required a single surface of interconnect. The circuit was first placed and routed in electrical CAD software and subsequently imported into mechanical CAD software to be “deformed” around a cylinder, which in this example contains a lithium polymer battery. Fig. 2(b) illustrates the final representation from both sides. Cavities are formed to place components and UV curable material is used as adhesive to hold the devices in place. Each interconnect trace was designed into the surface with a trench to allow for depositing ink without the concern of the conductive inks spreading and resulting in electrical shorts prior to thermal curing. With the trenches, the SL process dictates the routing density based on the laser resolution rather than the resolution of the micro-dispensing system or the viscosity of the inks. In this example, line pitches (e.g. center to center minimum distances) were 560 microns.

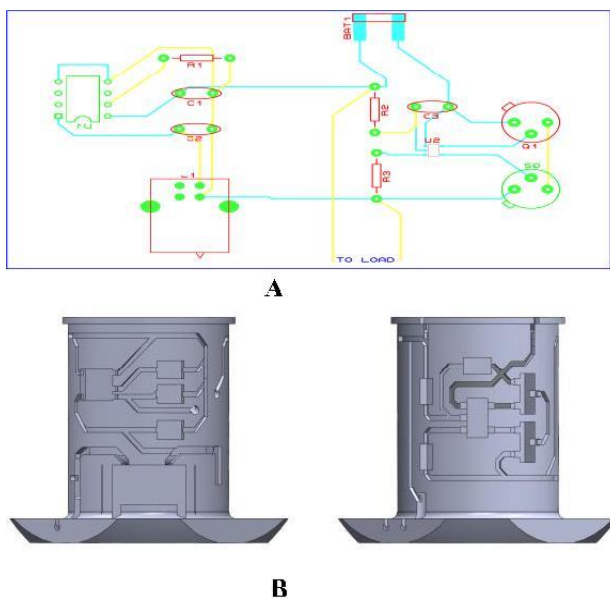


Figure 2: A) Battery Charging Circuit to be deformed and B) Both Sides of the Final Mechanical Representation.

Fig. 3 illustrates a more complex design with a microcontroller and accelerometer in surface mount packaging technology that provides little pin pitch (0.56 mm) and miniaturized foot prints.

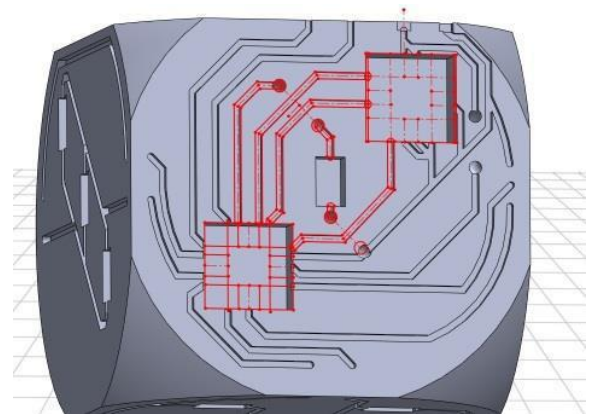


Figure 3: Electronic Circuit Mechanically Designed into Substrate.

Although the design included circuits on at 2D planes, two additional challenges were present: (1) the planes were connected with 90 degree connections around the corners which needed to be physically protected and (2) the 2D circuits required several cross-over points due to the complexity of the circuit network. These can be seen as tubular channels that tunnel underneath other traces to avoid shorting. This base design represents the outer shell of the gaming dice, which housed the cylindrical battery circuit shown in Fig. 2.

B. Gaming Die Versions

The concept to be prototyped in both form and function was a typical gaming die in terms of size with additional electronic functionality that provided for (1) the determination of the die coming to rest after a roll; (2) detection of final orientation; and (3) flashing of the LEDs on the top surface. The design underwent three prototype optimization versions, each of which was quickly implemented, improved and iterated owing to the availability of the enhanced AM process. A final prototype version was implemented using traditional manufacturing techniques for commercial viability analysis and used for cost and manufacturing time comparison.

1) Version 1: Non-Rechargeable Batteries

The first prototype was made to test the feasibility of the concept; the overall design began by defining the functional requirements. The electronic circuit was developed to provide the stated operation. The constraints of cost, functionality, and availability were evaluated in turn. The major priority was given to the availability of components that would allow for the fabrication of a dice within normal physical dimensions, (17mm or 19mm per side based on a measured commercial die), while still providing the desired functionality.

Fig. 4 shows the design of the dice constructed from two parts, to allow access to a cavity where two silver oxide batteries would be placed connected in series. The cavities for each of the components were designed into the volume of the die itself. The channels, to provide interconnects between each of the components, were likewise mechanically built into the design of the dice. This prototype demonstrated the feasibility of the concept as well as the availability of components sufficiently small to allow for the desired operation within the target volume. The first version prototype also revealed shortcomings that would be addressed in future iterations of the design: (1) the use of disposable, replaceable batteries was seen as an undesirable complication. These would be later replaced with recharge-able batteries to avoid requiring a structure that could be opened repeatedly. (2) The use of individual LED control was also deemed unnecessary. Instead, LEDs for each side could be grouped together for simplicity, allowing for the reduction of I/O ports used on the microcontroller and providing smaller overall dimensions of the largest chip component

2) Version 2: Lithium Polymer Battery with A Wireless Charging System

The second prototype improved on the shortcomings observed on the first iteration and is shown in Fig. 5. In this version, the LEDs were not individually controlled by a corresponding micro-controller I/O port; instead, there were up to two groups per face that would flash separately. This modification allowed for a physically smaller microcontroller with a smaller pin count.

The disposable batteries were replaced by a lithium polymer cell; meaning that the case could be sealed upon assembly for additional structural robustness.



Figure 4: Design of prototype version 1.



Figure 5: Design of prototype version 2.

3) Version 3: Using Rechargeable Lithium Polymer Battery With A Standard USB Charging Port

The third prototype stage addressed the shortcoming identified in version 2. The overall design remained largely unchanged; however the induction charging was eliminated and replaced with a simple micro USB-b charging port. Through this charging port, a simple USB to micro USB-b cable can be utilized to directly charge the lithium polymer battery from any computer USB port. This modification was intended to improve the appeal from a commercial perspective, by providing a

simple user interface and reducing the sale price by eliminating the separate charging station. The power module cylinder was modified by merging the power circuit with the sealing cap used in version 2. The final design, both in CAD and actual fabrication, is shown in Fig. 6.

III. RESULTS AND DISCUSSION

Traditional 3D Electronics

The design of traditionally manufactured electronics (e.g. cell phones, laptops, defense and space systems, etc.) has been driven towards better volume utilization without abandoning the flat printed circuit board paradigm. The traditional 3D electronics methodology can be more accurately described as 2D-layered or 2-1/2 D. An alternative approach used in traditional 3D electronics is to implement flexible printed circuit boards or 'flex circuits' that allow some freedom to conform to an irregular volume by bending the circuit into the final volume. The next step in proposed development process of the design of the six-sided gaming die was to leverage the work previously done and to finalize the design using a traditional flexible circuit approach in order to produce a product with as low a cost point as possible.

A. Flexible PCB Design

For this final traditionally manufactured version of the smart dice, three main components included: (1) a hollow plastic cube built from plastic injection molding providing the housing; (2) a flexible circuit board designed as a flat unfolded cube and folded into the cube cavity and (3) the battery. The flex circuit was a 'cross' shape prior to being folded into the cube was created using layout and routing software. A handful of manual interventions were still required. Any wires connecting the top and bottom layers were manually moved away from the flexing points in the circuit.

The LEDs were manually laid out to match the natural location of the die pips on each of the six sides of the dice and the remaining components were laid out on the opposite side from the LEDs to remain hidden on an internal surface. As required for this methodology, the flexible circuit was then sent to an outside vendor for quote and fabrication.

Plastic Injection Molded 3D Case

Though the advantages of AM techniques have been discussed at length, the current state of development of these technologies still makes them a costly alternative for mass production. Consequently, a more conventional technique for manufacture of the housing was chosen: a plastic injection molded case. In order to produce a plastic case, care must be taken to address some design constraints particular to this technology. While designing a part to be fabricated through injection molding, the "parting line", where the two mold halves will meet, must be determined so that once solidified, the part will allow the mold halves to separate and the completed part to be extracted. Likewise each part must be designed with a small draft angle to allow proper separation from the mold. The draft angle ensures that the solidified material is released from the mold without distortion or damage. Additionally, care must be taken to ensure a smooth path for the plastic material to flow through the cavity to form. This stress can result in deformation and other defects and design guidelines were observed in the construction of the final die housing which would ultimately contain the flex circuit and battery. Final design shown in figure.7.

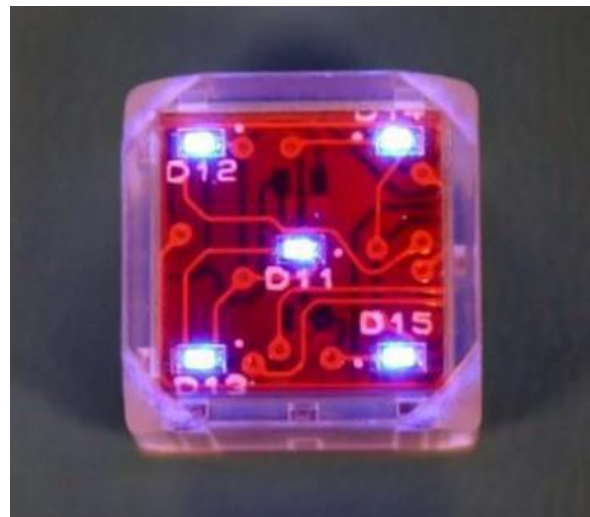


Figure 7: Final Version with Traditional Manufacturing.

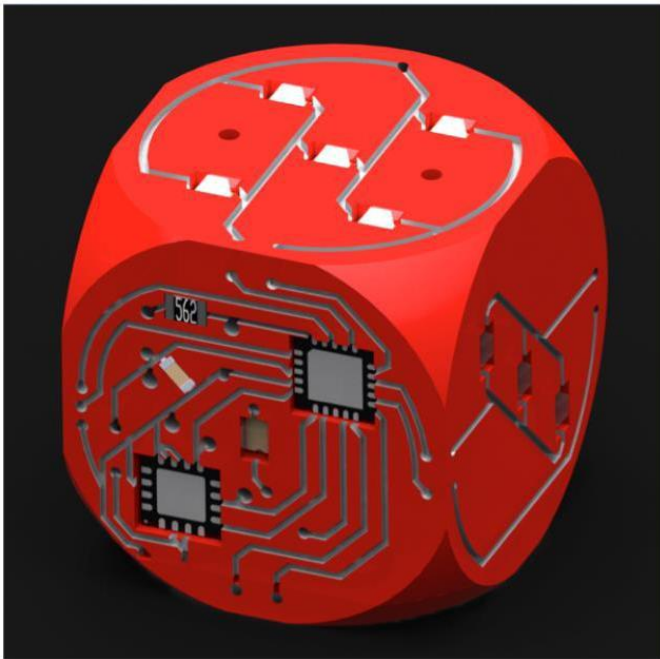


Figure 6: Version 3 Design

IV. CONCLUSION

This paper describes an enhanced 3D printing technology that by printing multifunctional prototypes can dramatically reduce the total time of the design cycle for an electronic device. An example case study is provided of four generations of a novelty electronic gaming die. The process, which includes building dielectric substrates using 3D printing, is enhanced with other complementary manufacturing technologies such as conductor embedding and component pick and place. By interrupting the 3D printing process and integrating

electronics functionality into the structure, rapidly-developed, high fidelity prototypes can be fabricated in order to capture and evaluate form, t and functionality simultaneously.

V. ACKNOWLEDGMENT

The research presented here was conducted at VIT University, Vellore within the Creations lab of VIT University. Through funding from the Vellore Institute of Technology, the creation lab recently expanded its project field and equipment for additive manufacturing processes, materials, and applications. The authors are grateful to creation lab members for their participation and contribution.

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Isothermal Forging of Ti-6Al-4V Alloy - Flow Stress Evaluation and Optimization

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ABSTRACT

Narrow-forging-temperature range makes titanium alloys tough to forge. In this paper hot compression experiments on Ti-6Al-4V alloy specimens are conducted using Thermo mechanical Simulator Gleeble-3500. These objectives of the test were to obtain flow stress data under varying conditions of strain, strain rate and temperature. Furthermore, artificial neural network (ANN) was used for studying high temperature flow characteristics for Ti-6Al-4V alloy in terms of stress-strain curves. A predicting model was also established for the calculation of flow stress using ANN. Results show that the neural network can correctly reproduce the flow stress in the sampled data and can also predict the non-sampled data very well. These studies are significant for determining the hot-forging processing parameters of Ti-6Al-4V alloy.

Keywords: Isothermal Forging, Flow Stress, Thermo Mechanical Simulation, ANN.

I. INTRODUCTION

Today in this world of technological advancement isothermal forging is competing with the other more classical technologies for closed die forging. The basic principle consists of a plastic forming process with die and work piece temperatures identical or very similar. Isothermal forging represents a possible alternative to produce near net and net shape forgings. With this method it is possible to produce functional surfaces to finished tolerance. It is more advantageous than conventional forging process especially in terms of material and machining cost reduction. Material cost as in the case of components made of Ti-alloy with complex shapes, it is possible to reach savings up to 40-45%. It must also be said that for some components it is possible to finish forge in one step after having performed with different equipment. Machining costs are also generally reduced and depending on complexity and final tolerances, the savings can reach up to 30%. The most important resulting advantage is the possibility to produce forgings with very thin sections [1]. Artificial

neural network (ANN) is one of the most researched and used technology in last two decades by industries and technocrats. It is a revolutionary tool in the world of soft computing related with realistic work. The back propagation network is probably the most well-known and widely used among all the current types of neural network systems available. The back propagation network is multilayer feed forward network with a different transfer function in the artificial neuron and a more powerful learning rule. The learning rule is known as back propagation, which is a type of gradient decent technique with backward error (gradient) propagation. Back-propagation neural network (BPNN) seems to be potentially useful tool for predicting and comparing the flow stress behaviour of titanium alloys experimentally forged with isothermal forging.

There also many researchers who have applied the Neural network method and neural fuzzy methodology in the various field of engineering and Technology. Very few researchers have applied the techniques of ANN to study the forging behaviour of titanium alloy and in

other forging application. Hashmi et al. [2] developed a model based on fuzzy logic for selecting cutting speed in single point turning operations. In a similar vein, Arghavani et al. [3] applied a fuzzy logic approach to the selection of gaskets, for their sealing performance, based on system requirements. Guo and Sha [4] developed an artificial neural network (ANN) model for the analysis and simulation of the correlation between processing parameters and properties of managing steels and it is believed that the model can be used as a guide for practical optimization of alloy composition and processing parameters for managing steels. Miaoquan [5] developed a fuzzy neural network model to correlate the relationship between the grain size of forged materials and the process parameters of the forging process. Tang and Wang [6] developed an adaptive fuzzy control system to reduce the non-linear cutting behaviour of a CNC turning machine. Kuo [7] used the fuzzy theory to improve the neural network learning rate in the fault diagnosis of a marine propulsion shaft system.

The present investigation is directed towards the development of more comprehensive artificial model for flow stress prediction of titanium alloy Ti-6Al-4V. Neural network have been studied in the recent years in the hope of achieving humanlike performance in the various field of engineering. Neural networks are effective tools which can recognise similar patterns by training a network with particular pattern of data. Their parallelism, trainability and speed make the neural network fault tolerant as well as fast and efficient for handling large amount of data [8]. In this work an attempt have been made to develop a neural network model to predict the flow stress of Ti-6Al-4V alloy and to analyse the behaviour of alloy during isothermal forging in temperature range from 875-1025oC at various strain rates from 0.001s-1 to 10s-1. Further the result obtained from neuro-fuzzy model is compared with the neural network model.

II. METHODS AND MATERIAL

In order to artificial intelligence model to predict the flow stress behaviour of Ti-6Al-4V alloy, sample data sets are necessary for training, testing and validation. By taking into consideration the properties of Ti-6Al-4V alloy, temperature, strain, strain rate as the input process parameters, while flow stress was taken as the output

parameter or target value as in neural network for modelling. Prior to the isothermal forging the specimens were prepared with a diameter of 10 mm and a height of 15 mm by a diamond cutter (Low speed saw, Buehler make) shown in Figs. 1, 2 and 3.



Figure 1: Low speed saw, a diamond cutter (Buelher make, USA).

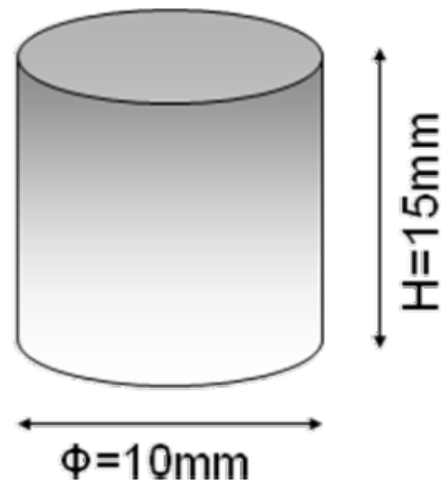


Figure 2: Sample prepared; D= 10 and H=15 mm



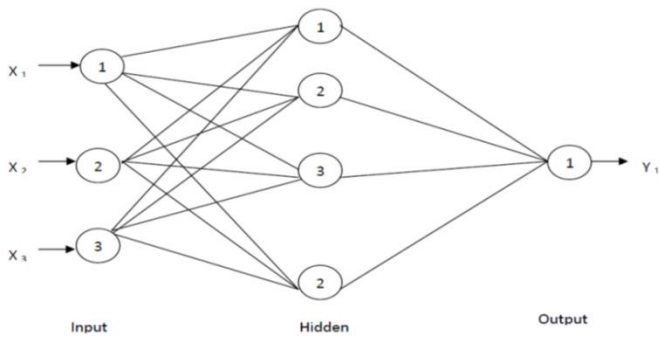
Figure 3: Thermo mechanical simulator (Gleeble-3500) for isothermal forging of the samples

III. RESULTS AND DISCUSSION

88 sets of data were generated by varying the temperature, strain rate and strain. The variations of these parameters are as follows:

- Temperature: From 875 to 1025°C

- Strain: From 0.1 to 0.6 at the interval of 0.1.
- Strain Rate: From 0.001 to 10.



X1= Temperatures in °c X2= Strain X3= strain rate in s ⁻¹ Y1= Flow stress	Number of hidden layer=1 Number of neurons in hidden layer=21 Number of training iteration= 750 Learning rate= 0.7 Momentum factor= 0.4
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Figure 4: Three layer back-propagation network architecture

For each temperature at different strain and strain rate the flow stress values are measured. The specified ranges of input parameters for the experimentations were selected based on the known industrial practice.

Out of the total data generated from the experiments, 9 sets of data were selected randomly for testing the developed model and another 9 sets for validation of the developed network model. The remaining 70 sets of data were used for training the proposed network model.

3.1 Development of neural network model

The learning algorithm selected for training the network is back-propagation algorithm. A C++ source code was compiled for developing the back-propagation neural network (BPNN) model. The developed model was trained until minimum error limit as desired was reached. The connection weights were stored in a text file and subsequently used for prediction of output parameters. The architecture of the network obtained can be seen in Fig.4. A sample set of data prepared for training the network is shown in Table 1. After the successful training of the network, the performance of the network was tested with the test data sets, which comprised of 9 sets of data randomly selected from those not included

in training. The test data set is shown in Table 2. The response of the network was accessed by comparing the predicted values of the network with the experimental values to determine the predictive capability of the network. The network predicts the best possible value and minimum possible error as desired by authors when the selected input parameters are within limit as set by the user based on the obtained experimental result. The generalisation capability of the network has been validated with a set of 9 data, which has not included in the training and testing of the network.

Table.1: Sample data set for training the network model

Sl. No.	Temperature	Strain	Strain rate	Output
1	925	0.01	0.6	8.4077
2	1025	1	0.4	46.3148
3	925	0.1	0.5	62.908
4	875	0.1	0.2	168.502
5	875	0.01	0.6	51.097
6	975	0.01	0.1	22.806
7	925	0.1	0.6	29.03
8	975	10	0.6	97.3088
9	925	0.01	0.1	43.23
10	875	1	0.2	231.55
11	1025	0.1	0.3	37.581
12	875	0.01	0.1	114.1
13	975	0.01	0.3	17.9614
14	925	10	0.6	105.614
15	1025	10	0.1	71.5356
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67	975	0.01	0.6	3.192
68	925	1	0.1	125.312
69	1025	10	0.6	52.4644
70	875	0.01	0.5	59.917

Table 2: Sample data set used for testing the network model

Sl. No	Temperature	Strain	Strain Rate	Output
1	1025	10	0.5	72.6026
2	1025	1	0.2	47.5798
3	975	0.01	0.4	15.4082
4	925	10	0.3	187.818
5	925	0.1	0.2	86.6382
6	875	0.1	0.2	168.502
7	1025	1	0.4	46.3148
8	925	0.01	0.1	43.23
9	875	1	0.3	212.462

Table 3: Comparison of actual and predicted flow stress of Ti-6Al-4V alloy

Sl. No.	Temperature	Strain rate	Strain	Actual Output	Predicted (ANN)	%Error
1	1025	10	0.5	72.60 26	76.3	1.37
2	1025	1	0.2	47.57 98	46.23	2.8
3	975	0.01	0.4	15.40 82	19.8	22.1
4	925	10	0.3	187.8 18	209.5	10.3
5	925	0.1	0.2	86.63 82	88.8	2.4
6	875	0.1	0.2	168.5 02	161.2	4.3
7	1025	1	0.4	46.31 48	52.32	11.4
8	925	0.01	0.1	43.23	45.32	4.6
9	875	1	0.3	212.4 62	209	1.6

IV. CONCLUSION

Hot deformation parameters have significant effects on the flow stress of Ti-6Al-4V alloy. The flow stress decreases with temperature and increases with strain rate. The deformation degree for the maximum flow stress shifts towards higher strain values with increasing temperature and increasing strain rate. A neural network predicting the behavior of Ti-6Al-4V alloy under isothermal forging condition, and analyzing the relationship between temperature, strain rate and strain with the flow stress was developed. The predicted values of output i.e. Flow stress of both the model are in good agreement with the experimental values.

V. ACKNOWLEDGEMENT

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Generation of Electrical Power by Using Magenn Air Rotor System

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ABSTRACT

In the last decade, several research groups and companies around the world have been developing a new class of wind generators, aimed at harnessing the energy of winds blowing at high elevation above the ground. Most of the energy which flows around the planet as wind isn't near the ground, or even above the ocean, its way up in the sky where some research suggests constant winds could meet the world's energy needs and cut the cost of power on that bases an Magenn Air Rotor System(MARS) is design with a rotor supported in the air without a tower, thus benefiting from more mechanical and aerodynamic options, the higher velocity and persistence of wind at high altitudes, while avoiding the expense of tower construction, or the need for yaw mechanism Magenn Air Rotor System(MARS) are devices that effectively extract energy from the air flow, more specifically kinetic energy, and convert it to electricity. Wind is the manifestation of the kinetic energy present in the atmosphere. An electrical generator is mounted on the magenn air rotor & transferring generated power back to earth through the cable.

Keywords: Magenn, Aerodynamic, Magnus, Air Rotor , Magenn Air Rotor System

I. INTRODUCTION

In the fast growing world of technology & science, renewable source of energy is one of the most crucial parts that can be used effectively for gaining energy. The use of various renewable courses like wind, solar energy, and tidal energy can prove boon to mankind. So the use of airborne wind energy for generation of energy by using suitable eco-friendly technique is magenn air rotor system.

A Magenn Air Rotor System is a design concept for a wind turbine generator that is supported in the air without a tower. For supporting the wind collection elements, two types are considered the primary options, both of which are tethered to the ground: aerodynamic systems that rely on wind for support (i.e. kite- or wing-based), and aerostat systems that rely, at least in part, on buoyancy.

Generally, airborne wind energy systems may operate in low (250ft/76m) or high (2,000ft/610m) altitudes. Their advantage is in tapping higher-speed winds without

requirements for airborne slip rings or yaw mechanisms, and without the expense of tower transportation and construction.

Magenn Air Rotor System (MARS) can be positioned at higher altitudes to take advantage of wind speeds that generally increase with altitude, as surface friction diminishes. With each doubling of the wind speed the amounts of theoretical energy or power density increases roughly eight times.

An airborne wind turbine (Magenn Air Rotor System) technology innovation started during 1970's, its effective evolution was during 2008-2009. In the year 2010, MARS technology innovations recorded a remarkable growth of 35%, compared to 14% in the previous year. However, the growth phase has declined in 2011 and 2012. Nevertheless, in the following years, there are possibilities of some more interesting innovations.

The airborne wind turbine technology can be categorized under four major types based on their design concept:

- Kite type
- Balloon type (Magenn Air Rotor System)
- Kyttoon type (Combined Kite & Balloon)
- Tethered auto gyro type



Figure 1 : Overview of Magenn Air Rotor System

A Magenn Air Rotor System is design with a rotor supported in the air without a tower, thus benefiting from more mechanical and aerodynamic options, the higher velocity and persistence of wind at high altitudes, while avoiding the expense of tower construction, or the need for yaw mechanism. Magenn Air Rotor System is devices that effectively extract energy from the air flow, more specifically kinetic energy, and convert it to.

II. METHODS AND MATERIAL

A. Magenn Air Rotor System

i Air Rotor System:

An air rotor wind turbine concept base on the Magnus Effect has been proposed and is kept uplift by helium gas generating rated power. A height of 400 feet is enough to catch the maximum 3 m/s wind speed need to sustain adequate supply of electricity. The turbine spins in the air turning the generators. The rotation stabilizes the turbine while energy is transferred down to the ground through the tether. A Magenn Air Rotor System is a lighter than air tethered wind turbine that rotes about a horizontal axis in response to wind generating electrical energy. This electrical energy is to be transferred down to ground for immediate use, or to a set of batteries for later use, or to the power grid.

Helium gas sustains it and allows it to ascend to a higher altitude than traditional wind turbine. It captures the energy available at the 400-1000 feet low level and nocturnal jet steam that exit almost everywhere.

Its rotation also generate the Magnus effect which provide additional lift, keeps it stabilized, and position it within a controlled and restricted location to adhere to Aviation Rules guidelines.

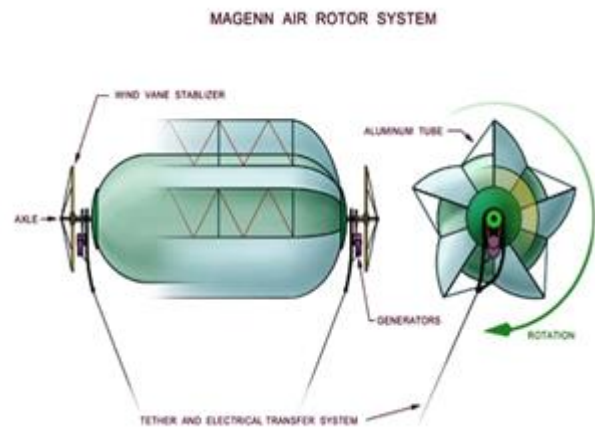


Figure 2: Magenn Air Rotor System

ii Magnus Effect :

This is the effect, discovered in the mid 1800's, that creates lift when a spherical or cylindrical object is spun while moving in a fluid. A dimpled golf ball, hit properly, has a back spin that causes it to lift in flight. A baseball curve-ball pitch uses the Magnus effect.

A back spin causes a low pressure region to form above the object & high pressure to form below, resulting in lift. A large object like the air rotor create substantial lift, so much so that the device should actually work in a wind stream, without using a lifting gas like Helium.

iii Magnus Effect Airship:

Fred Ferguson proposed the Magnus Airship in the 1980's. This airship utilized the Magnus effect for the first time in lighter than air craft. This Magnus Airship was a large spherical envelope filled with helium to achieved static, buoyant lift. As the sphere rotated during forward motion, a Magnus lift was generated proportional to the airspeed flowing over the sphere; the faster the vehicle, the higher the Magnus lift.

The sphere rotated backward as the craft flew forward. The resulting lift at cruise was greater than the total buoyant lift which could be up to 10 tones payload depending upon the final production size. As the wind speed increase, rotation increases, lift increases, drag will be minimized because of reducing of leaning and stability increases.

iv Helium Gas Use :

The air rotor is filled with Helium gas, which is inert and non-flammable. The lifting gas creates a lift force that is in excess of the total weight of the system. The Helium gas provides at least the positive lift versus the overall weight of the unit. Additional lift is also created when the rotor is spinning in a wind. The aerodynamic effect that produces additional lift is also created when the rotor is spinning in a wind. The aerodynamic effect that produces additional lift is the Magnus Effect. The 4 KW rated power unit would require slightly over 6000 cubic feet of Helium. The price of He varies country to country but it is abundantly available It could cost between 7-17 cent per cubic foot depending upon location. Helium leaks at a rate of 0.5 cent per month or 6 cent per year, therefore the air rotor units will have to be topped up with Helium every 4-6 month.

v Material Use:

The wind rotor is constructed with composite fabric used in airship. The fabric will be either woven Dacron or Vectran with an inner laminated coating of Mylar to reduce porosity and an exterior coating of Tedlar which will provide ultra violet radiation protection, scuff resistance and color. Dacron is used for boat sails. Mylar in silver toy helium balloon and Tedlar is the plastic coating founded in all-weather house siding.

vi Height Restriction:

The air rotor unit may not operate in controlled airspace or within five miles of the boundary of an airport. The unit that operated over 150 feet will have a lightning system including individual lights that are placed every 50 feet on the tether. The light will flash once per second. The deployed unit will have a Rapid Deflection Device installed that will automatically and rapidly deflate the balloon if it escapes from its moorings. The device will be equipped with at least two deflate system that will

bring the unit slowly and safely to the ground. If a unit cut down system does not function properly it will immediately notify the nearest ATC facility of the location and time of escape. It also provides lightning protection.

B. Construction Details

Construction of the Magenn Air Rotor System has following important parts:

i. Aluminum Tube:

Aluminum tube is used for to restrict air flow, and gives thrust for the rotor to rotate in the direction as shown in the figure 2&3. Here it converts the actual linear motion of wind flow energy into rotary motion, which is necessary to rotate the generator shaft.

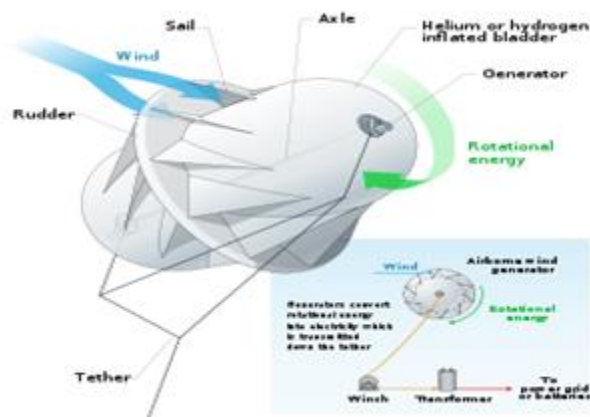


Figure 3: Construction Details of MARS

ii. Cylindrical Balloon:

It is the balloon which is cylindrical shape and is filled with helium air which is lighter than air; hence it could be placed above 300m height, and where as conventional wind-mills could be maximum 125m height.

iii. Wind Vane Stabilizer:

It is one of the important parts of Magenn Air Rotor System. It restricts the MARS in horizontal direction, and gives stability to the balloon.

iv. Axle & Generator:

It acts as a frame which is a single shaft connecting balloon, and aluminum tube to the generator shaft, hence it is the power transferring element of the Magenn Air Rotor System. Generator is the actual machine which converts the rotary motion into electrical power & transfers power to the base station which is connected to battery storage plant or electrical power grid.

v. Tether (Transmission Cable):

The tether represents a key element of a magenn air rotor system power generation system. It retains the airborne part of the MARS to the ground and provides the electric link between the balloon to local power network and the ground based power and control station, which is connected to the grid.

C. Operation of AWTG

The Magenn Power Air Rotor System (MARS) is an innovative lighter-than-air tethered device that rotates about a horizontal axis in response to wind, efficiently generating clean renewable electrical energy at a lower cost than all competing systems. This electrical energy is transferred down the tether to a transformer at a ground station and then transferred to the electricity power grid. Helium (an inert non-reactive lighter than air gas) sustains the Air Rotor which ascends to an altitude for best winds and its rotation also causes the Magnus effect. This provides additional lift, keeps the device stabilized, keeps it positioned within a very controlled and restricted location, and causes it to pull up overhead rather than drift downwind on its tether.

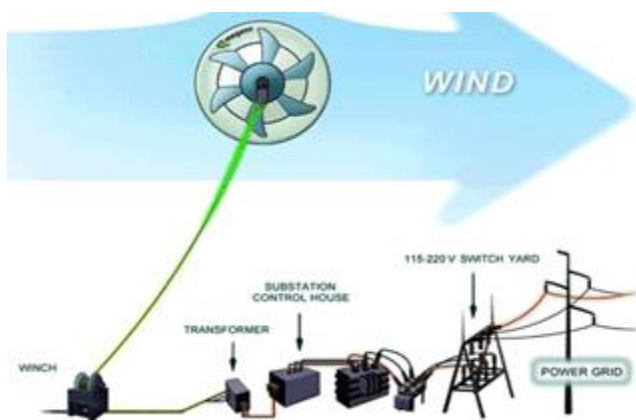


Figure 4: Operation of MARS

The cylindrical MARS unit is filled with helium, which provides the lift necessary to keep it in the air, additional lift is provided by the Magnus effect, where a rotating object in the air can also generate lift for itself. This effect also enables the unit to stay in place, rather than constantly drift downwind. Once the wind passes over the unit, electricity is generated by rotation of the MARS unit, and it is then transferred by cables to the ground into a transformer. All competing wind generators use bladed two-dimensional disk-like structures and rigid towers. The Magenn Power Air Rotor system is a closed three-dimensional structure (cylinder). It offers high torque, low starting speeds, and superior overall efficiency thanks to its ability to deploy higher. The closed structure allows Magenn Power to produce wind rotors from very small to very large sizes at a fraction of the cost of current wind generators

III. RESULTS AND DISCUSSION

A. Comparison Mars with Conventional Wind Turbine

- i.) Magenn Air Rotor System is less expensive per unit of actual electrical energy output than competing wind power systems.
- ii.) Magenn Air Rotor System will deliver time-averaged output much closer to its rated capacity than the capacity factor typical with conventional designs. MARS efficiency will be 40 to 50 percent. This is hugely important, since doubling capacity factor cuts the cost of each delivered watt by half.
- iii.) Wind farms can be placed closer to demand centers, reducing transmission line costs and transmission line losses.
- iv.) Conventional wind generators are only operable in wind speeds between 3 meters/sec and 28 meters/sec. Magenn Air Rotors are operable between 1 meter/sec and in excess of 28 meters/sec.
- v.) Magenn Air Rotors can be raised to higher altitudes, thus capitalizing on higher winds aloft. Altitudes from 400-ft to 1,000-ft above ground level are possible, without having to build an expensive tower, or use a crane to perform maintenance.
- vi.) Magenn Air Rotors are mobile and can be easily moved to different locations to correspond to changing wind patterns. Mobility is also useful in emergency deployment and disaster relief situations.

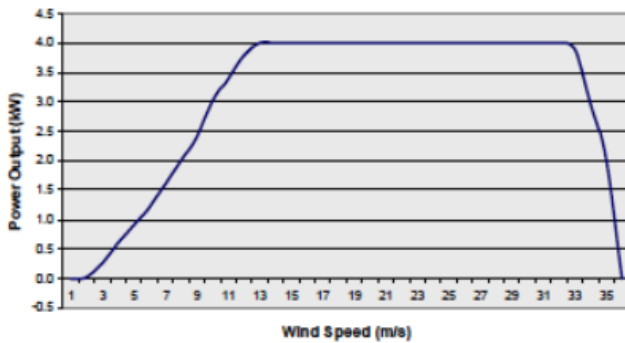


Figure 5: Power Output Vs Wind Speed of MARS

B. Future of Mars

High-altitude wind is an enormous reservoir of energy, the second biggest energy flow after sun radiation. It also highly exploitable without causing environmental issues, as a recent study found 1800 terrawatts can be generated without impacting the climate.”

According to the Airborne Wind Energy Group, there are nearly 50 commercial high-altitude wind energy projects in development, chief among them Google’s Makani Power from the same Google X labs which are bringing us Google Glass.

C. Advantages of Mars

- i.) It is the renewable source of energy
- ii.) It does not require any land, because whole structure is situated on the atmosphere.
- iii.) Wide range of wind speeds - 2 to more than 28 meters/second
- iv.) Higher altitudes - from 200 to 1,000 feet above ground level are possible without expensive towers or cranes.
- v.) Fewer limits on placement location - coast line placement is not necessary
- vi.) Ideal for off grid applications or where power is not reliable.

D. Disadvantages of Mars

- i.) Due to flying rotor, it disturbed the airline transport path.
- ii.) There are chances of broken the connection between flying turbine and ground system.

IV. CONCLUSION

With the demand for energy requirements increasing tremendously, it can be met by alternative energy resources such as wind.

Particularly, wind at high altitudes can generate more power compared to the conventional wind turbines. In addition, this alternative energy source offers benefits such as easy deploying, low installation cost and maintenance systems, and less wind fluctuations. In terms of operational lifetime, installation cost and reliability, so a magenn air rotor system generator is considered as a promising alternate for traditional power sources.

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A Survey on Malicious and Selfish Nodes in Mobile Ad Hoc Networks

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ABSTRACT

MANETs are alluring innovation for some applications, for example, salvages operations, strategic operations, ecological observing, meetings, and so forth. Notwithstanding, performing system capacities devours vitality and different assets. To spare its vitality a hub may carry on egotistically and uses the sending administration of different nodes without effectively can extremely corrupt the execution at the steering layer. In particular, nodes may take an interest in the course disclosure and support transform yet decline to forward information parcels. In this overview different routines for recognizing egotistical nodes are talked about with their key focal points. In addition a standout amongst the most essential perspectives is to propose particular conduct design creation that would let to assess neighbour conduct; I reviewed the key calculations for developing conduct design for the neighboring nodes in MANETs. In the literature there are many methods which deal with the selfish behaviour of the nodes. This paper compares different methods available for reducing the effect of selfish nodes in mobile ad hoc networks.

Keywords: Mobile Ad Hoc Networks, Routing Misbehavior, Selfishness, Network Security.

I. INTRODUCTION

Mobile ad-hoc networks (MANETs) allow for remote devices to frame a system without the requirement for focal foundation [1]. While the absence of requirement for base permits the system to be exceptionally adaptable, it additionally makes steering a discriminating concern in the system. The information accumulation part is in charge of gathering and pre-preparing information undertakings: exchanging information to a typical organization, information stockpiling and sending information to the discovery module. In impromptu remote systems every PC with a remote interface can communicate directly with participating nodes. These nodes can self-arrange without focal administration and extraordinary infrastructure [2][3]. The system is built up utilizing (restricted extent) radio correspondence where every hub goes about as both information terminal and information exchange hardware. Besides, nodes can move openly bringing about changes to the system topology and overhauled directing to forward the bundles. The topology change relies on upon distinctive variables, for

example, versatility model, hub speed and so forth. Because of the foundation less nature of MANETs parcels sent between removed nodes are relied upon to be handed-off by middle of the road ones [3], which go about as switches and give the sending administration. The sending administration is firmly identified with the steering. It comprises in accurately transferring the got bundles from hub to hub until coming to their last destination, taking after courses chose and kept up by the directing convention [3]. These administrations (directing and information sending) together are at the center of the system layer. The way of MANET makes participation among nodes fundamental for the framework to be operational. In some MANET's applications where all nodes fit in with a solitary power (in the application layer perspective) and have a typical objective, e.g.- officers in a military unit amid a front line or rescuers in a salvage group amid a salvage operation, nodes are helpful by nature[2][3]. However, in many civilian applications, such as networks of cars and provision of communication facilities in remote areas, nodes typically do not belong to a single authority and do not pursue a common goal. In such networks,

forwarding packets for other nodes is not in the direct interest of anyone, so there is no good reason to trust nodes and assume that they always cooperate. In MANETs critical functions like routing and forwarding performed by less trusted and less secured nodes. Indeed, nodes try to preserve their resources, and particularly their batteries [4].

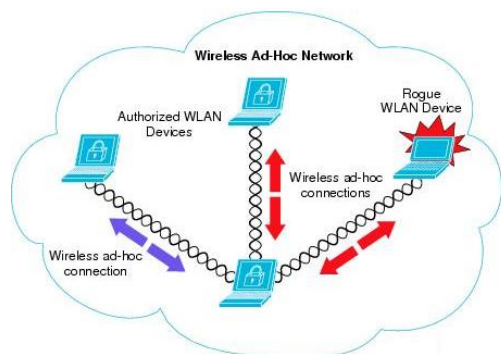


Figure 1 : Mobile Adhoc Network

An individual mobile node may attempt to benefit from other nodes, but refuse to share its own resources. Such nodes are called selfish or misbehaving nodes and their behavior is termed selfishness or misbehavior. Intentionally uncooperative behavior (misbehavior) may result in a total communication breakdown. A node may behave selfishly by agreeing to forward the packets and then failing to do so due to Overloaded, Selfish, Malicious or Broken. Behavior node models Collaborative model: A node that behaves properly executing both packet forwarding and routing functions. Selfish model: A node that misbehaves to save its battery life. This node could disable packet forwarding and/or routing functions.

II. METHODS AND MATERIAL

1. Related Work

A. Credit Based Methods

Credit based methods are also called as incentive based methods. In these methods selfish nodes are not punished instead unselfish nodes are rewarded for helping other nodes. This stimulates the cooperation of nodes in the network. This section discusses some of the credit based systems in the literature.

B. Secure Incentive Protocol

This approach assumes that each mobile node (MN) has a tamper-proof security module such as SIM cards in GSM networks, which deals with security related functions and each intermediate node (IN) puts non-forged stamps on the forwarded packets as a proof of forwarding[2]. Secure Incentive Protocol, (SIP) uses “credits” as the incentives to stimulate packet forwarding. For this purpose, each smartcard has a credit counter (CC) which is pre-charged with a certain amount of credits before shipped out[2][3]. The charging and rewarding on a node is done by decreasing or increasing the CC in that node and the CC will retain its value even when the MN is power off. When the MN is power-on again, it could still reuse the credits in the CC even in another SIP-enabled ad hoc network. To guarantee the security of SIP, each smartcard contains a private number and a public number (keys). The nodes have no knowledge about the keys stored in the smartcard and could not change CC in an unauthorized way either. SIP is session- based and mainly consists of three phases. During the first *Session initialization* phase, a session initiator (SI) negotiates session keys and other information with a session responder (SR) and INs between them. And each IN puts a non-forged stamp on each data packet forwarded and SI/SR collect those stamps for later rewarding use in the next *Data forwarding* phase[2]. The final phase is *Rewarding* phase, in which each IN is awarded a certain number of credits based on the number of forwarded packets. Advantages of this method are 1. SIP is routing- independent in the sense that it could coexist with any on- demand unicast routing protocol such as DSR and AODV. 2. SIP is session based rather than packet based. 3. Security module is tamper proof and hence unauthorized access is not allowed. But the problem with this approach is, it needs every node to possess the hardware module and SIP is implemented in the hardware module. Hardware module will not be available in the already existing mobile nodes.

C. Sprite

The basic idea of their scheme is as follows: a Credit Clearance Service (CCS) is introduced to determine the charge and credit to each node involved in the transmission of a message [5]. When a node receives a message, the node keeps a receipt of the message and later reports it to the CCS when the node has a fast connection with the CCS. Payments and charges are determined from a game theory perspective. The sender instead of the destination is charged in order to prevent denial-of-service attack in

the destination by sending it a large amount of traffic [5][6]. Any node who has ever tried to forwarding a message is compensated, but the credit a node receives depends on whether or not its forwarding action is successful – forwarding is considered successful if and only if the next node on the path reports a valid receipt to the CCS.

Three selfish actions and the corresponding countermeasures are discussed in the paper:

- i After receiving a message, a selfish node may save a receipt but does not forward the message. To prevent this, the CCS should give more credit to a node who forwards a message than to a node that does not forward a message to motivate a selfish node to forward others' message. To achieve this objective, if the destination does not submit a receipt, the CCS first determines the last node on the path that has ever received the message. Then the CCS pays this last node less than it pays each of the predecessors of the last node [5].
- ii A node received a message may not report the receipt. This is possible if the sender colludes with the intermediate nodes, so that the sender can pay the node a behind-the-scene compensation, which is little bit more than the CCS will pay, and the sender still get a net gain.

In order to prevent this cheating action, the CCS charges the sender an extra amount of credit if the destination does not report the receipt so that colluding group get no benefit. .

- iii Since reporting a receipt to the CCS is sufficient for getting credit, a group of colluding nodes may forward only the receipt of a message, instead of forwarding the whole message, to its successor.

Two cases are considered: 1) the destination colludes with the intermediate nodes; 2) the destination does not collude with the intermediate nodes. In the first case, since the message is for the destination and if the destination really submits the receipt, then the intermediate nodes and the destination should be paid as if no cheating had happened. In the second case, if the destination does not report a receipt of a

message, the credit paid to each node should be multiply by a fraction, r , where $r < 1$.

Modeling the submissions of receipts regarding a given message as a one-round game, the authors proved the correctness of the receipt-submission system using game theory. Although the main purpose of the system is for message-forwarding in unicast, it can be extended to route discovery and multicast as well. This scheme, however, may have several issues:

1. Receipts of each node along a path maybe submitted to the CCS at different times, making it difficult for the CCS to determine the actual payment to each node [5].
2. The scheme[6] is based on DSR, which includes the path in the forwarding message. A malicious node not on the path can collude with nodes on the path to forge a receipt and spoof the CCS.

2. Identifying and Isolating Selfish Nodes

This section explains methods that are used for punishing the selfish nodes. Selfish nodes are identified and isolated from the network. They are stopped from using the network services. Most of the approaches in the literature are following punishing

A. Watch Dog and Path Ratter

When a node forwards a packet, the node's watchdog verifies that the next node in the path also forwards the packet [6]. The watchdog does this by listening promiscuously to the next node's transmissions. If the next node does not forward the packet, then it is considered as misbehaving. The path rater uses this knowledge of misbehaving nodes to choose the network path that is most likely to deliver packets. The nodes rely on their own watchdog exclusively and do not exchange reputation information with others. F Fig 1 illustrates how the watchdog works. Suppose there exists a path from node S to D through intermediate nodes A, B, and C. Node A cannot transmit all the way to node C, but it can listen on node B's traffic [6]. Thus, when A transmits a packet for B to forward to C, A can often tell if B transmits the packet. If encryption is not performed separately for each link, which can be

expensive, then A can also tell if B has tampered with the payload or the header.

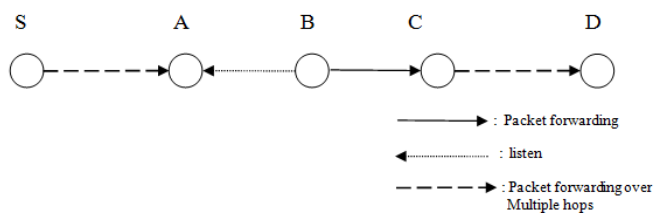


Figure 2 : Watchdog technology

When B forwards a packet from S toward D through C, A can overhear B's transmission and can verify that B has attempted to pass the packet to C. The solid line represents the intended direction of the packet sent by B to C, while the dashed line indicates that A is within transmission range of B and can overhear the packet transfer. The watchdog is implemented by maintaining a buffer of recently sent packets and comparing each overheard packet with the packet in the buffer to see if there is a match. If so, the packet in the buffer is removed and forgotten by the watchdog, since it has been forwarded on. If a packet has remained in the buffer for longer than a certain timeout, the watchdog increments a failure tally for the node responsible for forwarding on the packet. If the tally exceeds a certain threshold bandwidth, it determines that the node is misbehaving and sends a message to the source

notifying it of the misbehaving node. The path rater, run by each node in the network, combines knowledge of misbehaving nodes with link reliability data to pick the route most likely to be reliable. Each node maintains a rating for every other node it knows about in the network. It calculates a path metric by averaging the node ratings in the path. If there are multiple paths to the same destination, the path with the highest metric will be chosen. Nodes suspected of misbehaving by the watchdog mechanism are assigned a special highly negative value. When the path rater calculates the path metric, negative path values indicate the existence of one or more suspected misbehaving nodes in the path. If a node were marked as misbehaving due to a temporary malfunction or incorrect accusation it would be preferable if it were not permanently excluded from routing. Therefore nodes that have negative ratings should have their ratings slowly increased or set back to a non-negative value after a long timeout. In

watchdog and path rater mechanism, wireless interfaces that support promiscuous mode operation are assumed, which is not appropriate for all mobile ad hoc network scenarios. Also, the watchdog technique has the weaknesses that it might not detect a misbehaving node in the presence of:

1. Ambiguous collision. As in the above example, an ambiguous collusion is the scenario that packet collusion occurs at A while it is listening for B to forward on a packet.
2. Receiver collisions. In the example, A can only tell whether B sends the packet to C, but it cannot tell if C receives it.
3. Limited transmission power, in which signal is strong enough to be overheard by the previous node but too weak to be received by the true recipient.
4. False misbehavior, in which nodes falsely report other nodes as misbehavior.
5. Collusion, where multiple nodes in collusion can mount a more sophisticated attack. For example, B forwards a packet to C but do not report to A when C drops the packet.
6. Partial dropping, in which a node can circumvent the watchdog by dropping packets at a lower rate than the watchdog's configured minimum misbehavior threshold.

B. Confidant

CONFIDANT stands for Cooperation of Nodes Fairness in Dynamic Ad-hoc Network, it works as an extension to on demand routing protocols [8]. CONFIDANT is based on selective altruism and utilitarianism. It aims at detecting and isolating misbehaving nodes, thus making it unattractive to deny cooperation. Nodes monitor their neighbors and change the reputation accordingly. *Reputation* is used to evaluate routing and forwarding behavior according to the network protocol. *Trust* is used to evaluate participation in the CONFIDANT meta-protocol. Trust relationships and routing decisions are based on experienced, observed, or reported routing and forwarding behavior of other nodes. CONFIDANT consists of the following components: *The Monitor*,

the Trust Manager, the Reputation System and the Path Manager. The monitor is the equivalent of a “neighbor watch”, where nodes locally look for deviating nodes. The node can detect deviation by the next node on the source route by either listen to the transmission of the next node or by observation of route protocol behavior [8]. The trust manager deals with incoming and outgoing ALARM messages. ALARM messages are sent by the trust manager of a node to warn others of malicious nodes. Outgoing ALARM messages are generated by the node itself after having experienced, observed, or received a report of malicious behavior [8]. The recipients of these ALARM messages are so-called friends, which are administered in a friends list. Incoming ALARM messages originate from either outside friends or other nodes, so the source of an ALARM has to be checked for trustworthiness before triggering a reaction. The reputation system in this protocol manages a table consisting of entries for nodes and their rating. The rating is changed only when there is sufficient evidence of malicious behavior that is significant for a node and that has occurred a number of times exceeding a threshold to rule out coincidences. To avoid a centralized rating, local rating lists and/or black lists are maintained at each node and potentially exchanged with friends. The path manager performs the following functions: path re-ranking according to reputation of the nodes in the path; deletion of paths containing malicious nodes, action on receiving a request for a route from a malicious node (e.g. ignore, do not send any reply) and action on receiving request for a route containing a malicious node in the source route (e.g. ignore, alter the source).

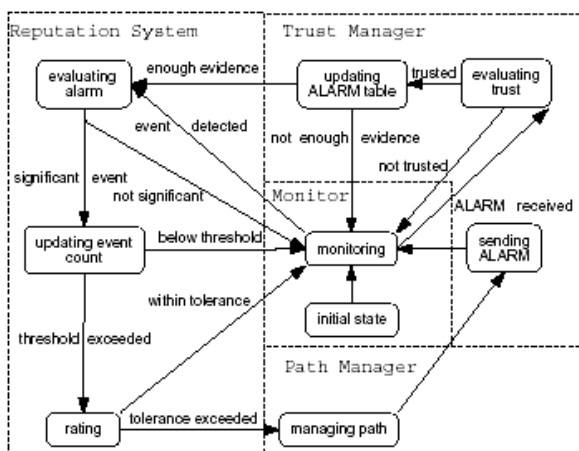


Figure 3: Trust architecture and finite state machine within each node.

As shown in Fig 2, each node monitors the behavior of its neighbors. If a suspicious event is detected, the information is given to the reputation system. If the event is significant for the node, it is checked whether the event has occurred more often than a predefined threshold that is high enough to distinguish deliberate malicious behavior from simple coincidences such as collisions. What constitutes the significance rating can be defined for different types of nodes according to their security requirements. If that occurrence threshold is exceeded, the reputation system updates the rating of the node that caused that event. If the rating turns out to be intolerable, the information is relayed to the path manager, which proceeds to delete all routes containing the misbehaving node from the path cache.

Although CONFIDANT can detect and isolate misbehaving nodes, it has some limitations:

1. It is a detection-based reputation system.
2. Events have to be observable and classified for detection.
3. Reputation can only be meaningful if the identity of each node is persistent; otherwise it is vulnerable to spoofing attack.

C. Core

CORE (Collaborative Reputation mechanism) is a generic mechanism that can be integrated with any network function like packet forwarding, route discovery, network management and location management [7]. CORE stimulates node cooperation by a collaborative monitoring technique and a reputation mechanism. In this mechanism, reputation is a measure of someone’s contribution to network operations. Members that have a good reputation can use the resources while members with a bad reputation, because they refused to cooperate, are gradually excluded from the community [7]. Each node computes a reputation value for every neighbor using a sophisticated reputation mechanism that differentiates between *subjective reputation* (observation), *indirect reputation* (positive reports by others) and *functional reputation* (task-specific behavior). There are two basic components for the CORE mechanism: *reputation*

table (RT) and *watchdog mechanism* (WD). The *watchdog* mechanism is used to detect misbehavior nodes [7]. The *reputation table* is a data structure stored in each node. Each row of the table consists of four entries: the unique identifier of the entity, a collection of recent *subjective observations* made on that entity's behavior, a list of the recent *indirect reputation* values provided by other entities and the value of the reputation evaluated for a predefined function. The CORE scheme involves two types of protocol entities, a *requestor* and one or more *providers* that are within the wireless transmission range of the requestor. If a *provider* refuses to cooperate (the request is not satisfied), then the CORE scheme will react by decreasing the reputation of the *provider*, leading to its exclusion if the non-cooperative behavior persists [7]. *Route tables* are updated in two different situations: during the request phase of the protocol and during the reply phase corresponding to the result of the execution. In the first case only the *subjective reputation* value is updated while in the second case, only the *indirect reputation* value is updated. To prevent a misbehaving entity to distribute false information about other entities in order to initiate a denial of service attack, the protocol allows only the distribution of positive rating factors. No negative ratings are spread between the nodes, so it is impossible for a node to maliciously decrease another node's reputation [7]. CORE suffers from spoofing attack because misbehaving nodes can change their network identity. The *watchdog* technique, a basic component of CORE, relies on the promiscuous mode operation, which is not always true (e.g. in military applications) and has some weakness. Though CORE successfully prevents false accusation that may decrease nodes' reputation maliciously, it cannot prevent colluding nodes from distribute false praise that may increase malicious nodes' reputation.

D. Token-based Approach

Token-based mechanism enforces cooperation in mobile ad hoc networks. In their proposal, each node has to have a *token* in order to participate in the network operations; its local neighbors collaboratively monitor it to detect any misbehavior in routing or packet forwarding services. The *token* is renewed via multiple neighbors after it is expired [9][10]. The period of validity of a node's *token* is dependent on how

long it has stayed and behaved well in the network. A well-behaving node accumulates its credit and renews its *token* less and less frequently as time evolves. The solution takes a self-organized approach, where neither existence of any centralized trust entity nor any a priori secret association between nodes is assumed [9][10]. There is only a global secret/public key pair *SK/PK*, where *PK* is well known by every node of the network, and *SK* is shared by all nodes in the network, but each node only knows a limited portion of it. The solution is composed of four components:

- Neighbor verification: verify whether each node is legitimate or malicious.
- Neighbor monitoring: monitor behaviors of each node and detect attacks from malicious ones.
- Intrusion reaction: alert the network and isolate the attackers.
- Security enhanced routing protocol: incorporates the security information into the mobile ad hoc network routing protocol.

The *token* issuing process is decentralized, and the *token* of each node is issued and signed by its *k* neighbors collaboratively. Before the expiration of a node's current *token*, the node broadcasts a TREQ (Token Request) to its neighbors [11]. When a node receives a TREQ from its neighbor, it extracts the *token* from the TREQ packet. If the TREQ is valid and the owner of the TREQ matches the owner of the *token*, it constructs a new *token*, signs the newly constructed *token* using its own share of *SK*, encapsulates the signed *token* in a TREP (Token reply), and unicasts the TREP to the node requesting the *token*[12]. When the node which needs to renew its *token* receives *k* TREP from different neighbors, it can combine these partially signed *token* into a *token* signed by *SK*. The adopted computational overhead, not to mention the high traffic generated by issuing/renewing a *token*.

1. The localized monitoring mechanism executed by each node is intrinsically inaccurate due to the inaccuracy in the information obtained by overhearing the channel.

The bootstrap phase to generate a valid *token* for each node has limitation. For example, the node needs to have at least *k* neighbors, suggesting the use of such mechanism in a rather dense mobile ad hoc network *c*

credit based strategy in determining the expiration time of each node's *token*. Each time a legitimate node renews its *token*, the period of validity of its *token* increases by a fixed time interval. The authors also extend the AODV protocol into AODV-S, which is a *security enhanced routing protocol*. Routing security relies on the redundancy of routing information rather than cryptographic techniques [12]. Each AODV-S node maintains the list of all its verified neighbors which possess valid *tokens* and only interacts with its verified neighbors. When a node broadcasts a new routing update, it explicitly claims the next hop. Each node also keeps track of the route entries previously announced by its neighbors. This redundancy of the routing information makes it possible for a node to prevent routing updates misbehavior. Packet forwarding misbehaviors, such as packet dropping, packet duplicating and network layer packet jamming, are also detected using an algorithm similar to the *watchdog* technique. Each node overhears the channel at all time and records the headers of the recent packets it has overheard. If a node detects a neighbor's misbehavior, it considers the neighbor as an attacker and broadcast a SID (Single Intrusion Detection) packet. A node is considered as an attacker if and only if m nodes out of all n neighbors have independently sent out SID packets against it. The selection of m represents the tradeoff between the prompt reaction to the attackers and the protection of legitimate nodes from false accusation. When a node has received m independent SID packets against the same node, it constructs a notification of *token* revocation, signs the notification using its own share of SK , and broadcasts it in a GID (Group Intrusion Detection) packet. Then the first node that receives k GID packets against the same node combines them and constructs a TREV (*Token Revocation*), which is signed by the SK , based on polynomial secret sharing. The *intrusion reaction* process is triggered only when an attacker is detected. When a node receives a TREV packet and if the *token* is not on the TRL (*Token Revocation List*), it adds the *token* into the TRL. At the same time, each neighbor of an attacker deems the link between it and the attacker as broken and uses the path maintenance mechanism to cancel out these links. *Token*-based mechanism is more suitable in large and dense mobile ad hoc network and where node mobility is low than

otherwise because it presents the following drawbacks:

1. Frequent changes in the local subset of the network that shares a key for issuing valid *tokens* can cause high computational overhead, not to mention the high traffic generated by issuing/renewing a *token*.
2. The localized monitoring mechanism executed by each node is intrinsically inaccurate due to the inaccuracy in the information obtained by overhearing the channel.
3. The bootstrap phase to generate a valid *token* for each node has limitation. For example, the node needs to have at least k neighbors, suggesting the use of such mechanism in a rather dense mobile ad hoc network.

III. RESULTS AND DISCUSSION

Framework for Detection Of Selfishness

This Paper describes a new framework based on Dempster-Shafer theory-based selfishness detection framework (DST-SDF) with some mathematical background and simulation analysis. The DST-SDF is dedicated for MANETs based on standard routing like dynamic source routing (DSR) [12]. The main concept relies on end-to-end packet acknowledgments in the following way: every time a source node sends a packet to a destination node, it waits for a certain predefined time for an acknowledgement of the packet. If one arrives within the predefined time, the source node has reason to claim that all nodes on the path are cooperative (none is selfish). Otherwise if there are no other indications of faultiness on the path (e.g., RERR messages), the source node knows that there are selfish nodes on the path. Whenever an acknowledgment does or does not arrive in time, a special recommendation message is sent out to inform the other nodes about the detected situation (selfish or cooperative behavior on the path, respectively). Every node in the network is equipped with a dedicated component executing a DST-based algorithm that uses received recommendation messages to evaluate the selfishness of each node. The resulting values can be used as routing metrics while selecting packets' routes in the near future.

IV. CONCLUSION

This paper examined a few methodologies for managing narrow minded nodes. Childish nodes are a genuine issue for impromptu systems since they influence the system throughput. Numerous methodologies are accessible in the writing. In any case, no methodology gives a strong answer for the childish nodes issue. The Credit based methodology gives motivating forces to the well acting nodes and just by passes the egotistical nodes in selecting a course to the destination. Be that as it may, narrow minded hub still appreciates administrations without chipping in with others. The identification also, disconnection component disengages the childish nodes with the goal that they don't get any administrations from the system. Therefore punishing the narrow minded nodes. In any case, what happens if numerous nodes get to be narrow minded? System correspondence itself will get to be inconceivable. Along these lines we can't wipe out all the egotistical nodes from the system. Another system to diminish the impact of childishness and animating the nodes to participate in the system administrations ought to be produced. However, the overhead in accomplishing this ought to additionally be less. Since we ought to recollect that after all we are managing battery worked gadgets.

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Analysis of Catalyst Technology in Direct Alcohol Fuel Cell A Review

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ABSTRACT

Direct alcohol fuel cells (DAFCs) are a type of electrochemical energy conversion device that directly convert the chemical energy stored in a liquid alcohol fuel, commonly methanol and ethanol, and also ethylene glycol, or *n*-propanol, to electricity. Because of their simplicity, high energy density, instantaneous recharging, and presumably long life, DAFCs have been identified as the most promising candidate to replace batteries in micro power applications. The role of catalyst is significant since by modifying the catalyst composition, it was confirmed that the overall electro catalytic activity is greatly enhanced at low potentials as it enables the breakdown of alcohols into proton and electron. Platinum is used as a catalyst for both half-reactions. Even though platinum is being used as a conventional catalyst, modifications like alloying or impregnations of other elements on it enables a better and cost effective catalyst. However, their dependence on expensive Pt-based catalysts for both the anode and the cathode make them unsuitable for large-scale commercialization. This paper deals with the recent evolution of catalyst technology in DAFC. Analysis is made about the anode catalysts and cathode catalyst. Critical analysis of catalyst technology is also made on Nano structures, New Carbon Materials as Catalyst Supports. The effective composition of catalyst is identified and reported as an outcome of the analysis.

Keywords: DAFC; Direct ethanol fuel cell; direct methanol fuel cells, Catalyst, Catalyst support.

I. INTRODUCTION

A fuel cell is an electrochemical energy conversion device which constantly produces electricity using hydrogen and oxygen. Fuel cell on no account goes dead as long as there is a flow of chemical into the cell. Fuel cells generate electricity from an electrochemical reaction between oxygen in air and a fuel to form water. The electricity produced from fuel cells can be used to power all sorts of devices, from cars and buses to laptops and mobiles phones. However there are certain constraints that reduce its performance. Low temperature fuel cells, generally conceived around a proton electrolyte membrane, seem able to be used for a large range of power application. Electro-catalyst materials are a major obstacle for fuel cell technology. Pt catalysts suffer from several drawbacks including slow kinetics, low efficiency, high cost, and limited. Thus, current research is focused on the development of

catalyst materials with low cost [1], high performance [2], high stability, and durability. The basic function of a catalyst layer is to provide a conductive environment for electrochemical reactions. Alcohols mainly methanol and ethanol are widely proposed as possible fuel for mobile application such as electric vehicle. Ethanol offers an attractive alternative as a fuel in low temperature fuel cells because it can be produced in large quantities from agricultural products and it is the major renewable biofuel from the fermentation of biomass. By comparing the performance of fuel cells employing an H₃PO₄ doped polybenzimidazole membrane and Pt–Ru as anode catalyst operating on various methanol-alternative fuels, Wang et al. found that ethanol is a promising alternative fuel with an electrochemical activity comparable to that of methanol. These reasons motivate investigations on ethanol electro oxidation in order to improve the electrical performances when using it in a direct ethanol fuel cell

(DEFC), and to open the possibility of replacing methanol in a direct alcohol fuel cell. Ethanol is one of the most important renewable fuels contributing to the reduction of negative environmental impacts generated by the worldwide utilization of fossil fuels. By modifying the catalyst used for both methanol and ethanol fuel cell, an efficient DAFC can be formed, which can be used for many portable applications.

II. METHODS AND MATERIAL

Catalyst Technology in DMFC

A. Anode Catalysts

Pt has been the most effective metal used as Anode. However, pure platinum is not efficient due to poisoning of CO intermediates. According to the dual pathway mechanism [2], the intermediate CO generated in the indirect pathway can be strongly adsorbed on the Pt surface, and the reaction active sites on the Pt become occupied, leading to a severe decrease in reaction kinetics. To address the poisoning by CO, modification of Pt with foreign metals (Me) (e.g., Ru, Ni, Co, and Sn) is necessary. Among the multifarious Pt-based catalysts, the Pt–Ru alloy has been identified to be the most effective for Methanol Oxidation reaction (MOR). Ru could produce active OH at a low potential to react with adsorbed intermediates on neighbouring Pt sites [3, 4]. Recently, by an accelerated degradation test and normal pulse voltammetry, scientists showed kinetic evidence favoring the electronic effect of Ru in the promotion of initial dissociative adsorption of methanol on Pt and weaken the adsorption strength of CO. Recently; considerable efforts have been dedicated to structure optimization to increase the electro catalytic activity of Pt–Ru for MOR [7]. For example, it was reported that the electro catalytic activity of a Pt–Ru catalyst with a Ru-decorated Pt surface in MOR was twice higher for optimised Ru coverage as compared to Pt–Ru black alloy catalysts.

Tsang et al investigated the dependence of the electro catalytic activity of Pt–Ru catalysts on Ru coverage. Page et al investigated Pt–Ni, Pt–Co, Pt–Fe and Pt–Cu catalysts for MOR [9]. They found that Pt–Co/C catalysts were better catalysts for MOR than Pt and other transition metal alloy catalysts. In addition, the CO tolerance of Pt–Co catalysts was recently investigated

and their results showed that the CO adsorption rate for the Pt–Co alloys was much slower than that for pure Pt, which might be attributed to the electronic effect of Co on Pt. Pt–Mo and Pt–Sn catalysts, with high CO tolerance, have long attracted significant attention. In the study of the binding energies and geometries of CO and OH, for Pt–Ru, Pt–Mo and Pt–Sn catalysts [12], the Pt–Mo and Pt–Sn catalysts seemed to be better CO oxidation catalysts than Pt–Ru catalysts.

Experimentally, found that both a Pt 0.8 Mo0.2 alloy and core-shell catalysts showed negligible over potential for oxidation of a H₂/CO mixture. Until now, Ru has been the most effective metal for improving the CO tolerance of Pt catalysts. However, as Ru is a precious metal with relatively high cost and low production, the development of Pt–Me catalytic systems is beneficial to obtaining low-cost alternative catalysts for MOR.

B. Cathode Catalysts

With the cathode, the fundamental challenges are how to address the sluggish ORR kinetics and the methanol crossover. The sluggish ORR kinetics require high loading of Pt in the cathode for acceptable power density. Correspondingly, methanol crossover not only decreases fuel efficiency but also causes mixed potentials due to the occurrence of MOR on Pt. Therefore, the development of low-platinum/non-platinum and methanol tolerant cathode catalysts is highly desired for implementation in DMFCs. Generally, the smaller the Pt particles are, the larger surface area the Pt particles possess, leading to good electro catalytic performance of Pt catalysts. Pt alloys have been studied for many years as an effective tactic to improve the electro catalytic activity of Pt and simultaneously reduce Pt loading. To maximize Pt utilization, the ideal structure of a Pt-based catalyst is where the total available Pt atoms are distributed on the electrochemical reaction interface.

Until now, Pt-based catalysts were considered state-of-the-art catalysts for oxygen reduction reaction (ORR). Nevertheless, from a long-term viewpoint, considering the limited mining capability and prohibitive cost of Pt metal, the development of non-platinum catalysts such as Pd based catalysts, Ru–Se and heat-treated MeN_xCy-based catalysts is significant for widespread application of DMFCs. Although Pd-based and Ru–Se catalysts show promise as alternatives to Pt, this is still one

precious metal replacing another. Thus, virtually all non-precious metal catalysts (NPMC) are of interest for large scale and cost-competitive DMFCs. Recently, MeNxCy catalysts have been receiving increased attention due to their reasonable activity and remarkable selectivity towards ORR. MeNxCy catalysts are usually obtained through heat treatment of a mixture of metal salts, carbon, and N-containing molecular precursors.

C. Technology for Catalyst Support

Among new carbon-based materials, nanotubes are the most investigated catalyst support for low-temperature fuel cells. The highly crystalline structure of CNTs provides high conductivity, surface area and porosity, resulting in exceptional diffusivity. Moreover, CNTs and CNFs have a positive effect on catalyst structure, yielding higher catalytic activity and stability than carbon black. On the other hand, few studies have been conducted on carbon nanohorns, nanocoils and fibers as Pt catalyst supports. A considerable amount of research has been focused on reducing Pt and/or PteRu poisoning and improving the performance of DMFCs. Oxide-supported Au catalysts are promising candidates for the selective oxidation of CO in gas phase reactions. Kim et al.[9] added Au/TiO₂ to a PteRu/C electrode to improve the performance of DMFC, Catalyst performance was improved by the removal and selective oxidation of CO and other poisonous species generated during the oxidation of methanol. Park et al.[17] enhanced the catalytic activity of a PteRueRheNi in a direct methanol fuel cell. PteRueRheNi showed a high oxidation current, power density, and excellent long-term stability in electrochemical half- and single-cell particles on carbon and metal supports. Thus, carbon supports may improve stability, properties, and cost of the catalyst.

D. Nanostructures as Catalyst Support

Currently, carbon black supports (Vulcan XC-72R, Black Pearls 2000, etc.) are widely used in platinum catalysts. However, recent publications suggest that novel carbon supports, such as ordered mesoporous carbon [3,4], carbon aero and xerogels, carbon nanofibers (CNFs) [5], and carbon nanotubes (CNTs) may improve efficiency of electro catalysts and reduce Pt loading [6,7] and increase surface area of the catalyst. This results to the high reaction area of alcohol and water to produce electron and proton. CNT-supported

electro catalysts commonly exist in unusual shapes and have bulky specific volumes compared to conductive carbon black. As a result, CNT-supported electro catalysts are difficult to fabricate into fuel cell electrodes by conventional means such as painting, brushing [8, 9], spraying [6, 11, 12], screen printing etc. Additionally, high catalyst loadings required for DMFC are also difficult to achieve in CNT-supported electro catalysts [12]. Common obstacles include thick catalyst layers, loose structures in coated layers, poor cell performance, and high ionomer content, leading to high electrode resistance. These problems are exacerbated when catalysts with low amounts of metal and high amounts of CNT are used in the electrode catalyst layer. Innovative solutions for common problems are urgently needed in practical applications. Recently, electrophoretic deposition (EPD) has been investigated as a novel method for fabricating electrodes for membrane fuel cells [13, 14]. This method is generally conducted in non-aqueous suspensions under high-voltage conditions. At present, studies in this field are limited.

III. RESULTS AND DISCUSSION

New Carbon Materials as Catalyst Supports

In order to improve the proton transport capacity in an electro catalytic reaction, Nafion solution was added into the catalyst slurry during the preparation of the catalyst ink. The proper amount of Nafion ranged from 10% to 30%. The addition of Nafion can improve proton transport capacity, but it will inevitably cover some of the catalyst active sites, thereby reducing the utilization of the precious metals. To improve the utilization of the precious metal catalysts, the modification of the carbon support is also another useful approach [18]. This not only improves the transport capacity of protons but also reduces the amount of Nafion, which can reduce the cost of the fuel cell. Furthermore, with regard to the carbon support for the oxygen reduction catalyst, in order to allow the product (water) to be quickly and effectively removed from the active sites, and reactant (oxygen) to access the active sites, the carbon supports are required to be hydrophobic. On the contrary, the methanol oxidation catalyst needs a certain degree of hydrophilic support. These can be achieved by the modification of the carbon support. By the combination of new carbon materials and modification of the support, it can be

possible to get an ideal support for electro catalysts. The commercial carbon support, such as Vulcan XC-72R, has a relatively large surface area, good electrical conductivity, and proper particle.

IV. CONCLUSION

Alcohols are a hydrogen-rich liquid and have a higher energy density ranging from 6.1 to 8.0 kWh/kg. Also Ethanol can be obtained in great quantity from biomass. Among new carbon-based materials, nanotubes are the most investigated catalyst support for low-temperature fuel cells. The highly crystalline structure of CNTs provides high conductivity, surface area and porosity, resulting in exceptional diffusivity. Moreover, CNTs and CNFs have a positive effect on catalyst structure, yielding higher catalytic activity and stability than carbon black. Technologically significant nanomaterials come in many shapes, sizes and structures. Nanomaterials range from small molecules to complex composites and mixtures. Depending upon the spatial dimensions of the system and properties under investigation, molecular modeling of nanomaterials can be accomplished. This review illustrates a variety of modeling techniques through recent applications. To replace carbon black with carbon nanostructures in catalyst supports, further experiments in fuel cells must be performed to evaluate electrochemical activity and long-term stability of catalysts supported on these new promising materials. Also, We placed our results in context of the state-of-the-art in the development of improved PEM materials for DMFCs, and showed that the proposed approach is comparable to the most promising results available in the literature. We also highlighted the importance of accounting for variations in some of the key experimental methods while comparing results of different researchers.

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Preliminary Epidemiological Studies on Epizootic Ulcerative Syndrome (EUS) in Freshwater Fishes of Assam

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ABSTRACT

Preliminary epidemiological investigation was carried out to examine the status of Epizootic Ulcerative Syndrome among the freshwater (FW) fishes of Cachar district in Assam during the period from January 2013 to May 2015. Our study revealed fluctuation in the intensity of the disease in relation to species affected. A total of *c* 581 EUS-affected fishes were recorded during the present study period. The temperature of air and water of the wetlands were recorded as 17° C to 35° C and 19° C to 28° C respectively. pH was recorded as 5.5 to 7.0. The most prevalent symptoms of EUS disease, as reported by the farmers, were ulceration on the skin followed by tail and fin rot. The Case Fatality Ratio (CFR) has been calculated species wise and has been found to be high among *Cirrhinus mrigala* (83.72 %), followed by *Puntius ticto* (75 %), *Channa marulius* (70 %), *Mastacembelus armatus* 69.23 %), *Anabas testudineus* (53.85 %), and, so on. Further, the Specific Death Rate (SDR) due to EUS was found to be 57.89 %. Communicative nature of EUS revealed variation in time gap between fish and infection in different species. Financial loss to farmers due to fish disease was colossal, as was revealed through interviewing the Fish farmers.

Keywords: Fish, diseases, EUS, Epidemiology, Cachar, Assam, India.

I. INTRODUCTION

Disease, *per se*, is not an entity of an end in itself. Disease is the end result of an interaction between a noxious stimulus and biological system. In fact, it is necessary to understand all aspects of the biology of the species in order to understand a disease.

Severe outbreaks of disease may result from the introduction of parasites, pathogens, from malnutrition, from chemical and physical alterations of the water, from the genetic make-up of the fish; and, from the interrelationship of any or all these factors. This relationship could be expressed in the form of an equation as follows:

$$H + P + S^2 = D$$

Where 'H' represents the 'Host'; 'P', the 'Pathogen'; 'S', the 'Stress' caused by the environment; and, 'D', the resulting 'Disease'.

It may be noted here that, the stress caused by the changes in the environment may increase very rapidly after the acceptable range for a particular species

of fish exceeds. As such, the effect of such a stress could be expressed as a quantity which increases exponentially; while, the concomitant changes in the environment could be represented arithmetically, e.g., temperature by degrees; Dissolved Oxygen (DO) by mg/lit; and, so on. The stress created by such changes and the resulting mortalities are likely to increase geometrically or logarithmically.

Fish forms a dependable source of animal protein for people of developing countries, like India, Bangladesh, Sri Lanka, and other countries of South and South-East Asia. Large-scale fish mortality often occurs due to environmental stress followed by parasitic afflictions. Fungi, bacteria and certain viruses are often found associated with such diseases which often become epizootic and epidemic.

Cutaneous ulcerative diseases, often involving a number of pathogens, are a common problem in wild and cultured fish. For the last two decades, a group of epizootic syndromes, all involving a severe ulcerative

mycosis, have been reported from Australia (Rodgers and Burke, 1981); South-East United States (Noga and Dykstra, 1986); and, Asia, stretching from the Philippines (Reantaso, 1990) in the East to India (Kar and Dey, 1988; Das *et al.*, 1990) in the West.

Outbreaks of ulcerative disease have been affecting the freshwater and estuarine fishes over much of Asia and Australia since last > 25 years. The disease had been variously named as 'Mycotic Granulomatosis (MG) in Japan, Red Spot Disease (RSD) in Australia and Epizootic Ulcerative Syndrome (EUS) in South-East and South Asia. Some of the studies had shown that, the same pathogenic *Aphanomyces* fungus had been involved in each case; but, there are other workers who subscribe to its primary viral aetiology. An account of each of the three epidemic conditions is briefly given below.

II. METHODS AND MATERIAL

Mycotic Granulomatosis (MG)

The first report of an EUS-like condition came in Summer of 1971, in farmed ayu (*Plecoglossus altivelis*) in Oita Prefecture, Japan (Egusa and Masuda, 1971). The characteristic lesion, a granulomatous response to invasive hyphae, was described and the disease was named Mycotic Granulomatosis (Miyazaki and Egusa, 1972). It had rapidly spread to several other Prefectures and had affected various fish species, predominantly the cultured ayu and the goldfish (*Carassius carassius auratus*), the Formosan snakehead (*Channa maculate*) and the grey mullet (*Mugil cephalus*) (Miyazaki and Egusa, 1972). However, the common carp (*Cyprinus carpio*) was not affected.

Red Spot Disease (RSD)

In 1972, outbreaks of a cutaneous ulcerative condition, called Red Spot Disease (RSD) affected the estuarine fishes, particularly, the grey mullet (*Mugil cephalus*), in Queensland, Australia (McKenzie and Hall, 1976). The disease later progressed to affect the freshwater (FW) and estuarine fishes in coastal rivers in New South Wales (NSW) (Callinan, *et al.*, 1989), Northern Territory (Pearce, 1990) and Western Australia (Callinan, 1994).

Epizootic Ulcerative Syndrome (EUS) Origin of the problem

The origin of EUS could be said to be a matter of controversy and speculation. Following the report of outbreak of MG in Japan during the 1970s, EUS was reported in Australia and in South-East and South Asia during the subsequent decades.

Chronology, Status and Major outbreaks in the World

Following the report of MG in Japan, sometime around 1971, the earliest report of EUS outbreak goes back to Australia during 1972 and Papua New Guinea during 1974; from where, EUS has been sweeping almost in a chronological manner through most of the South-East and South Asian countries, like Indonesia (1980), Malaysia (1979-83), Thailand (1985), Kampuchea and Lao PDR (1984); Myanmar (1984-85), Sri Lanka (1987); Bangladesh (March, 1988); until, EUS had reached India through the Barak valley region of Assam during July, 1988; and, has been sweeping the region, even today, causing large-scale mortality among the freshwater fishes.

In India, widespread initiation of outbreak of EUS started from Barak valley region of Assam since July, 1988 (Kar, 1999, 2005 d, 2007, 2010, 2013, 2014; Kar and Barbhuiya, 2013, Kar and Dey, S, 1988; Kar and Dey, SC, 1988 a, b; 1990 a, b, c; Kar *et al.*, 1990 a, b; 1993, 1994, 1995 a, b, c; 1996 a, b, c; 1997; 1998 a, b, c, d; 1999 a, b; 2000 a, b, c, d; 2001 a, b; 2002 a, b, c, d; 2003 a, b, c, d, e, f, g ; 2004 a, b, c; Patil *et.al.*, 2003). Outbreaks of EUS in India have been comprehensively reviewed at various Fora and workers (The Zoological Society of Assam, 1988; ICSF, 1992; Das and Das, 1993; Mohan and Shankar, 1994, *etc.*).

From Barak valley region of Assam (July, 1988), EUS has been sweeping, almost unabated and chronologically, through West Bengal (1989), Bihar (1989), Orissa (1989), UP (1990), Madhya Pradesh (1990), Maharashtra (1991-92), Karnataka (1993), Goa (1993), Tamil Nadu (1993), Andhra Pradesh (1992-93), Kerala (1994-95), till EUS had crossed India to other parts of the world.

Among some of the other Indian workers who had worked on EUS problems, are Bhaumik *et al.* (1990)

who had worked on the impact of Epizootic Ulcerative Syndrome on the Society. Chakraborty and Dastidar (1991) had repeatedly isolated chemoautotrophic nocardio form bacteria from fish affected by EUS. Chattopadhyay *et al.* (1990) had done microbiological investigations into EUS in fishes. Das *et al.*, (1990) had prepared a comprehensive account of EUS. Goswami *et al.*, (1988) had done studies on certain aspects of prevention and treatment of fish suffering from EUS. Jhingran (1991) had worked on strategy for containing EUS. Prasad and Sinha (1990) had prepared a status paper on the occurrence of EUS in fishes of Bihar. Purkait (1990) had done some case studies on the EUS of fishes in Chanditala of Hooghly district in West Bengal. Rahman *et al.*, (1988) had studied the role of EUS-affected fish on the health of ducks in Assam. CIFA (Central institute of Freshwater Aquaculture) (ICAR) developed the CIFAX which has been claimed to control EUS. Mohan and Shankar (1994), Vishwanath *et al.* (1997, a, b; 1998; Mohan *et al.*, 1999) did works revealing different aspects of EUS.

III. RESULTS AND DISCUSSION

Major species affected and Pattern of spread of EUS

In India, systematic study, conducted by us, since 1988, revealed wide scale attack among four species of fishes. These are: *Channa punctata*, *Macrognathus aral*, *Mystus vittatus*, *Puntius conchoni*

Other species affected by EUS during the same period, but not very widely, included *Aorichthys aor*, *Amblypharyngodon mola*, *Catla catla*, *Cirrhinus mrigala*, *Heteropneustes fossilis*, *Labeo rohita*, *Lepidocephalichthys guntea*, *Notopterus notopterus* and *Salmophasia bacaila*.

Our continued study revealed that, during the period 1992-94, the following species had been found to be very severely affected by EUS: *Parambassis ranga*, *Chanda nama*, *Nandus nandus*, *Glossogobius giuris* (Kar *et al.*, 1994). Some of the other species affected by EUS to a lesser extent during this period, included *Mastacembelus armatus*, *Macrognathus pancalus*, *Xenentodon cancila*, *Colisa fasciatus*, etc.

Our recent studies (Kar *et al.*, 1995, a,b,c; 1997; 1998 a,b,c; 1999 a; 2000 a; 2001 a; 2002 a; 2003 a; 2004 a) indicated that the following species of fishes have been severely-affected by EUS, since 1995, particularly, during the period Nov-Feb, causing large-scale mortality among them: *Channa striata*, *C. punctata*, *Anabas testudineus*, *Clarias batrachus*.

Thus, there has been a differential pattern of spread of EUS among different fish species during different seasons.

With regard to the Global scenario, more than 100 fish species have been reported to be affected by EUS (Lilley *et al.*, 1992); but, only relatively few reports have been confirmed by demonstrating the presence of MG in histological section or by isolation of the pathogenic fungus, *Aphanomyces* sp., from tissues underlying ulcers.

Similarly, some commercially important species are considered to be particularly resistant to EUS. But, not much study has been done to confirm these observations and investigate the mechanism of resistance. Species reported to be unaffected by EUS outbreaks include the Chinese carps, tilapias and milkfish (*Chanos chanos*). Hatai (1994) experimentally injected catfish (*Parasilurus asotus*), loach (*Misgurnus anguillicaudatus*) and eel (*Anguilla japonica*) with hyphae of *A. invadans* and found them to be refractory to infection. Wada *et al* (1994) and Shariffpour (1997) experimentally injected common carp (*Cyprinus carpio*) with zoospores of *Aphanomyces* from MG and EUS outbreaks respectively; and, demonstrated that fungal growth was suppressed by an intense inflammatory response.

Some authors have commented that the most severely affected species in natural outbreaks are generally bottom dwellers (Llobrera and Gacutan, 1987; Chondar and Rao, 1996) or the fishes which possess air-breathing organs (Roberts *et al.*, 1994).

In the case of snakeheads, no particular size group appears to be more susceptible, with affected fish ranging from 40 g to 900 g (Cruz-Lacierda and Shariff, 1995). However, there is a possibility that, size or age may be significant in other species. For example, the IMCs suffer high mortalities as fingerlings (Roberts *et al.*, 1989); but, larger fish, although appear ulcerated, are not reported as dying in large numbers (NACA, 1997).

Epidemiological Study

Epidemiology is the study of the distribution and determinants (*i.e.*, causes) of disease in populations. Epidemiologists typically take a wide view of causal factors, defining them as any event, condition or characteristic which play an essential role in producing an occurrence of the disease'. By contrast, many pathologists and microbiologists may consider, for example, a particular infectious agent to be the cause of a disease and may relegate all other contributions to 'contributing' or 'predisposing' factors.

For most diseases, including EUS, there is a strong evidence that, outbreaks occur only when a number of causal factors combine together. Many of the causal factors which have been identified or suggested, on the basis of reasonable evidence for EUS, may be represented in a causal web. It may be noted here that, there are several levels within the web; and, that, a number of factors may act at the same level, but not necessarily at the same time or intensity. It may, further, be noted here that, for EUS to occur, combinations of causal factors must ultimately lead to exposure of dermis, attachment to it by *Aphanomyces invadans*; and, subsequent invasion of the dermis and muscle by the fungus. The resulting mycotic granulomatous dermatitis and myositis may be considered as expression due to EUS (Lilley et al., 1998).

The multifactorial nature of the cause(s) of EUS could also be represented by using the concepts of 'necessary cause, component cause and sufficient cause'. Each combination of various causal factors ('component causes') which together cause a disease, could collectively be regarded as a 'sufficient cause' for that disease to be initiated. It may be important to note here that, different combinations of 'component causes' may result in sufficient amount of causes for the initiation of a disease; which could, however, be different under different circumstances. Moreover, all sufficient causes for a particular disease have, in common, at least one component cause, known as a 'necessary cause', which must always be present, as expected, for that disease to prevail.

For EUS, studies have suggested that, there are a number of sufficient causes; each could make-up its component causes. It may be noted here that, each of

these sufficient causes includes, amongst its component causes, one of the recognized necessary causes, *viz.*, propagules of *A. invadans* (Lilley et al., 1998).

Notwithstanding the above, a unique feature of an epidemiologist is to test the aetiological hypothesis and identify the underlying causes (or risk factors) for the diseases. A number of factors have been hypothesized as either factors or determinants of EUS outbreak in India. So, in order to find out the exact causative organism, or the infectious aetiology, it is the need of the hour to study the epidemiological aspects of the disease.

A standard format had been designed by following Park (1997). This format had been used to collect different information related to epidemiology of EUS in the Barak valley region of Assam, where EUS had made its initiation in India. It has been covered from the angles of socio-economic impact of it, epidemiology of the disease and its impact on aquaculture farms.

Since 1988, EUS has been considered to be one of the most serious diseases affecting fresh water fishes in India. According to the present study, the high mortality rate had been found among *Cirrhinus mrigala*, *Channa stirata*, *Puntius ticto*, *Labeo gonius*, *Lepidocephalus guntea*, etc. When analysis is planned to throw light on the aetiology, it is essential to use Specific Death Rates (SDR) (Park, 1997). Therefore, attempts had been made to determine the SDR due to EUS.

$$\text{SDR due to EUS} = \frac{\text{Number of deaths during a year}}{\text{Mid year population (Total number of speices)}} \times 100$$

Attempts had further been made to determine the Case Fatality Ratio (CFR) in order to represent the killing power of the disease which is as follows:

$$\frac{\text{Total number of deaths due to EUS}}{\text{Total number of cases due to EUS}} \times 100$$

Further, a model related to the study of factors affecting the outbreak of EUS in farmed fish in Bangladesh, carried out by Ahmed and Rab (1995), in collaboration with ICLARM and the Department of Economics, Islamic University of Bangladesh at Kusthia, was replicated by us in the field in Assam University, Silchar, in which, three experimental ponds (*viz.*, ponds A, B, C) were prepared of sizes 15 ft × 15 ft × 3 ft each. Lime

was applied during the post-stocking, generally, in the proportion of 0.027 kg, 0.032 kg and 0.043 kg respectively. Pond 'A' had been seeded with five species of fishes, viz., *Cirrhinus mrigala*, *Labeo rohita*, *Ctenopharyngodon idella*, *Oreochromis mossambicus* and *Channa punctatus*. Pond 'B' was seeded with only two species of fishes, viz., *Cirrhinus mrigala* and *Channa punctatus*. Pond 'C' was seeded with only a single species of fish, viz., *Cirrhinus mrigala* only. No EUS-outbreak had been found to occur in any of the experimental ponds (viz., A, B, C) during the study period.

Our study had further revealed that, high mortality rate had been found among *Cirrhinus mrigala*, *Channa* spp., *Puntius* spp., *Labeo* spp., and *Clarias batrachus*. Specific Death Rate (SDR) due to EUS = No. of deaths during a year/ Mid-year population (total number of species) x 100 = (22/38) x 100 = 57.89 %. The same study had further revealed that, during the said period, the killing power of EUS was represented by the Case Fatality Ratio (CFR) (which is = Total No. of deaths due to EUS/Total No. of cases due to EUS x 100). CFR had been calculated species-wise and had been found to be high among *Cirrhinus mrigala* (83.72 %), followed by *Puntius ticto* (75 %), *Channa marulius* (70 %), *Mastacembelus armatus* (69.23 %), *Anabas testudineus* (53.85 %).

IV. CONCLUSION

EUS, today, is a semi-global problem among the freshwater fishes. However, in view of its complex infectious aetiology, it is yet to be accurately defined (OIE, 1997).

Various postulates have been put forward for this disease including physical factors, such as water pollution causing changes in physico-chemical characteristics and micro-nutrients. But these may just be the triggering factors. The origin of the disease is unknown and remains a matter of speculation even today. Attempts have been made in different laboratories to investigate the cause(s) of EUS and to correlate the outbreak of the epizootic with environmental parameters. The rapid seasonal depression of salinity and temperature as important environmental factors predisposing the fish to attack by EUS due to the stress condition created. No particular characteristic of soil

fertility appear to be related to the occurrence of the EUS (Mackintosh and Phillips, 1986). *Aeromonas hydrophila* is one of the most commonly isolated bacterium involved in haemorrhagic fish diseases in the Indo-Pacific region (Roberts, 1989). A primary viral aetiology had been considered as a likely possibility for the rapid and uncontrollable spread of EUS (Frerichs *et al.*, 1986; Ahne *et al.*, 1988; Kar, 2007, 2013).

According to OIE (1997), EUS is a seasonal epizootic condition of wild and farmed fresh and brackish water fish of complex infectious aetiology. According to them, the most primary causative agent of EUS is the fungus *Aphanomyces invadans* often associated with bacterial septicaemia involving generally *Aeromonas hydrophila*. A variety of parasites have also been reported from the diseased fish; but, their presence is inconsistent. Associated viral infection also occurs frequently. It is believed that, the fungus, by itself, cannot normally invade fish; and, it is postulated that, certain co-factor, such as, epidermal damage (which could be initiated by an array of agents), severe environmental stress, or viral infection, is required to initiate this complex and exceedingly dangerous condition. EUS is said to be endemic in South-East and South Asia today.

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Selection of Reinforcement Steel Bars with Markovian Weldability Distribution against their Boron Content

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ABSTRACT

Deciding the functional suitability of reinforcement steel bars for welding operations has a dependence on boron content especially if such bars are made from recycled steel. In this study, a mathematical model is developed to optimize the selection decision of recycled steel bars from steel manufacturers considering a Markovian weldability distribution since the boron distribution in steel is predominantly random. In the given model, a building/fabrication contractor intends to select one of two manufacturers of recycled steel bars basing on the weldability of steel as determined by their boron content selected in equal monthly intervals. A Markov decision process approach is adopted where five states of a Markov chain represent possible states of weldability for steel bars. The boron content is minimized in order to achieve maximum weldability capacity where the decision to select the best steel is made using dynamic programming over a finite period planning horizon. A numerical example demonstrates the existence of an optimal state-dependent selection decision and boron composition over the planning horizon.

Keywords: Boron, Reinforcement Bar, Weldability, Markovian

I. INTRODUCTION

The ease with which a metal or alloy can be joined by fusion is termed weldability. It envisages the metallurgical compatibility of the metal with a specific welding process, its ability to be joined with mechanical soundness and the capacity of the resulting weld to perform satisfactorily under the intended service conditions (Jyotiet *al.*, 2012). Steel owes much of its versatility to the ease with which it can be joined with fusion welding. The weldability of plain carbon steel thermo-mechanically treated (TMT) bars has also given them an edge over the rest of concrete reinforcement bar varieties.

The major limitation of welded joints, however, is the frequent tendency to fusion defects which include any cracks, flaws or discontinuities that compromise the usefulness of the finished weld. The most insidious discontinuities are those that cause brittle cracking especially if they are of a metallurgical origin.

Cracks in welds are formed either when the weld pool is in the process of cooling, which is a case of hot cracking or after it has cooled; resulting in cold cracking. Most forms of cracks occur when the weld is in the process of cooling as a result of shrinking strains (Thomas, 2011). The stresses caused by the shrinking metal and the rigidity of the base metal which provides the restraints are key precursors in the eventual crack formation. Even when the case of cold cracking occurs as in hydrogen cracking, the sensitivity of the microstructure of heat affected zone is the major underlying factor (Carlet *al.*, 2011).

The conditions that lead to the evolution of cracks are therefore dependent on the composition of the base metal which when heated, transforms into austenite and on cooling, forms varying levels of martensite depending on the steel carbon equivalent (CE) which in turn depends on the types and amounts of alloying (tramp) elements in the base metal (Eq.1).

$$CE = C + A(C) * \{Si/24 + Mn/6 + Cu/15 + Ni/20 + (Cr + Nb + V + Mo)/5 + 5B\}$$

where:

$$A(C) = 0.75 + 0.25 \tanh\{20(C - 0.12)\} \text{ (Yurioka, 1985).}$$

Similarly, equation ii) from the work of Ito and Bessyo depicts the critical metal parameter P_{cm} for weld cracking and the influence of major alloying elements on weld crack formation.

$$P_{cm} = \%C + \frac{\%Mn + \%Cu + Cr}{20} + \frac{Ni}{60} + \frac{\%Mo}{15} + \frac{\%V}{10} + 5B \dots \dots \dots ii)$$

The majority of steel reinforcement bars worldwide are made from recycled steel. The fact that the alloy content of a recycled component is quite difficult to predict and control makes the properties of the steel bars hard to predetermine.

Importantly, alloying/tramp elements have individual effects on steel strength that are additive and increase with particular alloying element content (Grangeet *al*, 1977). Both equation *i*) and *ii*) allude to the effect of boron in steel which even when only present in small percentages, strongly alters the CE of steel and influence its inclination crack.

Boron comes into recycled steel from boron containing steel scrap articles but more predominantly as a result of the induction furnace and continuous casting lining (Tupkaryet *al*, 2008). In both forms, the boron content is not easy to control since its economic industrial chemical regulation is still not viable.

Weldability, a crucial value of thermo-mechanically treated bars, is strongly affected by the presence of boron, since it majorly influences the CE and thus the strength of the base metal (Saeedet *al*, 2012). Because of this and other reasons, the control and predictability of boron and its influence in respect major product functionalities have become an issue of vital importance.

In this research, a mathematical model is developed to depict the relationship between the steel boron content and reinforcing bar weldability using a stochastic approach based on a Markovian weldability distribution since it has also been established that the incidence and effect of tramp elements in steel has a random distribution (Senfukaet *al*, 2013).

II. METHODS AND MATERIAL

2. Model Formulation

2.1 Notation and assumptions

- i,j = States of demand
- A = Excellent state
- B = Very good state
- C = Good state
- D = Fair state
- E = Poor state
- n,N = Stages
- Z = Selection decision
- NZ_{ij} = Number of transitions
- WZ = Weldability transition matrix
- WZ_{ij} = Weldability transition probability
- RZ = Boron content matrix
- RZ_{ij} = Boron composition due to state transition
- eZ_i = Expected boron composition
- aZ_i = Accumulated boron composition
- m = Manufacturer
- i,j ∈ {A,B,C,D,E} m ∈ {1,2} Z ∈ {1,2}
- n=1,2,N

Consider a production system consisting of two manufacturing plants producing recycled steel bars in batches for a designated number of customers. The weldability state of steel bars during each time period over a fixed planning horizon is classified as *Excellent* (denoted by state A), *Very good*, (denoted by state B), *Good* (denoted by state C), *Fair* (denoted by state D) and *Poor* (denoted by state E). The transition probabilities for weldability capacity over the planning horizon from one state to another may be described by means of a Markov chain. Suppose one is interested in determining an optimal course of action, namely to select bars from manufacturer 1 (a decision denoted by Z=1) or to select bars from manufacturer 2 (a decision denoted by Z=2) during each time period over the planning horizon. Optimality is defined such that the expected boron content is accumulated at the end of N consecutive time periods spanning the planning horizon under consideration. In this paper, a two-period (N=2) planning horizon is considered.

2.2 Finite period dynamic programming problem formulation

Recalling that weldability capacity can be in states A, B,C,D and E, the problem of finding an optimal

selection decision among the manufacturers may be expressed as a finite period dynamic programming model.

Let $g_n(i)$ denote the optimal expected boron composition accumulated during the periods $n, n+1, \dots, N$ given that the state of the system at the beginning of period n is $i \in \{A, B, C, D, E\}$. The recursive equation relating g_n and g_{n+1} is:

$$g_n(i) = \min_Z [W_{iA}^Z(m)R_{iA}^Z(m) + g_{n+1}(A), W_{iB}^Z(m)R_{iB}^Z(m) + g_{n+1}(B)] \\ + \min_Z [W_{iC}^Z(m)R_{iC}^Z(m) + g_{n+1}(C), W_{iD}^Z(m)R_{iD}^Z(m) + g_{n+1}(D), W_{iE}^Z(m)R_{iE}^Z(m) + g_{n+1}(E)] \quad (1)$$

$i \in \{A, B, C, D, E\}$, $m = \{1, 2\}$, $n = 1, 2, \dots, N$

together with the final conditions

$$g_{N+1}(A) = g_{N+1}(B) = g_{N+1}(C) = g_{N+1}(D) = g_{N+1}(E) = 0$$

This recursive relationship may be justified by noting that the cumulative boron composition $R_{ij}^Z(m) + g_{N+1}(j)$ resulting from reaching state $j \in \{A, B, C, D, E\}$ at the start of period $n+1$ from state $i \in \{A, B, C, D, E\}$ at the start of period n occurs with probability $R_{ij}^Z(m)$.

$$\text{Clearly, } e^Z(m) = [W_{ij}^Z(m)] [R_{ij}^Z(m)]^T, \quad Z \in \{1, 2\}, \quad m \in \{1, 2\} \quad (2)$$

where ‘T’ denotes matrix transposition, and hence the dynamic programming recursive equations

$$g_N(i) = \min_Z [e_i^Z(m) + W_{iA}^Z(m)g_{N+1}(A) + W_{iB}^Z(m)g_{N+1}(B) + W_{iC}^Z(m)g_{N+1}(C) \\ + \min_Z [W_{iD}^Z(m)g_{N+1}(D) + W_{iE}^Z(m)g_{N+1}(E)]] \quad (3)$$

$$g_N(i, m) = \min_Z [e_i^Z(m)] \quad (4)$$

result where (4) represents the Markov chain stable state.

2.2.1 Computing $W^Z(m)$

The transition probability for weldability capacity from state $i \in \{A, B, C, D, E\}$ to state $j \in \{A, B, C, D, E\}$, given selection decision $Z \in \{1, 2\}$ may be taken as the number of state transitions observed at manufacturing plant m with weldability capacity initially in state i and later with weldability capacity changing to state j , divided by the sum of transitions over all states. That is,

$$W_{ij}^Z(m) = N_{ij}^Z(m) / [N_{iA}^Z(m) + N_{iB}^Z(m) + N_{iC}^Z(m) + N_{iD}^Z(m) + N_{iE}^Z(m)]$$

$$\text{i.e. } \{A, B, C, D, E\}, Z \in \{1, 2\}, m = \{1, 2\} \quad (5)$$

3. Optimization

The optimal selection decision and boron content are found in this section for each period separately.

3.1 Optimization during period 1

When weldability capacity is Excellent (i.e. in state A), the optimal selection decision during period 1 is

$$Z = \begin{cases} 1 & \text{if } e_A^1(m) < e_A^2(m) \\ 2 & \text{if } e_A^1(m) \geq e_A^2(m) \end{cases}$$

The associated boron composition is :

$$g_1(A, m) = \begin{cases} e_A^1(m) & \text{if } Z = 1 \\ e_A^2(m) & \text{if } Z = 2 \end{cases}$$

Similarly, when weldability capacity is Very good (i.e. in state B), the optimal selection decision and associated boron composition during period 1 are

$$Z = \begin{cases} 1 & \text{if } e_B^1(m) < e_B^2(m) \\ 2 & \text{if } e_B^1(m) \geq e_B^2(m) \end{cases}$$

and

$$g_1(B, m) = \begin{cases} e_B^1(m) & \text{if } Z = 1 \\ e_B^2(m) & \text{if } Z = 2 \end{cases}$$

respectively.

When weldability capacity is good (i.e. in state C), the optimal selection decision and associated boron composition during period 1 are:

$$Z = \begin{cases} 1 & \text{if } e_C^1(m) < e_C^2(m) \\ 2 & \text{if } e_C^1(m) \geq e_C^2(m) \end{cases}$$

and

$$g_1(C, m) = \begin{cases} e_C^1(m) & \text{if } Z = 1 \\ e_C^2(m) & \text{if } Z = 2 \end{cases}$$

respectively.

When weldability capacity is fair (i.e. in state D), the optimal selection decision and associated boron composition during period 1 are:

$$Z = \begin{cases} 1 & \text{if } e_D^1(m) < e_D^2(m) \\ 2 & \text{if } e_D^1(m) \geq e_D^2(m) \end{cases}$$

and

$$g_1(D, m) = \begin{cases} e_D^1(m) & \text{if } Z = 1 \\ e_D^2(m) & \text{if } Z = 2 \end{cases}$$

respectively.

When weldability capacity is poor (i.e. in state E), the optimal selection decision and associated boron composition during period 1 are:

$$Z = \begin{cases} 1 & \text{if } e_E^1(m) < e_E^2(m) \\ 2 & \text{if } e_E^1(m) \geq e_E^2(m) \end{cases}$$

and

$$g_1(E, m) = \begin{cases} 1 & \text{if } e_E^1(m) < e_E^2(m) \\ 2 & \text{if } e_E^1(m) \geq e_E^2(m) \end{cases}$$

respectively.

3.2 Optimization during period 2

Using dynamic programming recursive equation (1) and recalling that $a_i^z(m,2)$ denotes the already accumulated boron content at the end of period 1 as a result of decisions made during that period, when weldability capacity is Excellent (i.e. in state A), the optimal selection decision and the associated boron composition during period 2 are:

$$Z = \begin{cases} 1 & \text{if } a_A^1(m) < a_A^2(m) \\ 2 & \text{if } a_A^1(m) \geq a_A^2(m) \end{cases}$$

and

$$g_2(A, m) = \begin{cases} a_A^1(m) & \text{if } Z = 1 \\ a_A^2(m) & \text{if } Z = 2 \end{cases}$$

respectively.

Similarly, when weldability capacity is very good (i.e. in state B), the optimal selection decision and the associated weldability capacity are:

$$Z = \begin{cases} 1 & \text{if } a_B^1(m) < a_B^2(m) \\ 2 & \text{if } a_B^1(m) \geq a_B^2(m) \end{cases}$$

and

$$g_2(B, m) = \begin{cases} a_B^1(m) & \text{if } Z = 1 \\ a_B^2(m) & \text{if } Z = 2 \end{cases}$$

respectively.

When weldability capacity is good (i.e. in state C), the optimal selection decision and the associated weldability capacity are:

$$Z = \begin{cases} 1 & \text{if } a_C^1(m) < a_C^2(m) \\ 2 & \text{if } a_C^1(m) \geq a_C^2(m) \end{cases}$$

And

$$g_2(C, m) = \begin{cases} a_C^1(m) & \text{if } Z = 1 \\ a_C^2(m) & \text{if } Z = 2 \end{cases}$$

respectively.

When weldability capacity is fair (i.e. in state D), the optimal selection decision and the associated weldability capacity during period 2 are:

$$Z = \begin{cases} 1 & \text{if } a_D^1(m) < a_D^2(m) \\ 2 & \text{if } a_D^1(m) \geq a_D^2(m) \end{cases}$$

And

$$g_2(D, m) = \begin{cases} a_D^1(m) & \text{if } Z = 1 \\ a_D^2(m) & \text{if } Z = 2 \end{cases}$$

respectively.

When weldability capacity is poor (i.e. in state E), the optimal selection decision and the associated weldability capacity during period 2 are:

$$Z = \begin{cases} 1 & \text{if } a_E^1(m) < a_E^2(m) \\ 2 & \text{if } a_E^1(m) \geq a_E^2(m) \end{cases}$$

And

$$g_2(E, m) = \begin{cases} a_E^1(m) & \text{if } Z = 1 \\ a_E^2(m) & \text{if } Z = 2 \end{cases}$$

respectively.

III. RESULTS AND DISCUSSION

4. Case Study

In order to demonstrate use of the model in sections 3 to 4, real case applications from rolling mills 1 and 2 in Uganda are presented in this section. Steel bars are manufactured for fabrication shops and the degree of weldability capacity varies for the two manufacturers. The fabrication shop wants to avoid high boron composition when the state of weldability capacity is Excellent (state A), Very good (state B), Good (state C) or Fair (state D) in order to utilize steel for welding at lower levels of boron composition. Hence, decision support is sought for the fabrication shop in terms of an optimal selection decision and the associated boron composition in a two-month planning period for the two competing manufacturers.

4.1 Data Collection

Past data revealed the following patterns of weldability capacity and boron composition over 30 days.

Manufacturer 1

Days	$W_{ij}^1(1), C_{eq}$	$R_{ij}^1(1)$	Days	$W_{ij}^1(1), C_{eq}$	$R_{ij}^1(1)$
1	0.5279	0.001	16	0.4741	0.0012
2	0.5046	0.001	17	0.5236	0.0015
3	0.4604	0.001	18	0.5635	0.002
4	0.5376	0.001	19	0.3941	0.0007
5	0.3801	0.0012	20	0.3757	0.0008
6	0.4537	0.0012	21	0.3896	0.0012
7	0.3801	0.0012	22	0.4584	0.002
8	0.4537	0.0012	23	0.3354	0.001
9	0.5179	0.0012	24	0.4143	0.0008
10	0.4590	0.0012	25	0.4171	0.0022
11	0.4047	0.0007	26	0.4137	0.0006
12	0.4172	0.0013	27	0.6683	0.0018
13	0.3990	0.0009	28	0.6657	0.0013
14	0.4619	0.0008	29	0.4741	0.0012
15	0.6683	0.0018	30	0.3812	0.0008

Manufacturer 2

Days	$W_{ij}^2(2)$	$R_{ij}^2(2)$	Days	$W_{ij}^2(2)$	$R_{ij}^2(2)$
1	0.4460	0.0015	16	0.4261	0.002
2	0.4856	0.0015	17	0.4935	0.0006
3	0.5430	0.0007	18	0.3426	0.0007
4	0.5280	0.0018	19	0.4340	0.0008
5	0.4697	0.0009	20	0.5177	0.0013
6	0.4427	0.0013	21	0.3441	0.0014
7	0.6400	0.0018	22	0.6241	0.0012
8	0.4586	0.0014	23	0.3398	0.0011
9	0.4457	0.0011	24	0.5381	0.0012
10	0.3960	0.0011	25	0.4537	0.0012
11	0.5116	0.002	26	0.3480	0.0007
12	0.4732	0.003	27	0.4402	0.0014
13	0.5268	0.002	28	0.4170	0.0021
14	0.4143	0.001	29	0.4199	0.0013
15	0.5307	0.0015	30	0.6234	0.0007

4.2 Determining $W^Z(m)$ and $R^Z(m)$

4.2.1 Estimating Elements of $W^1(1)$ and $R^1(1)$

State Transition (i,j)	No. of Transitions	Weldability CE	Boron Content	Weldability Transition Probability, $W_{ij}^1(1)$	Boron content due to state transition $R_{ij}^1(1)$
AA	0	0	0	0	0
AB	0	0	0	0	0
AC	1	0.335	0.0008	(1/1) = 1	(0.003/2)=0.0015
	0	0.414	0.0022		
AD	0	0	0	0	0
AE	0	0	0	0	0
TOTALS	1			1	
BA	0	0	0	0	0
BB	2	0.394	0.0007	(2/6)=0.333	(0.0027/3)=0.0009
		0.376	0.0008		
		0.390	0.0012		
BC	3	0.380	0.0012	(3/6)=0.500	(0.0074/6)=0.0012
		0.454	0.0012		
		0.405	0.0007		
		0.417	0.0013		
		0.390	0.002		
BD	1	0.458	0.001	(1/6)=0.167	(0.0017/2)=0.0009
		0.399	0.0009		
		0.462	0.0008		
BE	0	0	0	0	0
TOTALS	6			1	

State Transition (i,j)	No. of Transitions	Weldability CE	Boron Content (B)	Weldability Transition Probability, $W_{ij}^1(1)$	Boron content due to state transition $R_{ij}^1(1)$
CA	1	0.458	0.001	(1/7) = 0.143	(0.0032/2)=0.0016
		0.335	0.0008		
CB	3	0.454	0.0012	(3/7)=0.428	(0.0065/6)=0.0011
		0.380	0.0012		
		0.459	0.0012		
		0.405	0.0007		
		0.417	0.0013		
		0.399	0.0009		
CC	1	0.414	0.0006	(1/7)=0.143	(0.0024/2)=0.0012
		0.417	0.0018		
CD	0	0	0	0	0
CE	2	0.454	0.0012	(2/7)=0.286	(0.0048/4)=0.0012
		0.518	0.0012		
		0.414	0.0006		
		0.668	0.0018		
TOTALS	7			1	

State Transition (i,j)	No. of Transitions	Weldability CE	Boron Content	Weldability Transition Probability, $W_{ij}^1(1)$	Boron content due to state transition $R_{ij}^1(1)$
DA	0	0	0	0	0
DB	1	0.474	0.0012		
		0.381	0.0008	(1/4) =	(0.003/2)=0.0015
DC	0	0	0	0.250	0
DD	0	0	0	0	0
DE	3	0.460	0.0008	0	
		0.534	0.0018		
		0.462	0.0012		
		0.668	0.0015		(0.0073/3)=0.0024
		0.474	0.001	(3/4)=0.750	
		0.524	0.001		
TOTALS	4			1	
EA	0	0	0	0	0
EB	0	0	0	0	0
EC	1	0.517	0.0012		
		0.459	0.0012	(1/7)=0.143	(0.0024/2)=0.0012
ED	3	0.405	0.001		
		0.460	0.001		
		0.668	0.0018		
		0.474	0.0012	(3/7)=0.429	(0.007/6)=0.0012
		0.666	0.0012		
		0.474	0.0008		
EE	3	0.527	0.001		
		0.505	0.001		
		0.524	0.002		
		0.564	0.0007	(3/7)=0.429	(0.0067/6)=0.0011
		0.668	0.0012		
		0.665	0.0008		
TOTALS	7			1	

4.2.2 Estimating Elements of $W^2(2)$ and $R^2(2)$

State Transition (i,j)	No. of Transitions	Weldability CE	Boron Content	Weldability Transition Probability, $W_{ij}^1(2)$	Boron content due to state transition $R_{ij}^2(2)$
AA	0	0	0	0	0
AB	0	0	0	0	0
AC	2	0.342	0.0007		
		0.434	0.0008		
		0.348	0.0007	(2/3) = 0.667	(0.0036/4)=0.0009
		0.440	0.0014		
AD	0	0	0	0	0
AE	1	0.339	0.0014		
		0.538	0.0012	(1/3)=0.333	(0.0026/2)=0.0013

TOTALS	3			1	
BA	0	0	0	0	0
BB	0	0	0	0	0
BC	0	0	0	0	0
BD	0	0	0	0	0
BE	1	0.396 0.512	0.0011 0.002	(1/1)=1	(0.0031/2)=0.0016
TOTALS	1			1	

State Transition (I,j)	No. of Transitions	Boron Content (B)	Weldability Transition Probability, $W_{ij}^1(1)$	Boron content due to state transition $R_{ij}^2(2)$
CA	1	0.0012	(1/10) = 0.100	(0.0019/2)=0.0001
CB	1	0.0011		(0.0022/2)=0.001
CC	3	0.0011	(1/10) = 0.100	(0.007/3)=0.0023
		0.0011		
		0.0014		
CD	2	0.0021	(3/10)=0.300	(0.0056/4)=0.0014
		0.0013		
		0.0015		
CE	3	0.0015	(2/10)=0.200	(0.0066/6)=0.0011
		0.002		
		0.0006	(3/10)=0.300	
		0.001		
		0.0015		
0.0008				
0.0013				
0.0013				
0.0007				
TOTALS	7		1	

State Transition (i,j)	No. of Transitions	Weldability CE	Boron Content	Weldability Transition Probability, $W_{ij}^1(2)$	Boron content due to state transition $R_{ij}^2(2)$
DA	1	0.494 0.343	0.0006 0.0007	(1/4)=0.250	(0.0013/2)=0.0007
DB	0	0	0	0	0
DC	0	0	0	0	0
DD	0	0	0	0	0
DE	3	0.486 0.543 0.470 0.640 0.474 0.527	0.0015 0.0007 0.0009 0.0013 0.003 0.002	(3/4)=0.750	(0.0094/5)=0.0019
TOTALS	4			1	
EA	2	0.597 0.344 0.624 0.340	0.0013 0.0014 0.0012 0.0011	(2/7)=0.222	(0.005/4)=0.0013
EB	0	0	0	0	0
EC	5	0.640 0.459 0.527 0.414 0.531 0.426	0.0018 0.0014 0.002 0.001 0.0015 0.002	(5/9)=0.555	(0.0097/6)=0.0016
ED	2	0.528 0.470 0.512 0.473	0.0018 0.0009 0.002 0.003	(2/9)=0.222	(0.0077/4)=0.0019
EE	1	0.543 0.528	0.0007 0.0018	(1/9)=0.111	(0.0025/2)=0.0013
TOTALS	10			1	

Manufacturer 1:

Manufacturer 2:

State-transition matrices

$$N^1(1) = \begin{bmatrix} 0 & 0 & 1 & 0 & 0 \\ 0 & 2 & 3 & 1 & 0 \\ 1 & 3 & 1 & 0 & 2 \\ 0 & 1 & 0 & 0 & 3 \\ 0 & 0 & 1 & 3 & 3 \end{bmatrix} \quad N^2(2) = \begin{bmatrix} 0 & 0 & 2 & 0 & 1 \\ 0 & 0 & 0 & 0 & 1 \\ 1 & 1 & 3 & 2 & 3 \\ 1 & 0 & 0 & 0 & 3 \\ 2 & 0 & 4 & 2 & 1 \end{bmatrix}$$

Manufacturer 1:
 Manufacturer 2:

Weldability transition matrices

$$W^1(1) = \begin{bmatrix} 0 & 0 & 1 & 0 & 0 \\ 0 & 0.33 & 0.50 & 0.17 & 0 \\ 0.14 & 0.43 & 0.14 & 0 & 0.29 \\ 0 & 0.25 & 0 & 0 & 0.75 \\ 0 & 0 & 0.14 & 0.43 & 0.43 \end{bmatrix} \quad W^2(2) = \begin{bmatrix} 0 & 0 & 0.67 & 0 & 0.33 \\ 0 & 0 & 0 & 0 & 1 \\ 0.10 & 0.10 & 0.30 & 0.20 & 0.30 \\ 0.25 & 0 & 0 & 0 & 0.75 \\ 0.22 & 0 & 0.55 & 0.22 & 0.11 \end{bmatrix}$$

Matrices for boron content

$$R^1(1) = \begin{bmatrix} 0 & 0 & 0.0015 & 0 & 0 \\ 0 & 0.0009 & 0.0012 & 0.0009 & 0 \\ 0 & 0.0011 & 0.0012 & 0 & 0.0012 \\ 0 & 0.001 & 0 & 0 & 0.0024 \\ 0 & 0 & 0.0012 & 0.0012 & 0.0011 \end{bmatrix} \quad R^2(2) = \begin{bmatrix} 0 & 0 & 0.0009 & 0 & 0.0013 \\ 0 & 0 & 0 & 0 & 0.0016 \\ 0.0001 & 0.0001 & 0.0023 & 0.0014 & 0.0013 \\ 0.0007 & 0 & 0 & 0 & 0.0023 \\ 0.0013 & 0 & 0.0016 & 0.0019 & 0.0013 \end{bmatrix}$$

4.3 Calculating $e_i^Z(m)$ and $a_i^Z(m)$

When steel bars are selected from manufacturer 1($m=1, Z=1$), the matrices $W^1(1)$ and $R^1(1)$ yield the following expected boron composition:

$$\begin{aligned} e_A^1(1) &= (0)(0) + (0)(0) + (1)(0.0015) + (0)(0) + (0)(0) = 0.0015 \\ e_B^1(1) &= 0 + (0.33)(0.0009) + (0.5)(0.0012) + (0.17)(0.0009) + 0 = 0.0011 \\ e_C^1(1) &= (0.14)(0.0016 + 0.0012) + (0.43)(0.0011) + (0.29)(0.0012) = 0.0012 \\ e_D^1(1) &= 0 + (0.25)(0.001) + 0 + 0 + (0.75)(0.0024) = 0.0021 \\ e_E^1(1) &= 0 + 0 + (0.14)(0.0012) + (0.43)(0.0011) = 0.0012 \end{aligned}$$

When steel bars are selected from manufacturer 2($m=2, Z=2$), the matrices $W^2(2)$ and $R^2(2)$ yield the following expected boron composition:

$$\begin{aligned} e_A^2(2) &= 0 + 0 + (0.67)(0.0009) + 0 + (0.33)(0.0013) = 0.0010 \\ e_B^2(2) &= 0 + 0 + 0 + 0 + (1)(0.0016) = 0.0016 \\ e_C^2(2) &= (0.10)(0.0002) + (0.3)(0.0023 + 0.0011) + (0.2)(0.0011) = 0.0013 \\ e_D^2(2) &= (0.25)(0.0007) + 0 + 0 + 0 + (0.75)(0.0023) = 0.0019 \\ e_E^2(2) &= (0.22)(0.0013) + 0 + (0.55)(0.0016) + (0.22)(0.0019) = 0.0017 \end{aligned}$$

4.4 Optimal Decisions for Steel Selection against Weldability states

4.4.1 Month 1 Decisions

Excellent state

Since $0.0010 < 0.0015$, it follows that $Z=2$ is an optimal decision for steel selection in month 1 with associated boron composition of 0.0010 when weldability of steel bars is Excellent.

Very good state:

Since $0.0011 < 0.0016$, it follows that $Z=1$ is an optimal decision for steel selection in month 1 with associated boron composition of 0.0011 when weldability of steel bars is Very good.

Good state:

Since $0.0012 < 0.0013$, it follows that $Z=1$ is an optimal decision for steel selection in month 1 with associated boron composition of 0.0012 when weldability of steel bars is Good.

Fair state:

Since $0.0019 < 0.0021$, it follows that $Z=2$ is an optimal decision for steel selection in month 1 with associated boron composition of 0.0019 when weldability of steel bars is Fair.

Poor state:

Since $0.0012 < 0.0017$, it follows that $Z=1$ is an optimal decision for steel selection in month 1 with associated boron composition of 0.0012 when weldability of steel bars is Poor.

Hence, in month 1, the optimal selection criterion is in favor of manufacturer 1 when weldability of steel bars is very good, good or poor. Otherwise manufacturer 2 can be selected when weldability of steel bars is excellent or fair.

The accumulated boron composition is computed for manufacturer 1 when weldability of steel bars is Excellent, Very good, Good, Fair or Poor and the following results are obtained:

$$a_{A(1)}^1 = 0.0015 + (0)(0.0010) + (0)(0.0011) + (1)(0.0012) + (0)(0.0019) + (0)(0.0012) = 0.0027$$

$$a_{B(1)}^1 = 0.0011 + (0)(0.0010) + (0.33)(0.0011) + (0.5)(0.0012) + (0.17)(0.0019) + (0)(0.0012) = 0.0024$$

$$a_{C(1)}^1 = 0.0012 + (0.14)(0.0010) + (0.43)(0.0011) + (0.14)(0.0012) + (0)(0.0019) + (0.29)(0.0012) = 0.0023$$

$$a_{D(1)}^1 = 0.0021 + (0)(0.0010) + (0.25)(0.0011) + (0)(0.0012) + (0)(0.0019) + (0.75)(0.0012) = 0.0033$$

$$a_{E(1)}^1 = 0.0012 + (0)(0.0010) + (0)(0.0011) + (0.14)(0.0012) + (0.43)(0.0019) + (0.43)(0.0012) = 0.0027$$

Similarly, the accumulated boron composition is computed for manufacturer 2 when weldability of steel bars is Excellent, Very good, Good, Fair or Poor and the following results are obtained:

$$a_{A(2)}^2 = 0.0010 + (0)(0.0010) + (0)(0.0011) + (0.67)(0.0012) + (0)(0.0019) + (0.33)(0.0012) = 0.0022$$

$$a_{B(2)}^2 = 0.0016 + (0)(0.0010) + (0)(0.0011) + (0)(0.0012) + (0)(0.0019) + (1)(0.0012) = 0.0028$$

$$a_{C(2)}^2 = 0.0013 + (0.10)(0.0010) + (0.10)(0.0011) + (0.30)(0.0012) + (0.20)(0.0019) + (0.30)(0.0012) = 0.0026$$

$$a_{D(2)}^2 = 0.0019 + (0.25)(0.0010) + (0)(0.0011) + (0)(0.0012) + (0)(0.0019) + (0.75)(0.0012) = 0.0031$$

$$a_{E(2)}^2 = 0.0017 + (0.22)(0.0010) + (0)(0.0011) + (0.55)(0.0012) + (0.22)(0.0019) + (0.11)(0.0012) = 0.0031$$

4.4.2 Month 2 Decisions

Excellent state:

Since $0.0022 < 0.0027$, it follows that $Z=2$ is an optimal decision for steel selection in month 2 with associated accumulated boron composition of 0.0022 when weldability of steel bars is Excellent.

Very good state:

Since $0.0024 < 0.0028$, it follows that $Z=2$ is an optimal decision for steel selection in month 2 with associated accumulated boron composition of 0.0024 when weldability of steel bars is Very good.

Good state:

Since $0.0023 < 0.0026$, it follows that $Z=1$ is an optimal decision for steel selection in month 2 with associated accumulated boron composition of 0.0023 when weldability of steel bars is Good.

Fair state:

Since $0.0031 < 0.0033$, it follows that $Z=2$ is an optimal decision for steel selection in month 2 with associated accumulated boron composition of 0.0031 when weldability of steel bars is Fair.

Poor state:

Since $0.0027 < 0.0031$, it follows that $Z=1$ is an optimal decision for steel selection in month 2 with associated

accumulated boron composition of 0.0027 when weldability of steel bars is Poor.

Hence in month 2, the optimal selection criterion is in favor of manufacturer 2 when weldability of steel bars is Excellent, Very good, or Fair. Manufacturer 1 can be selected when weldability of steel bars is Good or Poor.

IV. CONCLUSION

An optimization model for determining the selection criteria of recycled reinforcement steel bars under Markovian weldability distribution against their boron content was presented in this paper. The decision of selecting better welding steel bars from two competing manufacturers is modeled as a multi-period decision problem using dynamic programming over a finite period planning horizon. The working of the model was demonstrated by means of a real case study as demonstrated in section 4 of the paper.

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Privacy Preserving Secure Data Mining of Association Rules in Horizontally in Distributed Computation Databases

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ABSTRACT

We propose a protocol for secure mining of association rules in horizontally distributed databases. Our protocol, like theirs, is predicated on the quick Distributed Mining FDM rule that is Associate in unsecured distributed version of the Apriori rule. the most ingredients in our protocol area unit Two novel secure multi-party algorithms ,one that computes the union of personal subsets that every of the interacting players hold, and another that tests the inclusion of part command by one player in an exceedingly set command by another. Our protocol offers increased privacy with regard to the protocol. Additionally, it's easier and is considerably additional economical in terms of communication rounds, communication value and procedure value.

Keywords: Secure Mining, Fast Distributed Databases, Distributed Mining, Multi Party Rule

I. INTRODUCTION

We study here the matter of secure mining of association rules in horizontally partitioned off databases. In this setting, there square measure many sites (or players) that hold undiversified databases, i.e., databases that share constant schema however hold data on totally different entities. The goal is to seek out all association rules with support a minimum of s and confidence a minimum of c , for a few given lowest support size s and confidence level c , that hold within the unified information, whereas minimizing the knowledge disclosed concerning the personal databases command by those players. The information that we'd wish to defend during this context isn't solely individual transactions within the totally different databases, however conjointly additional world data like what association rules are supported regionally in every of these databases. That goal defines a haul of secure multi-party computation. In such issues, there square measure M players that hold personal inputs, x_1, \dots, x_M , and that they would like to firmly figure $y = f(x_1, \dots, x_M)$ for a few public perform f . If there

existed a trust worthy third party, the players might surrender to him their inputs and he would perform the perform analysis and send to them the ensuing output. Within the absence of such a trustworthy third party, it's required to plot a protocol that the players will run on their own so as to make the desired output y . Such a protocol is taken into account utterly secure if no player will learn from his read of the protocol over what he would have learnt within the idealized setting wherever the computation is dole out by a trustworthy third party. The primary to propose a generic resolution for this downside within the case of two players. Different generic solutions, for the multi-party case, were later projected in. In our downside, the inputs square measure the partial databases, and also the needed output is that the list of association rules that hold within the unified information with support and confidence no smaller than the given thresholds s and c , severally. Because the on top of mentioned generic solutions depend on an outline of the perform f as a mathematician circuit, they'll be applied solely to little inputs and functions that square measure realizable by easy circuits. In additional

advanced settings, like ours, different strategies square measure needed for finishing up this computation. In such cases, some relaxations of the notion of good security could be inevitable once craving for sensible protocols, given that the surplus data is deemed benign see samples of such protocols that downside in and devised a protocol for its resolution. The most a part of the protocol may be a sub-protocol for the secure computation of the union of personal subsets that square measure command by the various players. The personal set of a given player, as we have a tendency to justify below, includes the item sets that square measure s-frequent in his partial information. That the foremost expensive a part of the protocol and its implementation depends upon crypto logical primitives like independent cryptography, oblivious transfer, and hash functions. This can be conjointly the sole half within the protocol within which the players might extract from their read of the protocol data on different databases, on the far side what's implicit by the ultimate output and their own input. Whereas such outflow of knowledge renders the protocol not utterly secure, the perimeter of the surplus data is data outflow is innocuous, wherefrom acceptable from a sensible purpose of read. Herein we have a tendency to propose an alternate protocol for the secure computation of the union of personal subsets. The projected protocol improves upon that in [18] in terms of simplicity and potency also as privacy. Specifically, our protocol doesn't rely on independent cryptography and oblivious transfer (what simplifies it considerably and contributes towards abundant reduced communication and process costs). Whereas our resolution remains not utterly secure, it leaks excess data solely to a tiny low variety (three) of potential coalitions, in contrast to the protocol of that discloses data conjointly to some single players. Additionally, we have a tendency to claim that the surplus data Digital Object Identifier .This article has been accepted for publication in an exceedingly future issue of this journal however has not been absolutely emended. Content might amendment before final publication. That our protocol might leak is a smaller amount sensitive than the surplus data leaked by the protocol of. The protocol that we have a tendency to propose here computes a parameterized family of functions, that we have a tendency to decision threshold functions, within which the 2 extreme cases correspond to the issues of computing the union and intersection of personal subsets. That square measure if truth be told all-purpose protocols that may be employed in different

contexts also. Another downside of secure multiparty computation that we have a tendency to solve here as a part of our discussion is that the set inclusion problem; particularly, the matter wherever Alice holds a personal set of some ground set, and Bob holds part within the ground set, and that they would like to work out whether or not Bob's component is among Alice's set, while not revealing to either of them data concerning the opposite party's input on the far side the on top of delineated inclusion. In this paper, we have a tendency to study the matter of. The system architecture is given fig1.

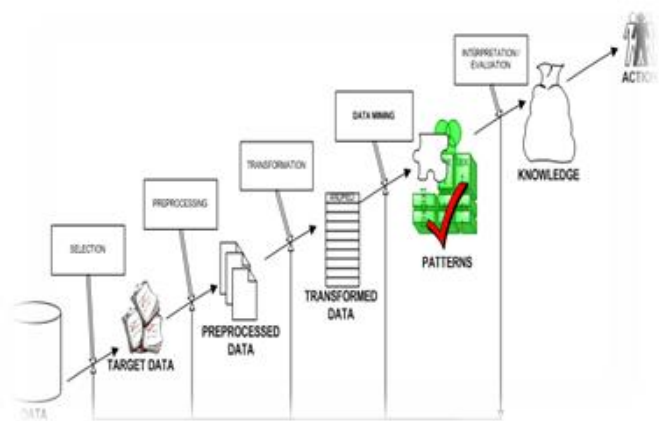


Figure 1: System Architecture

II. EXISTING SYSTEM

Some analysis folks studied that issues and devised a protocol for its resolution. The most a part of the protocol could be a sub-protocol for the secure computation of the union of personal subsets that area unit command by the various players. The non-public set of a given player, as we tend to justify below, includes the item sets that area unit s-frequent in his partial information. That's the foremost pricey a part of the protocol and its implementation depends upon cryptologic primitives like independent secret writing, oblivious transfer, and hash functions. This is often additionally the sole half within the protocol within which the players might extract from their read of the protocol data on alternative databases, on the far side what's understood by the ultimate output and their own input. Whereas such escape of data renders the protocol not absolutely secure, the perimeter of the surplus data is expressly finite and it's argued there that such data escape is innocuous, wherefrom acceptable from a sensible purpose of read.

DRAWBACKS OF EXISTING SYSTEM:

1. Insufficient security, simplicity and efficiency are not well in the databases, not sure in privacy in an existing system.
2. While our solution is still not perfectly secure, it leaks excess information only to a small number (three) of possible coalitions, unlike the protocol of that discloses information also to some single players.
3. Our protocol may leak is less sensitive than the excess information leaked by the protocol.

III. PROPOSED SYSTEM

The protocol that we have a tendency to propose here computes a parameterized family of functions, that we have a tendency to decision threshold functions, during which the 2 extreme cases correspond to the issues of computing the union and intersection of personal subsets. Those square measure indeed all-purpose protocols which will be employed in alternative contexts additionally. Another downside of secure multiparty computation that we have a tendency to solve here as a part of our discussion is that the set inclusion problem; particularly, the matter wherever Alice holds a non-public set of some ground set, and Bob holds a component within the ground set, and that they would like to work out whether or not Bob's component is at intervals Alice's set, while not revealing to either of them info regarding the opposite party's input on the far side the on top of delineated inclusion.

BENIFITS OF PROPOSED SYSTEM

1. We proposed a protocol for secure mining of association rules in horizontally distributed databases that improves significantly upon the current leading protocol in terms of privacy and efficiency.
2. The main ingredient in our proposed protocol is a novel secure multi-party protocol for computing the union (or intersection) of private subsets that each of the interacting players holds.

IV. METHODOLOGY

1. Privacy Preserving Data Mining:

One, in which the data owner and the data miner are two different entities, and another, in which the data is distributed among several parties who aim to jointly perform data mining on the unified corpus of data that they hold. In the first setting, the goal is to protect the data records from the data miner. Hence, the data owner aims at anonymizing the data prior to its release. The main approach in this context is to apply data perturbation. The idea is that. Computation and communication costs versus the number of transactions N the perturbed data can be used to infer general trends in the data, without revealing original record information. In the second setting, the goal is to perform data mining while protecting the data records of each of the data owners from the other data owners. This is a problem of secure multiparty computation. The usual approach here is cryptographic rather than probabilistic.

2. Distributed Computation

We compared the performance of two secure implementations of the FDM algorithm Section In the first implementation (denoted FDM-KC), we executed the unification step using Protocol UNIFI-KC, where the commutative cipher was 1024-bit RSA in the second implementation (denoted FDM) we used our Protocol UNIFI, where the keyed-hash function was HMAC. In both implementations, we implemented Step 5 of the FDM algorithm in the secure manner that was described in later. We tested the two implementations with respect to three measures:

- 1) Total computation time of the complete protocols (FDMKC and FDM) over all players. That measure includes the Apriori computation time, and the time to identify the globally s -frequent item sets, as described in later.
- 2) Total computation time of the unification protocols only (UNIFI-KC and UNIFI) over all players. 3) Total message size. We ran three experiment sets, where each set tested the dependence of the above measures on a different parameter: • N — the number of transactions in the unified database.

3. Frequent Item Sets

We describe here the solution that was proposed by Kantarcioglu and Clifton. They considered two possible settings. If the required output includes all globally s -frequent item sets, as well as the sizes of their supports, then the values of $\Delta(x)$ can be revealed for all. In such a case, those values may be computed using a secure summation protocol, where the private addend of P_m is $suppm(x) - sNm$. The more interesting setting, however, is the one where the support sizes are not part of the required output. We proceed to discuss it.

4. Association Rules

Once the set F_s of all s -frequent itemsets is found, we may proceed to look for all (s, c) -association rules (rules with support at least sN and confidence at least c). In order to derive from F_s all (s, c) -association rules in an efficient manner we rely upon the straightforward lemma.

V. CONCLUSION

We proposed a protocol for secure mining of association rules in horizontally distributed databases that improves significantly upon the current leading protocol [18] in terms of privacy and efficiency. One of the main ingredients in our proposed protocol is a novel secure multi-party protocol for computing the union (or intersection) of private subsets that each of the interacting players holds. Another ingredient is a protocol that tests the inclusion of an element held by one player in a subset held by another. Those protocols exploit the fact that the underlying problem is of interest only when the number of players is greater than two.

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Monitoring Cloud Resources Based on SAAS Community using Cloud Bee Live Cloud Service

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ABSTRACT

Distributed computing is present popular expression in the business sector. It is worldview in which the assets can be utilized on per use premise subsequently diminishing the expense and unpredictability of administration suppliers. Distributed computing guarantees to cut operational and capital expenses and all the more essentially give it a chance to divisions concentrate on vital ventures as opposed to keeping datacenters running. It is a great deal more than straightforward web. It is a build that permits client to get to applications that really dwell at area other than client's own PC or other Internet-associated gadgets. There are various advantages of this build. Case in point other organization has client application. This suggests that they handle expense of servers, they oversee programming redesigns and relying upon the agreement client pays less i.e. for the administration just. In this proposition Distributed registering, with its on-enthusiasm provisioning capacity on shared resources has ascended as another perspective for diminishing IT costs. In this thesis, we demonstrate the basic arranging of a provisioning structure that streamlines the course of action of complex application organizations on a Cloud base. We will exhibit the thought of Composite Appliance and clear up how it can be executed and used to streamline organization endeavors and to decrease costs. We layout the extensibility and inclinations of our setup with a model course of action containing a 3-level application advantages that are passed on and composed thusly without manual intercession on a game plan of virtual machines cases in a Cloud.

Keywords: Cloud Bee, Provisioning, Cloud Computing Services, Security Assertion Markup Language, Advancement Of Structured Information Standards, Openid, Cloudbees Platform

I. INTRODUCTION

The term Cloud first appeared in the early 1990s, referring mainly to large ATM networks. Cloud computing began in the beginning of this century, just a short nine years ago with the advent of Amazon's web-based services. Less than three years ago, Yahoo and Google announced plans to provide cloud computing services to some countries largest universities: Carnegie Mellon, University of Washington, Stanford and MIT [8]. The IBM quickly announced plans to offer cloud computing technologies. More recent entries into the encounter include well-known companies: Sun, Intel, Oracle, SAS and Adobe. All of these companies invested mightily in cloud computing infrastructure to provide vendor-based cloud services to the masses [10].

Cloud computing has become a buzzword of today. Cloud Computing is not a completely new concept; it has intricate connection to the established Grid Computing paradigm, and other relevant technologies such as utility computing, cluster computing, and distributed systems in general [10]. The term cloud is used as a metaphor for the internet.

Cloud Computing is a concept of computing in which dynamically scalable and often virtualized resources are provided as a service over the internet. Cloud Computing consists of hardware and software resources made available on the internet as managed by third-party services. These services typically provide access to advanced software applications and high-end networks of server computers [3].

To get Cloud Computing to work, three things are required: thin clients (or clients with a thick-thin switch), grid computing, and utility computing. Grid computing links disparate computers to form one large infrastructure, harnessing unused resources. Utility computing is paying for what users use on shared servers like consumers pay for a public utility such as electricity, gas, and so on [9].

1.2.1 Characteristics of Cloud

There is a level of consensus emerging around the characteristics of cloud computing, or the capabilities that must be adhered to an offering to be considered a cloud. These include [14]:

- Pay as you go – payment is variable based on the actual consumption by the customer.
- Highly abstracted – server hardware and related network infrastructure is highly abstracted from the users.

II. METHODS AND MATERIAL

RELATED WORK

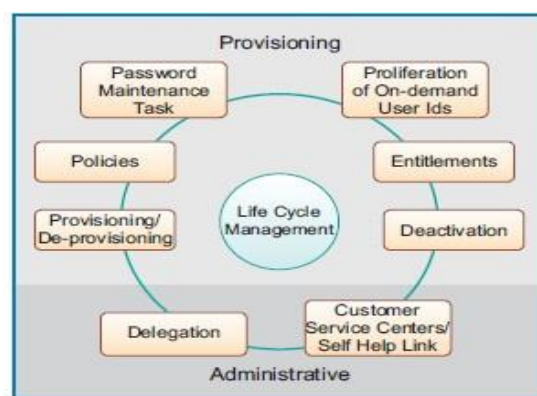
2.1 Cloud Identity Management

Managing identities and access control for enterprise applications remains one of the greatest challenges facing IT today. While an enterprise may be able to leverage several Cloud Computing services without a good identity and access management strategy, in the long run extending an organization's identity services into the cloud is a necessary precursor towards strategic use of on-demand computing services. Supporting today's aggressive adoption of an admittedly immature cloud ecosystem requires an honest assessment of an organization's readiness to conduct cloud-based Identity and Access Management (IAM), as well as understanding the capabilities of that organization's Cloud Computing providers [10].

2.1.1 Identity Lifecycle Management

Lifecycle management incorporates an integrated and comprehensive solution for managing the entire lifecycle of user identities and their associated credentials and entitlements. Functionally, it is divided into two

components — the provisioning component and the administrative component. Administrative component defines delegations rules, providing self-service components to change personal details or make requests to the users. Delegation of administrative rights to local group or process-in-charge is crucial for a volatile and dynamic cloud based scenarios. Decentralizing the tasks will reduce the load on the authenticator component and also save time in making access control decisions [3]. Figure 2.1 illustrates the various components of lifecycle management. In cloud, provisioning means just-in-time or on-demand provisioning and de provisioning stands for real time de-provisioning. Just-in time provisioning indicates the federation of user accounts without sharing prior data, based on some trust model.



2.1.2 Security Assertion Markup Language (SAML)

The Organization for the Advancement of Structured Information Standards (OASIS) developed SAML as an XML-based specification for exchanging security information. Currently at Version 2, SAML defines syntax and exchange mechanisms for three kinds of assertions:

1. Authentication assertions, which are declarations about a user's identity
2. Attribute assertions, which contain particular details about a user
3. Authorization decision assertions, which specify what the user is allowed to do on a particular site

2.1.3 OpenID

OpenID is another way to achieve identity federation. It is centric around user, open and decentralized framework. It makes single sign on very easy to be achieved as user can have multiple logins and there is no requirement of predefined trust. It is mainly

authentication protocol mainly achieved through attribute exchange.

III. PROPOSED ALGORITHM

CloudBees Platform

The CloudBees Continuous Delivery Platform is unique in its integrated support of development, deployment and runtime activities. Most CI offerings focus on development time, while PaaS and DevOps tools tend to focus on runtime and deployment. A continuous delivery solution really needs to encompass both of these areas. But, continuous delivery isn't a one-size-fits-all proposition – most companies have existing investments, processes and constraints they need to live within and make use of. CloudBees development services give you the tools to build and manage a continuous delivery pipeline on-premise or in the cloud, or to use a mixture of on-premise and cloud resources. Our runtime services include our award winning PaaS that is already integrated with our development services and an ecosystem of best-of-breed partner services as well as an ability to deploy on-premise or to other PaaS offerings.

Proposed Algorithm for Provisioning Application and Resources:

```

for each request with QoS constraints:
resources←available_resources for the requested application;
Jobs_pending←number of jobs in the queue;
effort ← (Jobs_pending /resources)× averageJobsRuntime;
if effort > Remaining_Time_application then
additionalResources ←(Jobs_pending×averageJobsRuntime)
/ Remaining_Time_application;
CALL_New_Releics(job_Id);
// for resource provisioning
else
toRelease ← 0;
if Jobs_pending < resources then
toRelease ← Jobs_pending – resources;
end
else
Jobs_pending ← Jobs_pending + Jobs_running;
effort ← (Jobs_pending /resources)× averageJobsRuntime;
if effort < Remaining_Time_application then
toRelease←resources (Jobs_pending×averageJobsRuntime)
/Remaining_Time_application;
end
end
CALL_New_Relics_Release_resources(job_Id);
end

```

System Deployment

For deploying and evaluation of proposed provisioning following setup has been arranged

1. Deploying services on **cloudbees**.
2. Configuring and install of **New Relics**
3. Implementation of proposed provisioning algorithm on **cloudBee** and **New Relics**.

Following are the steps for provisioning:

Step 1: firstly we have developed the web based application in J2EE.

Step 2: upload the web application in cloud using codeenvy cloud SAAS community and set the parameters.

Step 3: open cloud bees PAAS and IAAS services after successful authentication and authorization.

Step 4: setup the configuration of application for provisioning and set the properties for deployment of application on cloud bees.

Step 5: deploy the application on cloud after that check the load statistics and system information on which application is running.

Step 6: result solve the problem of location of servers and virtualization mention in base paper.

IV. RESULTS AND DISCUSSION



Figure 4.1: This graph shows load statistics of resources after deploying application in cloud bees

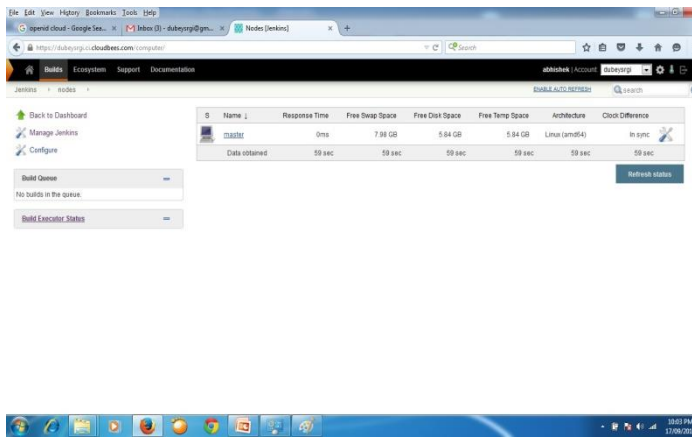


Figure 4.2: This shows the machine on which application is running

V. CONCLUSION

Cloud computing is the next step in utility computing. To leverage its advantages cloud security needs to be addressed as it poses to be one of the key challenges. In this paper Identity provisioning based on Policies can benefit the cloud providers to a large extent. In this thesis Show the benefits of the separation of resource provisioning from job execution management for application, cluster and grid computing, Introduce cloud bees as the Engine for the IAAS Infrastructure Present Cloud Computing as a paradigm for the on demand provision of resources as a service. Describe resources as the interoperability technology for the federation of clouds using Jenkins. Introduce the 3-tier project as the infrastructure technology to support the setup and deployment of services and resources on-demand across administrative domains.

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In Vitro Apical Culture of *Musa Paradisiaca* cv. Gaja Bantal

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ABSTRACT

Explants with apical domes have been reported to have higher rate of survival. In vitro propagation of banana (*Musa* spp.) from the apical explants isolated from the sword suckers is described here. Explants with apical domes were successfully cultured on Murashige and Skoog's medium containing 6-Benzyl Amino Purine, Kinetin, Indole-3-acetic acid, Naphthalene acetic acid and Adenine Sulphate. Multiple shoot initial could be produced from shoot tip explants in presence or absence of apical domes but the survival rates of explants were high when the apical domes were retained. From the in vitro apical culture of banana it was found out that 3 mg/l BAP + 3 mg/l KN + 1 mg/l IAA + 150 mg/l ADS induction medium and 3 mg/l BAP + 1 mg/l IAA + 0.25 mg/l NAA + 75 mg/l ADS multiplication medium shows remarkable results during different phases of in vitro culture.

Keywords: Apical domes, 6-Benzyl Amino Purine (BAP), Kinetin (Kn.), Indole-3-acetic acid (IAA), Naphthalene acetic acid (NAA) and Adenine Sulphate (ADS).

I. INTRODUCTION

Bananas and plantains (*Musa* spp.) are the world's fourth most important food crop after rice, wheat, and maize in terms of gross value of production, with the vast majority of the crop grown and consumed in the tropical and subtropical zones. Banana is generally propagated vegetatively through suckers. But the traditional method is laborious; time consuming and not very efficient as far as production of homogenous plant is concerned (Banaerjee and De Langhe, 1985). The extensive basic work on the *in vitro* propagation of banana (Kodym and Zapata, 1999; Nandwani *et al.*, 2000) had led to the technological development of *in vitro* mass production of different cultivars.

Large number of uniform disease free plants can be produced from a single plant or even a small plant tissue (explants) showing good genetic potential in *in vitro* culture method (Martin *et al.*, 2006) and plant multiplication can be continued throughout the year irrespective of seasonal variation (Rahman *et al.*, 2004). Till date, protocols have been standardized for *in vitro* propagation of a wide range of *Musa* species and cultivars belonging to various ploidy levels and genomes (Sathiamoorthy *et al.*, 1998).

Tissue culture technique produce 39% higher yield than conventional sword suckers (Farahani *et al.*, 2008). Shoot tip culture of banana has recently been studied in many laboratories (Bower and Fraser, 1982; Cronauer and Krikorian, 1984; Ma and Shii, 1972). The application of tissue culture and rapid propagation method for banana production continues to become more widely used in both developed and developing countries.

The goals of this study are (i) to examine the effect of different culture conditions on shoot tip culture, (ii) to find out the best plant growth regulators for shoot proliferation and multiplication of banana explants of *Musa paradisiaca* cv. Gaja Bantal with apical domes are cultured on Murashige and Skoog's medium containing different concentration of phytohormones (Cytokinin and Auxin). The influence of the phytohormones on shoot proliferation and rooting of shoots is described through various experiments.

II. METHODS AND MATERIAL

Plant Materials

Gaja bantal is most widely cultivated plantain variety of Odisha that belong to *Musa paradisiaca*. It is a monocotyledonous, herbaceous, evergreen perennial ranging from 3-5 meters in height. Gaja bantal bear 4 – 6

numbers of hands in the inflorescence each containing 10 – 13 numbers of fingers in it. The banana mother block of R.P.R.C, Bhubaneswar is maintained properly to avoid all types of diseases and special care is taken for better growth and development of mother plants.

Suckers were collected from the banana mother block of Regional Plant Resource Centre, BBSR in January 2015 and washed thoroughly under running tap water for 10-15 min. The suckers were then chopped off about 5-6 cm in length and 3-4 cm in diameter.

Sucker Sterilization

Sucker collected from the mother block contain many contaminations like bacteria and fungus that are present in soil. Before inoculation in media they were treated with different chemicals for surface sterilization. The following steps are carried out:

1. After processing suckers were washed in **liquid detergent (Labolene) for 2-3minutes.**
2. Explants were then dipped in **bavistin solution (1 %) for 30 minutes.**
3. After 30 minutes the suckers were washed with **autoclaved double distilled water** and transferred to **mercuric chloride solution (0.5 %) for 30 minutes.**
4. The suckers were washed in **70 % alcohol solution for 1 minute.**
5. Finally the suckers were washed 3- 4 times with autoclaved double distilled water to remove excess chemicals from the sucker surface.

Preparation of Culture Medium

The medium used for banana tissue culture was Murashige & Skoog Medium (MS) (**Murashige and Skoog, 1962**). The pH of the medium was adjusted 5.75 to 5.8 with 0.1N NaOH or 0.1N HCl. To one liter of medium 5.0gms of agar (Plant tissue Culture grade, Hi-Media, India) was added.

All the media were autoclaved at 15 psi and 121°C for 20 minutes. The autoclaved molten media were then dispensed into sterilized culture vessel inside a laminar air flow cabinet.

Table 1- Amount of phytohormones used in induction medium and multiplication medium along with **M.S** medium for in vitro apical culture.

Sl. No.	Medium code	Induction medium (15 days) All hormone conc. Mg/Lt			
		BAP	KN	IAA	ADS
1.	B1	6	0	1	150
2.	B2	4	0	1	150

3.	B3	2.5	0	1	150	
4.	B4	3	3	1	150	
5.	B5	0	6	1	150	
Sl. No.	Medium code	Multiplication medium (20 days for each subculture) All hormone conc. Mg/Lt				
		BAP	KN	IAA	NAA	ADS
6	1a	3	0	1	0.25	75
7	1b	3	3	1	0.25	75
8	2a	3	0	1	0.25	75
9	2b	3	3	1	0.25	75
10	3a	3	0	1	0.25	75
11	3b	3	3	1	0.25	75
12	4a	3	0	1	0.25	75
13	4b	3	3	1	0.25	75
14	5a	3	0	1	0.25	75
15	5b	3	3	1	0.25	75
Sl. No.	Medium code	Rooting medium (20 days) All hormone conc. Mg/Lt				
		BAP	KN	IAA	ADS	
16	A1	0	0	0.5	20	
17	A2	0	0	1	20	
18	A3	0	0	1.5	20	

Aseptic Transfer of the Ex-Plant

The working area of the laminar airflow cabinet was first wiped with cotton moistened with ethanol and then irradiated with ultraviolet light for 30 minutes before inoculation.

The explants were surface sterilized as described earlier and cut aseptically by a sterile surgical scalpel to obtain the explants with apical domes. Then the explants were inoculated in the culture vessel containing induction medium.

Culture Condition

The culture vessel containing the explants on solid media was kept in culture rack in the culture room. The culture was maintained at 22°C to 25°C, 16 hr photo period of 35-50µEm-2s-1 intensity provided by cool white fluorescent tubes.

Analysis of Leaf Pigments

100 mg of fresh tissue samples of leafs were taken into a mortar and 10 ml of 80% acetone (acetone:water / 80:20 v:v) is added to it. Grind the tissue with a pestle till leaf homogenate completely.

Filter the leaf homogenate through the filter paper. The retentate is removed by the filter paper (and discarded) and the extract (or filtrate) is collected in a test-tube.

Clean cuvette for the spectrophotometer/colorimeter was taken and fills two-thirds full with 80% acetone; this is the blank. Wipe the cuvette with a tissue and put it into the spectrophotometer, then set the wavelength to 663 nm. Cover the cuvette chamber and set the spectrophotometer to 0 absorbance with the blank in place. Remove the blank and save for the next measurement.

Gently swirl your first extract in the test-tube and fill a second cuvette two-thirds full.

Wiped it clean, insert into the spectrophotometer, and close the hatch. The readout should give you the absorbance at 663 nm, the A663. Record this number, and repeat step 2 with the other extracts.

Change the wavelength to 645 nm. Reinsert the blank cuvette, and re-zero the spectrophotometer at the new wavelength. Remove the blank and insert a cuvette containing your first extract. Read and record A645. Repeat for the other extracts.

Calculations:

Use Arnon's equation (Arnon, 1949) to convert absorbance measurements to mg Chl g-1 leaf tissue:

$$\text{Chl a (mg g-1)} = \frac{[(12.7 \times A663) - (2.6 \times A645)] \times \text{ml acetone}}{\text{mg leaf tissue}}$$

$$\text{Chl b (mg g-1)} = \frac{[(22.9 \times A645) - (4.68 \times A663)] \times \text{ml acetone}}{\text{mg leaf tissue}}$$

$$\text{Total Chl} = \text{Chl a} + \text{Chl b.}$$

III. RESULTS AND DISCUSSION

Shoot Proliferation

Among the different combinations of medium tested, induction medium supplemented with BAP 3.0 mg/lt, KN 3.0 mg/lt, IAA 1.0 mg/lt and ADS 150mg/lt and

multiplication medium supplemented with BAP 3.0 mg/lt along with IAA 1.0 mg/lt, NAA 0.25mg/lt and ADS 75mg/lt produced the highest number of plantlets.

Table 2- Number of shoot buds produced by apical culture of banana after 5 subcultures-

Sl. No.	No. of shoot buds in subcultures (Multiplication medium)					
		1 st	2 nd	3 rd	4 th	5 th
1	1a	0	0	2	5	8
	1b	0	2	6	11	18
2	2a	0	1	5	13	16
	2b	1	3	8	15	24
3	3a	3	6	13	19	25
	3b	3	5	11	18	27
4	4a	3	7	18	27	41
	4b	4	5	16	25	39
5	5a	2	2	8	14	22
	5b	3	4	10	20	31

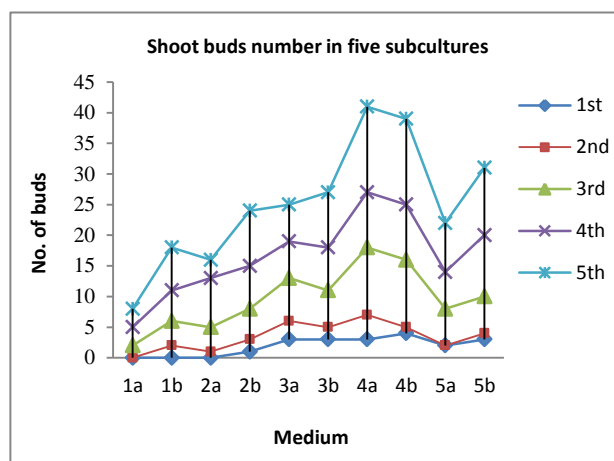
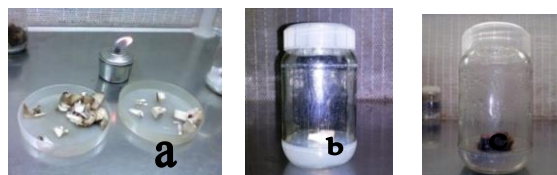


Figure 1: Shoot buds produced in different multiplication medium in five subcultures.

From the results it is clearly evident that efficiency of shoot bud regeneration from the rhizome explants depends on the concentration of cytokinins used in the medium. BAP shows better results in comparison to BAP + KN medium in shoot bud formation during the subculture of explants grown through *in vitro* apical culture of Gaja bantal.



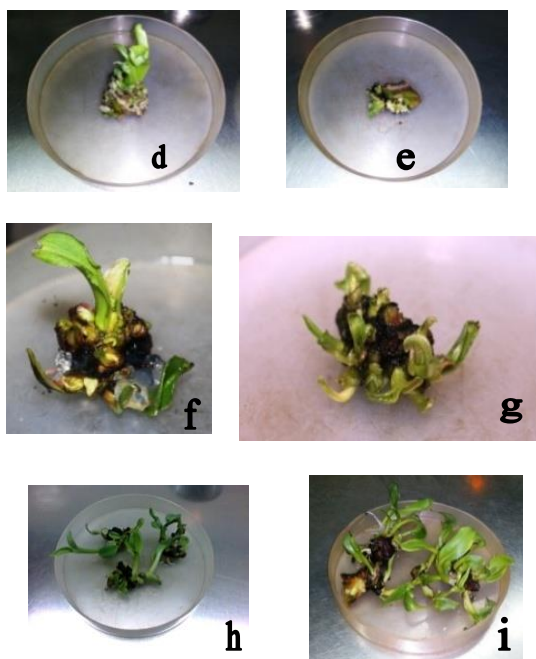


Figure 2: a. Apical explants from sucker, b. Inoculation of apical, c. Apical after 15 days, d. 1st subculture, e. 2nd subculture, f. 3rd subculture, g. 4th subculture, h. 5th subculture, i. Elongation.

After five cycles of subculture the shoot bud become fully developed into shoots with leaves. The explants are then transferred to elongation phase for the growth and elongation of shoots. The lengths of the shoots are measured at a given time interval for the comparative studies of the effect of phytohormones on shoots growth.

Table 3- Length of the shoots at different day's interval during elongation

Sl. No.	Medium	Length of the shoots (in Cm)		
		7 th	14 th	21 st
1	1a	2.8 ± 0.18	3.6 ± 0.17	4.5 ± 0.12
	1b	3.3 ± 0.20	4.3 ± 0.19	5.0 ± 0.11
2	2a	3.0 ± 0.08	3.9 ± 0.11	4.7 ± 0.17
	2b	3.2 ± 0.13	3.7 ± 0.12	4.8 ± 0.08
3	3a	3.8 ± 0.18	4.2 ± 0.15	4.6 ± 0.16
	3b	3.6 ± 0.16	4.3 ± 0.20	5.0 ± 0.11
4	4a	3.7 ± 0.17	4.9 ± 0.08	5.5 ± 0.14
	4b	3.3 ± 0.14	4.6 ± 0.13	5.0 ± 0.12
5	5a	3.1 ± 0.12	4.3 ± 0.19	5.1 ± 0.13
	5b	3.4 ± 0.17	4.4 ± 0.07	5.3 ± 0.08

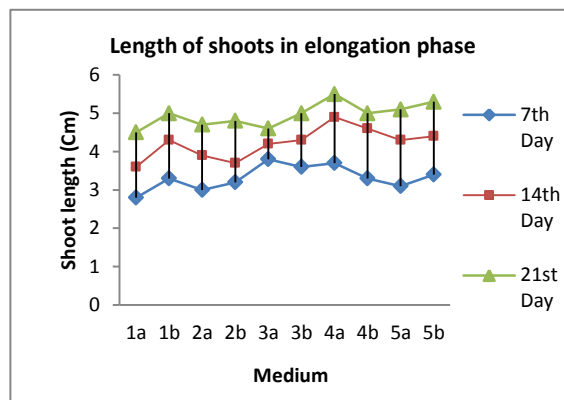


Figure 3: Length of shoot buds during the elongation phase.

Root Proliferation



Figure 4: Root formation in a- A1, b- A2 and c- A3 medium.

Shoots produce roots after 10-15 days in medium containing IAA (0.5 mg/lit, 1 mg/lit, 1.5 mg/lit). From the above observation medium with 1 mg/lit IAA show high number of root per shoot and root length.

Table 4- Adventitious Root Induction-

Sl. No.	Medium	% of response	No. of root / shoot	Root length (in cm)
1	A1	70	3.6 ± 0.16	7.2 ± 0.21
2	A2	90	5.3 ± 0.15	10.3 ± 0.14
3	A3	80	4.7 ± 0.17	8.6 ± 0.29

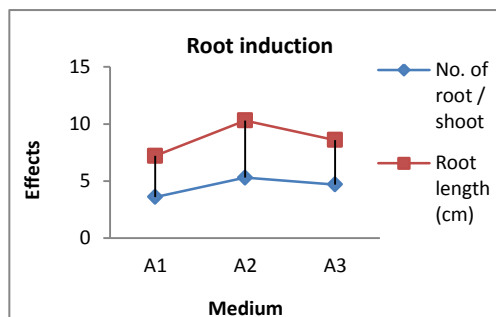


Figure 5: Root length (cm) and no. of roots per shoot in three different rooting medium

Chlorophyll Estimation

Fresh leaf sample was collected from the plantlets during elongation stage, were homogenized and filtered to collect the sample. The O.D of all the samples was measured at 663 nm and 645 nm.

Table 5- Photosynthetic pigments content-

Sl. No	Medium	Chl A (mg/g)	Chl B (mg/g)	Total Chl (mg/g)	Mean
1.	1a	1.31	0.97	2.28	2.28
		1.22	1.05	2.27	
	1b	1.41	1.23	2.64	2.54
		1.33	1.10	2.43	
2.	2a	0.91	0.73	1.64	2.07
		1.32	1.18	2.50	
	2b	1.30	1.02	2.32	2.16
		1.13	0.86	1.99	
3.	3a	1.31	1.17	2.48	2.39
		1.27	1.03	2.30	
	3b	1.45	1.17	2.62	2.75
		1.53	1.35	2.88	
4.	4a	1.71	1.40	3.11	3.01
		1.52	1.38	2.90	
	4b	1.62	1.34	2.96	2.56
		1.18	0.97	2.15	
5.	5a	1.32	1.02	2.34	2.27
		1.27	0.93	2.20	
	5b	1.43	1.11	2.54	2.50
		1.37	1.08	2.45	

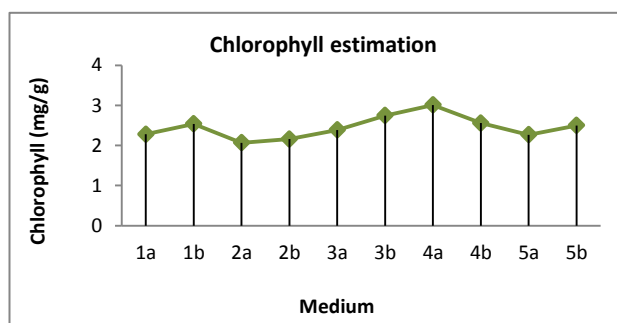


Figure 6: Chlorophyll content in different medium.

Analysis of leaf pigments was done from the leaf samples collected from different explants of elongation stages. In the present experiment the photosynthetic pigments (Chlorophyll-a, Chlorophyll-b, total Chlorophyll) were highest at the concentration of **BAP 3 mg/lit + KN 3 mg/lit + IAA 1 mg/lit + ADS 150 mg/lit** in initial medium and **BAP 3 mg/lit + IAA 1 mg/lit + NAA 0.25 mg/lit + ADS 75 mg/lit** in multiplication medium.

A considerable number of studies have indicated that the cultural conditions especially sucrose, growth regulators can influence the photosynthetic ability of *in vitro* grown plants (Yadav *et al.*, 2010).

Transplanting-

After the root formation the banana plantlets are send to nursery for primary hardening. The plantlets are taken out of culture vessel and the medium is removed by washing in water. Then the plantlets are arranged accordingly to their size. After primary hardening for 4-5 weeks the plantlets are transferred to polybags with soil and low cost minerals for secondary hardening.



Figure 7: a- Primary hardening and b- Secondary hardening.

Ma & Shii (1972) reported that the destruction of apical dominance by removing the apical domes were essential for the production of multiple shoot-inductions in cv. Cavendish. Later several researches have been done to prove the production of multiple shoots from explants banana with intact apical dome. In the present experiment the effect of different concentrations of cytokinin (BAP and Kn) on shoot proliferation and different concentration of auxin (IAA) on root growth is observed.

Cytokinins play an important role in buds formation *in vitro*. However, buds proliferation *in vitro* is influenced by apical dominance which is controlled by various growth regulators (Cline, 1994; Wickson and Thimann, 1958). Cytokinins such as benzyl amino purine (BAP) and kinetin are known to reduce the apical meristem

dominance and induce both auxiliary and adventitious shoot formation from meristematic explants in banana (Khalid, 2011). 6-benzylaminopurine (BAP) is the most commonly preferred cytokinin (Vuylsteke, 1989). The others are isopentyladenine (2-ip), zeatin and kinetin (De Langhe and Vuylstek, 1985). Auxins and other growth regulator such as gibberellins play important roles in the growth and differentiation of cultured cells and tissues (Bohidar *et al.*, 2008).

IV. CONCLUSION

From the above observation it was depicted that during *in vitro* apical culture of *Musa paradisiaca* cv. Gajabantal highest number of shoot buds and length of shoots were observed in **BAP 3 mg/lt + KN 3 mg/lt + IAA 1 mg/lt + ADS 150 mg/lt** induction medium and **BAP 3 mg/lt + IAA 1 mg/lt + NAA 0.25 mg/lt + ADS 75 mg/lt** multiplication medium measured at different day's interval. In rooting medium **1 mg/lt IAA** along with MS medium have shown high percentage of response and root length (cm). By this study it was found that combination of two different cytokinins (BAP and KN) was more effective during initial culture where as BAP alone was found more effective during stimulation of shoot proliferation.

The evaluation of photosynthetic properties is essential for optimization of culture conditions in order to achieve efficient micropropagation. From chlorophyll estimation it was observed that the chlorophyll content in shoots grown on induction medium **B4** and **B3** and multiplication medium **4a** and **3b** is higher in comparison to other experimental mediums.

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Detecting Duplicate Records - A Case Study

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ABSTRACT

Databases play an important role in today's IT based economy. Many industries and systems depend on the accuracy of databases to carry out operations. Therefore, the quality of the information stored in the databases, can have significant cost implications to a system that relies on information to function and conduct business. Often, in the real world, entities have two or more representations in databases. Duplicate detection is the process of identifying multiple representations of same real world entities. The purpose of this paper is to provide a thorough study on different methods used for detecting duplicate records. And also this paper discussed about the different duplication detection tools in detail.

Keywords: Database, Duplicate Detection, Records

I. INTRODUCTION

Data quality has become a key issue in computer-based management systems. Inadequate data causes serious operational difficulties as well as direct financial losses. Operational databases store information generated by business transactions, and this information is used by management to support business decisions. Data accuracy assurance is vital, as data is the cornerstone of a company's business operations. In addition to serious implications on decision making, the quality of the data may affect customer satisfaction, resulting in unnecessary and possibly high costs to repair damage caused by low-quality data. In an ideal situation, each data item should have a global or unique identifier, allowing these records to be identified, linked, and related across tables. Unfortunately, this is not the case in real-life, complex databases. Many organizations have multiple data collection systems (e.g. Oracle, legacy systems), and these may differ not only in values or identifiers, but also in format, structure, and schema of databases. Additionally, data quality is affected by human error, such as data entry errors, and lack of constraints.

When data is entered manually or gathered from different sources, whether from different systems or different locations, duplicate records may result. Describe duplicate records as "all cases of multiple representations of same real-world objects, i.e., duplicates in a data source". Heterogeneous data often lacks a global identifier, or a primary key, which would uniquely identify real-world objects.

II. METHODS AND MATERIAL

A. Data Preparation

Duplicate record detection is the process of identifying different or multiple records that refer to one unique real-world entity or object. Typically, the process of duplicate detection is preceded by a data preparation stage, during which data entries are stored in a uniform manner in the database, resolving (at least partially) the structural heterogeneity problem.

The data preparation stage includes the following steps.

i. Parsing

It locates, identifies and isolates individual data elements in the source files. Parsing makes it easier to correct,

standardize, and match data because it allows the comparison of individual components, rather than of long complex strings of data.

ii. Data transformation

It refers to simple conversions that can be applied to the data in order for them to conform to the data types of their corresponding domains. This type of conversion focuses on manipulating one field at a time, without taking into account the values in related fields. The most common form of a simple transformation is the conversion of a data element from one data type to another.

iii. Data standardization

It refers to the process of standardizing the information represented in certain fields to a specific content format. This is used for information that can be stored in many different ways in various data sources and must be converted to a uniform representation before the duplicate detection process starts. Without standardization, many duplicate entries could erroneously be designated as non-duplicates, based on the fact that common identifying information cannot be compared. One of the most common standardization applications involves address information. There is no one standardized way to capture addresses so the same address can be represented in many different ways. Address standardization locates (using various parsing techniques) components such as house numbers, street names, post office boxes, apartment numbers and rural routes, which are then recorded in the database using a standardized format.

Even after parsing, data standardization, and identification of similar fields, it is not trivial to match duplicate records. Misspellings and different conventions for recording the same information still result in different, multiple representations of a unique object in the database.

B. Detecting Duplicate Records

i. Matching Records with Individual Fields

One of the most common sources of mismatches in database entries is the typographical variations of string

data. Therefore, duplicate detection typically relies on string comparison techniques to deal with typographical variations.

- Character-based similarity metrics
- Token-based similarity metrics
- Phonetic similarity metrics
- Numeric Similarity Metrics

While multiple methods exist for detecting similarities of string-based data, the methods for capturing similarities in numeric data are rather primitive. Typically, the numbers are treated as strings (and compared using the metrics described above) or simple range queries, which locate numbers with similar values.

ii. Matching Records with Multiple Fields

In most real-life situations, however, the records consist of multiple fields, making the duplicate detection problem much more complicated. In this section, we review methods that are used for matching records with multiple fields. The presented methods can be broadly divided into two categories:

- Probabilistic approaches and supervised machine learning techniques.
- Approaches that rely on domain knowledge or on generic distance metrics to match records. This category includes approaches that use declarative languages for matching, and approaches that devise distance metrics appropriate for the duplicate detection task.

1). Probabilistic Matching Models: Newcombe et al.^[1] were the first to recognize duplicate detection as a Bayesian inference problem. Then, Fellegi and Sunter formalized the intuition of Newcombe et al. and introduced the notation that we use, which is also commonly used in duplicate detection literature. The comparison vector \underline{x} is the input to a decision rule that assigns \underline{x} to U or to M . The main assumption is that \underline{x} is a random vector whose density function is different for each of the two classes. Then, if the density function for each class is known, the duplicate detection problem becomes a Bayesian inference problem.

2). Supervised and Semi-Supervised Learning: The probabilistic model uses a Bayesian approach to classify record pairs into two classes, M and U . This model was

widely used for duplicate detection tasks, usually as an application of the Fellegi-Sunter model. While the Fellegi-Sunter approach dominated the field for more than two decades, the development of new classification techniques in the machine learning and statistics communities prompted the development of new deduplication techniques. The supervised learning systems rely on the existence of training data in the form of record pairs, pre-labeled as matching or not.

One set of supervised learning techniques treat each record pair $\langle \alpha, \beta \rangle$ independently, similarly to the probabilistic techniques of probabilistic matching models. Cochinwala et al.^[2] used the well-known CART algorithm, which generates classification and regression trees, a linear discriminant algorithm, which generates linear combination of the parameters for separating the data according to their classes, and a "vector quantization" approach, which is a generalization of nearest neighbor algorithms. The experiments which were conducted indicate that CART has the smallest error percentage. Bilenko et al.^[3] use SVM light to learn how to merge the matching results for the individual fields of the records. Bilenko et al. showed that the SVM approach usually outperforms simpler approaches, such as treating the whole record as one large field. A typical post-processing step for these techniques (including the probabilistic techniques of probabilistic matching models) is to construct a graph for all the records in the database, linking together the matching records. Then, using the transitivity assumption, all the records that belong to the same connected component are considered identical.

The transitivity assumption can sometimes result in inconsistent decisions. For example, $\langle \alpha, \beta \rangle$ and $\langle \alpha, \gamma \rangle$ can be considered matches, but $\langle \beta, \gamma \rangle$ not. Partitioning such "inconsistent" graphs with the goal of minimizing inconsistencies is an NP-complete problem. Bansal et al.^[4] propose a polynomial approximation algorithm that can partition such a graph, identifying automatically the clusters and the number of clusters in the dataset. Cohen^[5] proposed a supervised approach in which the system learns from training data how to cluster together records that refer to the same real-world entry. The main contribution of this approach is the adaptive distance function which is learned from a given set of training examples. McCallum and Wellner learn the clustering method using training data; their technique is equivalent

to a graph partitioning technique that tries to find the min-cut and the appropriate number of clusters for the given data set, similarly to the work of Bansal^[4] et al..

3).Active-Learning-Based Techniques: One of the problems with the supervised learning techniques is the requirement for a large number of training examples. While it is easy to create a large number of training pairs that are either clearly non-duplicates or clearly duplicates, it is very difficult to generate ambiguous cases that would help create a highly accurate classifier. Based on this observation, some duplicate detection systems used active learning techniques to automatically locate such ambiguous pairs. Unlike an "ordinary" learner that is trained using a static training set, an "active" learner actively picks subsets of instances from unlabeled data, which, when labeled, will provide the highest information gain to the learner.

Sarawagi^[6] designed ALIAS, a learning based duplicate detection system, that uses the idea of a "reject region" (see Reject region) to significantly reduce the size of the training set. The main idea behind ALIAS is that most duplicate and non-duplicate pairs are clearly distinct. For such pairs, the system can automatically categorize them in U and M without the need of manual labeling. ALIAS requires humans to label pairs only for cases where the uncertainty is high. This is similar to the "reject region" in the Fellegi^[7] model, which marked ambiguous cases as cases for clerical review. Tejada et al. used a similar strategy and employed decision trees to teach rules for matching records with multiple fields. Their method suggested that by creating multiple classifiers, trained using slightly different data or parameters, it is possible to detect ambiguous cases and then ask the user for feedback. The key innovation in this work is the creation of several redundant functions and the concurrent exploitation of their conflicting actions in order to discover new kinds of inconsistencies among duplicates in the data set.

4). Distance-Based Techniques: Even active learning techniques require some training data or some human effort to create the matching models. In the absence of such training data or ability to get human input, supervised and active learning techniques are not appropriate. One way of avoiding the need for training data is to define a distance metric for records, which

does not need tuning through training data. Using the distance metric and an appropriate matching threshold, it is possible to match similar records, without the need for training.

One approach is to treat a record as a long field, and use one of the distance metrics described in field matching to determine which records are similar. Monge^[8] proposed a string matching algorithm for detecting highly similar database records. The basic idea was to apply a general purpose field matching algorithm, especially one that is able to account for gaps in the strings, to play the role of the duplicate detection algorithm.

Distance-based approaches that conflate each record in one big field may ignore important information that can be used for duplicate detection. A simple approach is to measure the distance between individual fields, using the appropriate distance metric for each field, and then compute the weighted distance between the records. In this case, the problem is the computation of the weights, and the overall setting becomes very similar to the probabilistic setting that we discussed in probabilistic matching models.

5). Rule-based Approaches: A special case of distance-based approaches is the use of rules to define whether two records are the same or not. Rule-based approaches can be considered as distance-based techniques, where the distance of two records is either 0 or 1. Wang and Madnick^[9] proposed a rule-based approach for the duplicate detection problem. For cases in which there is no global key, Wang and Madnick suggest the use of rules developed by experts to derive a set of attributes that collectively serve as a "key" for each record. For example, an expert might define rules such as

```
IF age < 22 THEN status = undergraduate ELSE status = graduate
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IF distanceFromHome > 10 THEN transportation = car ELSE transportation = bicycle
```

By using such rules, Wang and Madnick hoped to generate unique keys that can cluster multiple records that represent the same real-world entity.

6). Unsupervised Learning: As we mentioned earlier, the comparison space consists of comparison vectors which contain information about the differences between fields in a pair of records. Unless some information exists about which comparison vectors correspond to which category (match, non-match, or possible-match), the labeling of the comparison vectors in the training data set should be done manually. One way to avoid manual labeling of the comparison vectors is to use clustering algorithms, and group together similar comparison vectors. The idea behind most unsupervised learning approaches for duplicate detection is that similar comparison vectors correspond to the same class.

The idea of unsupervised learning for duplicate detection has its roots in the probabilistic model proposed by Fellegi and Sunter (see probabilistic matching models). As we discussed in probabilistic matching models, when there are no training data to compute the probability estimates, it is possible to use variations of the Expectation Maximization algorithm to identify appropriate clusters in the data.

Ravikumar and Cohen^[11] follow a similar approach and propose a hierarchical, graphical model for learning to match record pairs. The foundation of this approach is to model each field of the comparison vector as a latent binary variable which shows whether the two fields match or not. The latent variable then defines two probability distributions for the values of the corresponding "observed" comparison variable. Ravikumar and Cohen show that it is easier to learn the parameters of a hierarchical model than to attempt to directly model the distributions of the real-valued comparison vectors.

C. Duplicate Detection Tools

i. FEBRL SYSTEM (Freely Extensible Biomedical Record Linkage)

It is an open-source data cleaning toolkit, and it has two main components: The first component deals with data standardization and the second performs the actual duplicate detection. The data standardization relies mainly on hidden-Markov models (HMMs); therefore, Febrl typically requires training to correctly parse the database entries. For duplicate detection, Febrl implements a variety of string similarity metrics, such as

Jaro, edit distance, and q-gram distance. Febrl supports phonetic encoding (Soundex, NYSIIS, and Double Metaphone) to detect similar names.

ii. Tailor

It is a flexible record matching toolbox, which allows the users to apply different duplicate detection methods on the data sets. The flexibility of using multiple models is useful when the users do not know which duplicate detection model will perform most effectively on their particular data. TAILOR follows a layered design, separating comparison functions from the duplicate detection logic. Furthermore, the execution strategies, which improve the efficiency, are implemented in a separate layer, making the system more extensible than systems that rely on monolithic designs. TAILOR reports statistics, such as estimated accuracy and completeness, which can help the users understand better the quality of the given duplicate detection execution over a new data set.

iii. Whirl

It is a duplicate record detection system available for free for academic and research use. WHIRL uses the tf.idf token-based similarity metric to identify similar strings within two lists. The Flamingo Project is a similar tool that provides a simple string matching tool that takes as input two string lists and returns the string pairs that are within a prespecified edit distance threshold. WizSame by WizSoft is also a product that allows the discovery of duplicate records in a database.

iv. BIGMATCH

It is the duplicate detection program used by the U.S. Census Bureau. It relies on blocking strategies to identify potential matches between the records of two relations, and scales well for very large data sets. The only requirement is that one of the two relations should fit in memory, and it is possible to fit in memory even relations with 100 million records. The main goal of BigMatch is not to perform sophisticated duplicate detection, but rather to generate a set of candidate pairs that should be then processed by more sophisticated duplicate detection algorithms.

III. CONCLUSION

As database systems are becoming more and more commonplace, data cleaning is going to be the cornerstone for correcting errors in systems which are accumulating vast amounts of errors on a daily basis. Despite the breadth and depth of the presented techniques, we believe that there is still room for substantial improvements in the current state-of-the-art. Data preparation, detecting duplicate records and duplicate detection tools were discussed in this paper. Finally, large amounts of structured information are now derived from unstructured text and from the web. This information is typically imprecise and noisy; duplicate record detection techniques are crucial for improving the quality of the extracted data. The increasing popularity of information extraction techniques is going to make this issue more prevalent in the future, highlighting the need to develop robust and scalable solutions. This only adds to the sentiment that more research is needed in the area of duplicate record detection and in the area of data cleaning and information quality in general.

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Generalize Prey-Predator Model with Reserve and Unreserved Area

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ABSTRACT

In this paper we generalized a prey-predator model with prey dispersal in a two patch environment, one is assumed to be free zone and other is reserved zone where fishing and other extractive activities are prohibited. The steady states of the system are determined. The local and global stability analysis has been carried out.

Keywords: Stability, Equilibrium, Prey-Predator Model, Liapunov Function

I. INTRODUCTION

Biological resources are renewable resources. Bio economic modeling of the exploitation of the biological resources such as fisheries and floristries has gained importance in recent years. As we know the biological species have been driven to extinct due to either natural or manmade reasons such as over exploitation, over predation, unregulated harvesting, environment pollution etc. One potential solution of this problem in the creation of marine resources where fishing and other extractive activities are prohibited. Mathematical model of ecological system reflecting these problems has been carried out Kar and Swarnakamal [10]. Nonlinear behavior of predator-prey model with refuge protecting a constant proportion of prey and wit temperature dependent parameters chosen appropriately for amite interaction on fruit species discussed by Colling [7]. Effect of two interacting population on resource following generalized logistic growth proposed by Singh et.al. [3]. Biological resources are renewable resources. Economic and biological aspect of renewable resources management has been considered by Clark [4]. A mathematical model of selective harvesting in a prey-predator fishery with time delay given by Kar [9]. A prey-predator model with a reserved area given in Dubey et.al.[1]. Persistence and extinction of one prey, two predator system analyzed and proposed by Dubey et.al.[2]. Optimal harvesting policy of prey-predator model considered by Zhang et.al.[11]. Prey –predator model with a generalized transmission function analyzed

by Mehta et.al. [6]. In this paper we generalized the model of [1] when predator is wholly depends on the prey species. The model takes the form
Model equation is

$$\frac{dx}{dt} = rx \left(1 - \left(\frac{x}{K}\right)^n\right) - \sigma_1 x - \sigma_2 y - \beta_1 xz$$

$$\frac{dy}{dt} = sy \left(1 - \frac{y}{L}\right) + \sigma_1 x - \sigma_2 y$$

$$\frac{dz}{dt} = Q(Z) - \beta_0 x$$

$$x(0) \geq 0, y(0) \geq 0, z(0) \geq 0 \quad (1)$$

Where

$x(t)$ be the density of prey species in unreserved zone,
 $y(t)$ be the density of prey species in reserved zone and
 $z(t)$ the density of the predator species at any time $t \geq 0$, σ_1 be the migration rate coefficient of the prey species from unreserved to reserved zone,

σ_2 the migration rate coefficient of the prey species from reserved to unreserved zone. Prey species in reserved and unreserved zone is assumed to be logistically.

r and s are intrinsic growth rate coefficient of prey species in unreserved and reserved zones respectively;

K and L are their respective carrying capacities.

β_1 is the depletion rate coefficient of the prey species due to the predator, and β_0 is the natural death rate coefficient of the predator species.

In model (1), the function $Q(Z)$ represents the growth rate of predator. The model (1) is analyzed when predator is wholly dependent on the prey species, so that $Q(Z) = \beta_2 xz$ then equation (3) of model (1) is

$$\frac{dz}{dt} = \beta_2 xz - \beta_0 x$$

Now above model becomes

$$\begin{aligned} \frac{dx}{dt} &= rx \left(1 - \left(\frac{x}{K}\right)^n\right) - \sigma_1 x - \sigma_2 y - \beta_1 xz \\ \frac{dy}{dt} &= sy \left(1 - \frac{y}{L}\right) + \sigma_1 x - \sigma_2 y \\ \frac{dz}{dt} &= \beta_2 xz - \beta_0 x \end{aligned} \quad (1a)$$

II. METHODS AND MATERIAL

Existence of Equilibria

There are three nonnegative equilibria namely $E_0(0,0,0)$, $E_1(\hat{x}, \hat{y}, 0)$ and $\bar{E}(\bar{x}, \bar{y}, \bar{z})$.

The equilibrium E_0 exist obviously. We prove the existence of E_1 and \bar{E} as follows:

Existence of $E_1(\hat{x}, \hat{y}, 0)$

Here \hat{x} and \hat{y} are the positive solution of the following algebraic equations:

$$rx \left(1 - \left(\frac{x}{K}\right)^n\right) - \sigma_1 x + \sigma_2 y - \beta_1 xz = 0 \quad (2)$$

$$sy \left(1 - \frac{y}{L}\right) + \sigma_1 x - \sigma_2 y = 0 \quad (3)$$

From (2)

$$y = \frac{1}{\sigma_2} \left(- (r - \sigma_1 x) + \frac{rx^{n-1}}{K^n}\right) \quad (4)$$

Substituting the value of y from (4) into equation (3) we get

$$Ax^{2n+1} + Bx^{n+1} + cx^n + Dx + E = 0 \quad (5)$$

Where

$$A = \frac{sr^2}{L\sigma_2^2 K^{2n}}, \quad B = \frac{-(r - \sigma_1)}{K\sigma_2^2 L} 2sr,$$

$$C = \frac{r}{K^n} \left(\frac{-s}{\sigma_2} + \frac{r}{K}\right),$$

$$D = (r - \sigma_1)^2 \frac{s}{\sigma_2^2} \quad \text{and} \quad E = \frac{(r - \sigma_1)(s - \sigma_2)}{\sigma_2} - \sigma_1$$

It is clear that (5) has a unique solution $x = x^*$ if the following inequality hold:

$$(r - \sigma_1)(s - \sigma_2) < \sigma_1 \sigma_2.$$

From the model system (1a) we note that if there is no migration of species from reserved to unreserved zone (i.e. $\sigma_2 = 0$) and $(r - \sigma_1) < 0$, then $\frac{dx}{dt} < 0$. similarly if there is no migration from of the prey species from unreserved to reserved zone

(i.e. $\sigma_1 = 0$) and $(s - \sigma_2) < 0$, then $\frac{dy}{dt} < 0$. Hence it is natural to assume that

$$r > \sigma_1 \quad \text{and} \quad s > \sigma_2.$$

Knowing the value of \hat{x} , the value of \hat{y} can be computed from equation (4). It may also be noted for \hat{y} to be positive we must have

$$\hat{x}^n > \frac{K^n}{r} (r - \sigma_1)$$

Existence of $\bar{E}(\bar{x}, \bar{y}, \bar{z})$

Here \bar{x}, \bar{y} and \bar{z} are the positive solution of the following algebraic equations:

$$rx \left(1 - \left(\frac{x}{K}\right)^n\right) - \sigma_1 x - \sigma_2 y - \beta_1 xz = 0 \quad (6a)$$

$$sy \left(1 - \frac{y}{L}\right) + \sigma_1 x - \sigma_2 y = 0 \quad (6b)$$

$$\beta_2 xz - \beta_0 x = 0 \quad (6c)$$

Solving the above equation, we get,

$$\bar{x} = \frac{\beta_0}{\beta_2} \quad (7a)$$

$$\bar{y} = \frac{L}{2s} \left[(s - \sigma_2) \pm \sqrt{(s - \sigma_2)^2 + \frac{4s\sigma_1\beta_0}{2\beta_2}} \right] \quad (7b)$$

$$\bar{z} = \frac{\beta_2}{\beta_0\beta_1} \left[\sigma_2\bar{y} + (r - \sigma_1)\frac{\beta_0}{\beta_2} - \frac{r\beta_0^{n+1}}{K^n\beta_2^{n+1}} \right] \quad (7c)$$

For \bar{z} to be positive, we must have

$$\sigma_2\bar{y} + (r - \sigma_1)\frac{\beta_0}{\beta_2} > \frac{r\beta_0^{n+1}}{K^n\beta_2^{n+1}} \quad (8)$$

Equation (8) gives a threshold value of the carrying capacity of the free access zone for the survival of predators.

In the following lemma, we show that all solutions of the model (2) are nonnegative and bounded.

$$\Omega = \left\{ (x, y, z) \in CR_3^+ : 0 < x + y + z \leq \frac{\mu}{\eta} \right\}$$

Is a region of the attraction for all solutions initiating of the positive orthant, where η is a constant such that

$$0 < \eta < \beta_0, \quad \mu = \frac{K^n}{4r}(r + \eta)^2 + \frac{L}{4s}(s + \eta)^2, \\ \beta_1 \geq \beta_2$$

Proof: Let $\omega(t) = x(t) + y(t) + z(t)$ and $\eta > 0$ be a constant. Then

$$\frac{d\omega}{dt} + \eta\omega = x(r + \eta) + y(s + \eta) - (\beta_0 - \eta)z - \frac{rx^{n+1}}{K^n} - \frac{sy^2}{L} - xz(\beta_1 - \beta_2) \quad (9)$$

Since β_1 is the depletion rate coefficient of prey due to its intake by the predator and β_2 is the growth rate coefficient of predator to its interaction with their prey, and hence it is natural to assume that $\beta_1 \geq \beta_2$. Now choose η such that $0 < \eta < \beta_0$, then equation (9) can be written as

$$\frac{d\omega}{dt} + \eta\omega \leq x(r + \eta) + y(s + \eta) - \frac{rx^{n+1}}{K^n} - \frac{sy^2}{L}$$

$$\frac{d\omega}{dt} + \eta\omega = \frac{K^n}{4r}(r + \eta)^2 - \frac{r}{K^n} \left[x^{(n+1)/2} - \frac{K^n}{2r}(r + \eta)^{(1-n)/2} \right]^2 - \frac{K^n}{4r}(r + \eta)^2 [1 - x^{1-n}] + \frac{L}{4s}(s + \eta)^2 - \frac{s}{L} \left[y - \frac{L}{2s}(s + \eta) \right]^2$$

$$\frac{d\omega}{dt} + \eta\omega \leq \frac{K^n}{4r}(r + \eta)^2 + \frac{L}{4s}(s + \eta)^2 = \mu(say)$$

By using the differential inequality [5], we obtain

$$0 < \omega(x(t), y(t), z(t)) \leq \frac{\mu}{\eta}(1 - e^{-\eta t}) + (x(0), y(0), z(0))e^{-\eta t}.$$

Taking limit when $t \rightarrow \infty$, we have, $0 < \omega(t) \leq \frac{\mu}{\eta}$, proving the lemma.

III. RESULTS AND DISCUSSION

Stability Analysis : Vibrational matrix of model (2) is

$$J = \begin{bmatrix} r - \left(\frac{n+1}{K}\right)rK^n - \sigma_1 - \beta_1z & \sigma_2 & -\beta_1x \\ \sigma_1 & s - \frac{2sy}{L} - \sigma_2 & 0 \\ \beta_2z & 0 & \beta_2x - \beta_0 \end{bmatrix}$$

At $E_0(0,0,0)$

$$J_0 = \begin{bmatrix} r - \sigma_1 & \sigma_2 & 0 \\ \sigma_1 & s - \sigma_2 & 0 \\ 0 & 0 & -\beta_0 \end{bmatrix}$$

By the characteristic equation of matrix E_0 is a saddle point with stable manifold locally in the z-direction.

At $E_1(\hat{x}, \hat{y}, 0)$

$$J_1 = \begin{bmatrix} r - \left(\frac{n+1}{K}\right)rK^n - \sigma_1 & \sigma_2 & -\beta_1x \\ \sigma_1 & s - \frac{2sy}{L} - \sigma_2 & 0 \\ 0 & 0 & \beta_2x - \beta_0 \end{bmatrix}$$

By the characteristic equation of matrix

- (a) If $\beta_2\hat{x} > \beta_0$ then E_1 is a saddle point with stable manifold locally in the xy plane and with unstable manifold locally in the z-direction.
- (b) $\beta_2\hat{x} < \beta_0$ then E_1 is locally asymptotically stable.

In the following theorem, we show that the model (2) cannot have any closed trajectory in the interior of the positive quadrant of the xy- plane

Theorem 1: The model system (2) cannot have any periodic solution in the interior of the positive quadrant of the xy-plane.

Proof: Let $H(x, y) = \frac{1}{xy}$. Clearly $H(x, y)$ is a positive in the interior of the positive quadrant of the xy- plane.

Let

$$h_1(x, y) = rx \left(1 - \left(\frac{x}{K}\right)^n\right) - \sigma_1 x + \sigma_2 y$$

$$h_2(x, y) = sy \left(1 - \frac{y}{L}\right) + \sigma_1 x - \sigma_2 y$$

Then

$$\Delta(x, y) = \frac{\partial}{\partial x}(h_1 H) + \frac{\partial}{\partial y}(h_2 H)$$

$$\Delta(x, y) = \frac{-n}{y} \left[\frac{rx^{n-1}}{K^n} + \frac{\sigma_2 y}{x^2} \right] - \frac{1}{x} \left[\frac{s}{L} + \frac{\sigma_1 x}{y^2} \right] < 0$$

From the above equation, we note that $\Delta(x, y)$ does not change the sign and is not identically zero in the interior of the positive quadrant of the xy- plane. By Dulac Bindixon criteria , it follows that there is no closed trajectory in the interior of the positive quadrant of the xy- plane , hence the theorem follows.

In following theorem , we are able to show that \bar{E} is globally asymptotically stable.

Theorem 2: The interior equilibrium of \bar{E} is globally asymptotically stable with respect to all solution initiating in the interior of the positive orthant.

Proof: Consider the following positive definite function about \bar{E} .

$$W(t) = \left(x - \bar{x} - \ln \frac{x}{\bar{x}}\right) + c_1 \left(y - \bar{y} - \ln \frac{y}{\bar{y}}\right) + c_2 \left(z - \bar{z} - \ln \frac{z}{\bar{z}}\right)$$

Differentiating W with respect to time t along the solution of model (2) , we get

$$\begin{aligned} W(t) = & \frac{-r}{K^n} (x - \bar{x})(x^n - \bar{x}^n) + \\ & + \sigma_2 (x - \bar{x}) \left(\frac{\bar{x}y - \bar{y}x}{x\bar{x}}\right) - (c_2\beta_2 - \beta_1)(z - \bar{z})(x - \bar{x}) \\ & - \frac{s}{L} (y - \bar{y})^2 + c_1\sigma_1 (y \\ & - \bar{y}) \left(\frac{\bar{y}x - \bar{x}y}{y\bar{y}}\right) \end{aligned}$$

Choose $c_1 = \frac{\sigma_2\bar{y}}{\sigma_1\bar{x}}$ and $c_2 = \frac{\beta_1}{\beta_2}$, then

$$\begin{aligned} \frac{dW}{dt} = & \frac{-r}{K^n} (x - \bar{x})(x^n - \bar{x}^n) - \frac{\bar{y}\sigma_2 s}{L} (y - \bar{y})^2 \\ & - \frac{\sigma_2}{x\bar{x}y} (\bar{x}y - \bar{y}x)^2 < 0 \end{aligned}$$

Which is negative definite. Hence W is a Liapunov function [8] with respect to \bar{E} whose domain contains the region of attraction Ω , proving the theorem.

If we put n=1 we get the result of B. Dubey [1].

IV. CONCLUSION

In this paper we generalized the prey-predator model, in the case of when predator is wholly depends on the prey species. Criteria for coexistence of prey –predator are obtained using the stability theory.

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Environmental Auditing

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ABSTRACT

The environmental audit help in pollution control. Improved production safety and health and conservation of natural resources and hence its overall objective can be stated as achieving sustainable development. However for conducting environmental audit objectives are to be defined clearly or else the audit procedure will be subject to varying interpretations which may yield and contribute to differences in approach thereby influencing the end results. The objectives of environmental audit in an industry are (i) to determine the mass balance of various materials used and the performance of various process equipment so as to identify usage of materials in excess than required. To review the conversion efficiencies of process equipment and accordingly fix up norms for equipment/operation performance and minimization of the wastes. (ii) (a) To identify the areas of water usage and wastewater generation and determine the characteristics of wastewater..^[3]

Keywords: Environmental Audit, Audit Team, Field Observations, Synthesis of Data, ETP

I. INTRODUCTION

1.1 Philosophy of Environmental Auditing

1.1.1 Definition

Environmental auditing is management tool comprising systematic documented, periodic & objective evaluation of how well the management systems are performing with the aim of

- (i) Waste prevention and reduction.
- (ii) Assessing, compliance, with, regulatory, requirements.
- (iii) Facilitating control of environmental practices

Because of the limitations on practically achievable operational efficiencies and the raw materials purity. These excess usages of raw materials unless recovered find their way to environment causing pollution. Wastes from an industry include non-product discharges in gaseous, liquid and solid phases. End -of-the-pipe waste treatment techniques, where in all the wastes are carried to a common facility for treatment is proving to be ineffective and uneconomical due to the complexity of problems associated with waste generation, their quantity and characteristics. The waste generation may

vary hourly, daily and seasonally especially in case of the multiplicity of manufacturing product in the same premises. The wastewater characteristics also widely vary from stream to stream discharged from various unit operations of a particular product. In this growing complexity of problems. The concept of waste prevention implementation within a reasonable time frame keeping in view the financial and other considerations of a company. In cases of gaps for compliance with the regulatory requirements the regulatory bodies could be apprised of these action plans and time obtained for implementation. Thus the regulatory risk on and reduction can work out to be more effective. It is important to find out whether an industry is complying with environmental standards and other regulatory requirements. It is also very essential to periodically monitor this aspect, determine the gaps and workout action plans for could be overcome and effective steps taken for pollution control. .^[3]

1.1.2 Objectives of Environmental Audit

The environmental audit help in pollution control. Improved production safety and health and conservation of natural resources and hence its overall objective can be stated as achieving sustainable development.

However for conducting environmental audit objectives are to be defined clearly or else the audit procedure will be subject to varying interpretations which may yield and contribute to differences in approach thereby influencing the end results. The objectives of environmental audit in an industry are

- (i). Equipment and accordingly fix up norms for equipment/operation performance and minimization of the wastes.
- (ii). (a) To identify the areas of water usage and wastewater generation and determine the characteristics of wastewater.
(b) To determine the emissions, their sources, quantities and characteristics.
(c) To determine the solid wastes and hazardous wastes generated, their sources, quantities characteristics.
- (iii). To identify the possibilities of waste minimization, recovery and recycling of wastes.
- (iv). To determine the performance of the existing waste treatment control systems so as to modify or install additional or alternative control equipment accordingly.
- (v). To determine the impact on the surrounding environment (groundwater, stream, residential area, agricultural area, sensitive zone) due to the disposal of wastewater, emissions and solid wastes from the industry and accordingly identify suitable preventive measures, if necessary.
- (vi). To verify compliance with the standards and conditions prescribed by the regulatory bodies under the Water Act, Air Act and the Environmental Protection Act.
- (vii). To check the effectiveness of
 - (a) organizational set up of the industry for decision making and environmental management with special reference to their technical view point, attitudinal view point.
 - (b) Environmental policy of company.^[3]

1.1.3 Benefits of Environmental Audit

Environmental auditing has far reaching benefits to the industry, to the society and the nation at large. The benefits of environmental audit are

- (i). Determines how well the process systems and pollution control systems are performing and identifies the operations of poor performance. To determine the mass balance of various materials

- used and the performance of various process equipment so as to identify usage of materials in excess than required. To review the conversion efficiencies of process paper may present orig
- (ii). Identifies potential cost savings which can be accrued through reduction in raw material consumption by way of waste minimization and adoption of recycle/recovery reduction in pollution load.
- (iii). Increases awareness of environmental requirements policies and responsibilities.
- (iv). Helps in understanding the technical capabilities and attitude of the environmental organization in a company.
- (v). Provides upto date environmental data base for use in plant modification emergencies (vi) Unreveals surprises and hidden liabilities due to which regulatory risk and exposure to litigation can be reduced.
- (vi). Ensures independent verification, identifies matters needing attention and provides timely warning to management on potential future problems.
- (vii). Helps to safeguard environment and assists in complying with local regional and national laws and regulations, with the company's policy and with the environmental standard

II. METHODS AND MATERIAL

2.1 Environmental Audit: Indian Scenario

Industrial pollution in our country is on increase and is creating a high risk environment. Various legislations/viz The water (Prevention & Control of pollution) Act 1974, the Air (Prevention & Control of Pollution) Act 1981 and the Environment Protection Act 1986 have come into force and organizations created to combat pollution. Gone are the days when industrialization means profit-making and environment was grossly neglected. It is being realized that industry and environment should go hand in hand so as to achieve sustainable development. Also over the years awareness has brought in realization to consider environmental protection a bare necessity. Yet, the investments for such a protection are still considered a liability by many industrialists mainly due to lack of up-to-date scientific practices of environmental factors at par with production helps in minimizing material losses and also in reduction of liabilities in the long run.

The growing environmental pollution and the complexity of this problem with increasing risks from the regulatory controls needs an effective management tool so as to prevent pollution and to make pollution control programmes cost effective and feasible.

Environmental audit' is a technique being introduced for integrating the interest of the industry and the environment so that these could be mutually supportive. This technique is basically a part of industry's internal procedures in meeting their responsibilities towards better environment. Also the policy statement for abatement of pollution by the Government of India provides for submission of environmental statement by all concerned industries, which would subsequently evolve into an environmental audit. A notification under the Environment (Protection) Rules, 1986 has been issued on April 22, 1993, requiring industries to submit an environmental statement for the financial year ending on March 31 in Form V to the concerned State pollution Control Boards on or before September 30 every year beginning 1993. The Department of Company Affairs also agreed to include this requirement as a part of the Director's Annual Report. The submission of an environmental statement is applicable to the following (i) Those who require consent under the Water (Prevention & Control of Pollution Act 1974 (ii) Those who require consent under the Air (Prevention & Control of Pollution) Act 1981. (iii) Those who require authorization under Hazardous wastes (Management & Handling) 1989.

2.2 Environmental audit procedure

The audit procedure includes broadly the following

- (i) Pre-audit activities.
- (ii) Activities at the site.
- (iii) Post audit activities.

The details of these activities and this procedure are discussed in detail below.

(i) Pre-audit activities

(A) Preliminary information Pre-audit activities include various preparatory works. Having chosen the industry to be audited, preliminary information on the industry are to be obtained through a questionnaire. The information include location of the industry with

surrounding land uses climatic conditions, products manufactured, raw materials used, details on water utilization, wastewater generation and disposal of gaseous emissions, solid waste/hazardous waste and organizational set up and policies of the company for environmental management. The preliminary information received on the industry should be reviewed to identify main areas of concern. Thereafter it is required to prepare and organize audit team and resources and allocate specific tasks to team members. Resources such as the sampling and monitoring equipment and laboratory facilities for analysis should be checked if available at site or else arrangements should be made for their availability through external sources such as private/government laboratories, loan from other industries. The visit programmer should then be intimated to the industry mentioning that the environmental audit should not be considered as a raid. The prior intimation to the industry helps them convince the senior management and staff at various levels of the purpose of audit and the cooperation they have to extend to the audit team. The staff should not feel that the audit would lead to surfacing problems and hence they would be subject to criticism by the management. They should be made clear about the purpose and objectives of the audit and how beneficial it would be for the industry. This would also increase employee's awareness towards waste reduction and promote input and support for the audit.

(B) Audit team Audit team should be carefully selected to cover various aspects of the audit. The team should include employee from production, quality control laboratory R&D, pollution control operations technical staff for monitoring and analysis of waste samples and environment and an environment specialist. The number of people may vary from 4 to 8 depending on the size and complexity of the facility being audited.

The team should be sufficiently detached to provide an independent view. The members should be so chosen that they would not hesitate bringing out even criticism, owing to obligations with Supervisor. Sometimes it is advantageous to include members from the headquarters of the industry.

It is important to have well defined and systematic procedures which are known and understood by all

concerned. The audit may take 3-10 days depending on the industry.

Effectiveness of audit is a direct result of the qualification, confidence training and proficiency of the personnel who conduct audits. The team should understand regulatory requirements, relevant waste control technologies and their operations and process. They should have capability to examine question, sample and analysis waste and interpret data. The management should be provided with a realistic assessment of environmental performance.

(ii) Activities at Site

(A) General

The activities at site include deriving material balance, identifying waste flow lines, monitoring of characteristics, evaluating performance of pollution control equipment/system, assessing environmental quality, holding discussions with the management and finally preparing the draft report. Interviews should be carried out with various cross sections of the staff engaged in production, laboratory/quality control, R & D, environment management, so as to understand different operation mechanisms. Having a fair idea on the manufacturing process reconnaissance surveys should be made to be familiar with layout of the plant and process operations, and to understand possible impact on the surrounding environment. Various activities to be carried out at site are discussed in detail in the following paragraphs.

(B) Material Balance

The entire manufacturing process of each product should be drawn into a process flow sheet representing various unit operations as blocks. A unit operation is a process where materials are input a function occurs and materials are output mostly in a different form state or composition.

The quantities of inputs and outputs at each unit operation should be worked out for the entire process and data incorporated in the process flow sheet. Discussions with the staff, perusal of the records of the company and the reconnaissance survey will help in arriving at these flow sheets. From these flow sheets

data sheets incorporating the raw material requirement, water consumption, wastewater and solid waste generation, and gaseous emissions should be worked out for each product manufactured.

The water balance sheet which shows areas of water usage and wastewater generation and their quantities is depicted.

(C) Waste flow

From the material balance the sources and quantities of generation of wastewater gaseous emissions and solid waste should be identified. The waste pre-treatment, final treatment and disposal path should be identified.

The production staff should be consulted as these people are likely to know about waste discharge points and about unplanned waste generations such as spills, leaks, washings, etc. Also visits to the process plants may disclose many other discharge points due to overflows, spills and other material handling practices which are not accounted and recorded. The quantities and sources should be accordingly finalized and a waste flow sheet prepared.

(D) Monitoring

The characteristics of the wastes as generated from the sources are important to understand its use for recycle, recovery of treatment. Also the performance of the treatment facilities is to be monitored so as to check their efficiencies and to modify or install additional equipment/ facility, if necessary. The surrounding environment groundwater, stream, soil, surrounding land uses residential agricultural and ambient air quality should be monitored to determine the impact due to the industry. With the above objectives sampling points should be identified and monitoring network established. Parameters to be analyzed should be determined from the material balances of the wastes generated.

The frequency of sampling should be fixed so as to cover hourly and daily variation in characteristics. It should also covers attest one full cycle of operations. More than one such set of data can result in more realistic results. Samples collected should be of grab type where characteristics do not vary significantly and of composite type where characteristics fluctuate. Grab

sampling means collection of sample in one pick while composite sampling requires collection of sample continuously or at predetermined frequency (1-hour, 2-hour, etc) and compositing it in proportion to the flow rate observed at each sampling time. The method of analysis of samples should be done as per standard procedure and by trained analysis.\

(E) Field Observations

The entire plant should be inspected thoroughly. The aspects of site layout, material handling, storage, drainage system, safety aspects, lapses/negligence in operations, and attitude of operators in process, waste treatment facilities, handling of scrap and wastes, instruction, color codes should be observed.

The attitude and technical capability of various staff including senior management should be observed as is very critical in achieving the goal of safer environment. The training requirements can be assessed based on these observations.

(F) Draft Report

After completing the above mentioned activities including determining material balance identifying waste flow monitoring and analysis of various samples and field observations, a draft report should be prepared with findings and possible recommendations.

The draft report should be presented before the senior management and various points should be thoroughly discussed. The Management should put forward their views. The participation of the Management and their acceptance of various observations and recommendations make the task of implementation meaningful.

(iii) Post Audit Activities

(A) Synthesis of Data

The requirement of various raw materials according to the mass balance of chemical equation involved in the manufacture of a product is called stoichiometric requirement. A comparison of these requirements with the actually used in the industry given an indication of excess usage of various raw materials. These excesses

may be presumed to be finding their way to air, water and soil thus causing pollution. Hence, it is important to reduce these excesses. The unit operation should be checked up to find out the cause of excess usage of the materials and accordingly modifications made. Norms should then be fixed for performance of each of the unit operations, for wastes generated from each of these unit operations, the production and environment staffs are simply to adhere to the norms. The "Environment Manager" thus can have a control over production as well as wastes generation too.

(B) Evaluation of Waste Treatment Facilities

Performance of various pre-treatment and final treatment facilities should be evaluated based on the analysis reports. If the treated wastewater, gaseous emissions and solid waste do not conform to the standards prescribed by the Pollution Control Board, reasons for the same should be diagnosed.

From the individual streams of wastewater recyclable and recoverable materials should be identified and provisions made for the same. All the avoidable wastes should be completely controlled and only the unavoidable allowed for discharge. The wastewater should be segregated based on the characteristics such as inorganic, organic, acidic, alkaline, easily biodegradable, not easily biodegradable, and toxic to streams, pretreatment units viz oil separator, neutralization, detoxification should be provided wherever required at the source so as to minimize cost of final treatment.

The wastewater of similar nature should be combined and common treatment facilities provided. This would be efficient and economical. Many a times it is observed that inorganic wastes and non-biodegradable wastes are treated in biological treatment plants which on the contrary render biological treatment ineffective. Toxic wastes should be detoxified before treating in biological treatment plant. Highly toxic wastes may be isolated and incinerated. The rate of wastewater flow and polluted loads to the effluent treatment plant (ETP) should be properly regulated to keep off shock loads to micro-organisms. The designed criteria and the actual operating conditions of various treatment units should be compared and norms fixed for the operation of these units.

Similarly the problems related to gaseous emission and solid waste generation may be identified. Recommendations for the best practicable waste management systems should be formulated.

The environment division of the industry should have an environment specialist to look into matters related to pollution control and evolve norms for resource conservation/waste minimization vis a vis process control. Besides, he should also evolve norms for optimal utilization of resources and performance of various pollution control systems. The members of this division and the operators of the treatment facilities should be well trained.

To oversee the implementation of the measures for pollution control and the overall management of environment, there should be a Peer group comprising members from production, quality control/laboratory, R&D and waste treatment divisions, the top management and an environment specialist.

(C) Final Report

Various aspects discussed above should be compiled and final report prepared along with recommendations. The final report may if necessary be sent to the top management for comments so as to make further modifications.

(D) Action Plans

The recommendations include measures for best practicable environmental management. If the annual burden that is the annualized capital cost of the pollution control measures and their operating cost for the implementation of all the recommendations is high and the investment not feasible for the industry then these recommendations, should be implemented in phases. Priorities should be fixed and action plans with time frame should be formulated.

(E) Follow-up Actions

Follow-up actions should be taken to check the progress of implementation of recommendations. The environment division of the industry should meet the other divisional heads periodically to review the progress.^[3]

III. RESULTS AND DISCUSSION

- Make auditing of material used, different exhaust, solid waste etc.
- Ground water characteristics & waste water characteristics should be included in the report
- Figures showing in variation of characteristics should be drawn
- Characteristics of each treatment units and efficiency of each treatment unit should be done separately.

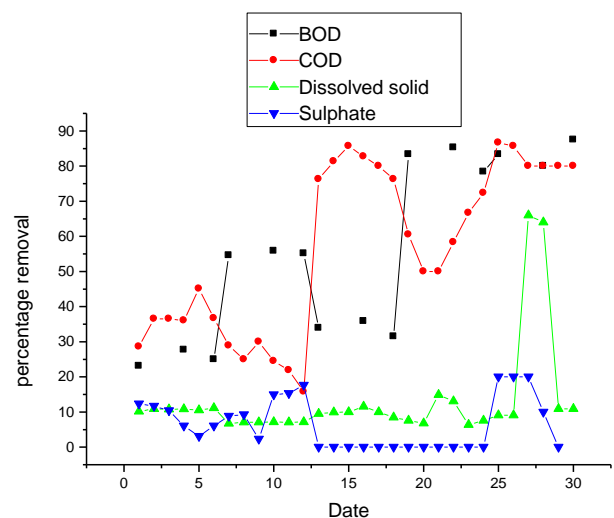


Figure 1: Efficiency against characteristics

IV. CONCLUSION

- 1) Correlation coefficient between the analyzed parameters has to be finding out.
- 2) Positive relationship between any substance for ground water & waste water has to be observed considering the limit $+0.67$ & (-0.67) also.
- 3) Efficiency of each unit should be calculated separately..
- 4) Condensate water, cooling, make up water, boiler expansion tank water are initially softened and necessary to recycle
- 5) The variation in effluent characteristics can be studied by varying the temperature of influent.
- 6) The influent flow rate can be varied to check the changes in performance.
- 7) Rate of flow to aeration tanks in the ETP should be kept constant to avoid shock loads.
- 8) Transfer of materials should be done through closed operations.

- 9) Evaporation losses from storage tanks should be checked by proper insulation and putting the suitable dip columns.
- 10) Water consumption is looking high, cleaner technology scenario needed to study.

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'Useful' Renyi's Information Measure of Order α , Type β And Source Coding Theorem

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ABSTRACT

A parametric mean length is defined as the quantity

$${}_{\alpha\beta}L_u = \frac{1}{1-\alpha} \log_D \left[\frac{\sum (u_i p_i)^\beta D^{-n_i(\alpha-1)}}{\sum (u_i p_i)^\beta} \right],$$

where $\alpha > 0 (\neq 1)$, $\beta > 0$, $u_i > 0$, $D > 1$ is an integer, $\sum p_i = 1$. This being the useful mean length of code words weighted by utilities, u_i . Lower and Upper bounds for ${}_{\alpha\beta}L_u$ are derived in terms of 'useful' Renyi's entropy of order α type β .

AMS Subject classification: 94A15, 94A17, 94A24, 26D15.

Keywords: Tsalli's Entropy, Useful Tsalli's entropy, Utilities, Kraft inequality, Holder's inequality.

I. INTRODUCTION

Consider the following model for a random experiment S ,

$$S_N = [E; P; U]$$

where $E = (E_1, E_2, \dots, E_N)$ is a finite system of events happening with respective probabilities $P = (p_1, p_2, \dots, p_N)$, $p_i \geq 0$, $\sum p_i = 1$ and credited with utilities $U = (u_1, u_2, \dots, u_N)$, $u_i > 0$, $i = 1, 2, \dots, N$. Denote the model by S_N , where,

$$S_N = \begin{bmatrix} E_1, E_2, \dots, E_N \\ p_1, p_2, \dots, p_N \\ u_1, u_2, \dots, u_N \end{bmatrix}. \quad (1.1)$$

We call (1.1) a Utility Information Scheme (UIS). Belis and Guiasu [2] proposed a measure of information called 'useful information' for this scheme, given by

$$H(U; P) = -\sum u_i p_i \log p_i, \quad (1.2)$$

where $H(U; P)$ reduces to Shannon's [8] entropy when the utility aspect of the scheme is ignored i.e., when $u_i = 1$ for each i . Throughout the paper, \sum will stand for $\sum_{i=1}^N$ unless otherwise stated and logarithms are taken to base $D (D > 1)$.

Guiasu and Picard [4] considered the problem of encoding the outcomes in (1.1) by means of a prefix code with codewords w_1, w_2, \dots, w_N having lengths n_1, n_2, \dots, n_N and satisfying Kraft's inequality [9].

$$\sum_{i=1}^N D^{-n_i} \leq 1. \quad (1.3)$$

Where D is the size of the code alphabet. The useful mean length L_u of code was defined as :

$$L_u = \frac{\sum u_i n_i p_i}{\sum u_i p_i}, \quad (1.4)$$

and the authors obtained bounds for it in terms of $H(U; P)$. Generalized coding theorems by considering different generalized measures under condition (1.3) of unique decipherability were investigated by several authors, see for instance the papers [1,3,15].

In this paper, we study some coding theorems by considering a new function depending on the parameters α, β and a utility function. Our motivation for studying this new function is that it generalizes ‘useful’ information measure already existing in the literature such as Renyi’s entropy.

II. CODING THEOREMS

In this section, we define a new information measure as :

$${}_{\alpha\beta}H(U; P) = \frac{1}{1-\alpha} \log_D \left[\frac{\sum (u_i p_i^\alpha)^\beta}{\sum (u_i p_i)^\beta} \right], \quad (2.1)$$

where

$\beta > 0, \alpha > 0 (\neq 1), u_i > 0, p_i \geq 0, i = 1, 2, \dots, N$
and $\sum p_i = 1$.

- (i) If $\beta = 1$, Then (2.1) becomes a ‘useful’ information measure

$$\text{i.e., } {}_{\alpha}H(U; P) = \frac{1}{1-\alpha} \log_D \left[\frac{\sum u_i p_i^\alpha}{\sum u_i p_i} \right] \quad (2.2)$$

which is studied Hooda[1].

- (ii) When $u_i = 1$ for each i , i.e., when the utility aspect is ignored, $\sum p_i = 1$, and $\beta = 1$, then (2.1) reduces to Renyi’s entropy .

$$\text{i.e., } {}_{\alpha}H(P) = \frac{1}{1-\alpha} \log_D \left[\sum p_i^\alpha \right]. \quad (2.3)$$

- (iii) When $\alpha \rightarrow 1$, and $\beta = 1$, then (2.1) reduces to a measure of ‘useful’ information due to Hooda and Bhaker [1].

$$\text{i.e., } H(U; P) = - \frac{\sum u_i p_i \log p_i}{\sum u_i p_i}. \quad (2.4)$$

- (iv) When $u_i = 1$ for each i , then (2.1) reduced to Satish and Arun [6] entropy.

$$\text{i.e., } {}_{\alpha\beta}H(U; P) = \frac{1}{1-\alpha} \log_D \left[\frac{\sum p_i^{\alpha\beta}}{\sum p_i^\beta} \right]. \quad (2.5)$$

- (v) When $u_i = 1$ for each i , i.e., When the utility aspect is ignored, $\sum p_i = 1, \beta = 1$, and $\alpha \rightarrow 1$, the measure (2.1) reduces to Shannon’s entropy [8].

$$\text{i.e., } H(P) = - \sum p_i \log p_i. \quad (2.6)$$

Further consider,

Definition: The ‘useful’ mean length ${}_{\alpha\beta}L_u$ with respect to ‘useful’ R-norm information measure is defined as :

$${}_{\alpha\beta}L_u = \frac{1}{1-\alpha} \log_D \left[\frac{\sum (u_i p_i)^\beta D^{-n_i(\alpha-1)}}{\sum (u_i p_i)^\beta} \right], \quad (2.7)$$

under the condition, $\sum (u_i D^{-n_i \alpha})^\beta \leq \sum (u_i p_i^\alpha)^\beta$. (2.8)

Clearly the inequality (2.8) is the generalization of Kraft’s inequality (1.3). A code satisfying (2.8) would be termed as a useful personal probability code D ($D > 1$) is the size of the code alphabet. When, $u_i = 1$ for each i and $\beta = 1, \alpha = 1$, (2.8) reduces to (1.3).

- (i) For $u_i = 1$ for each i and $\beta = 1$, and $\alpha \rightarrow 1$, ${}_{\alpha}L_u$ becomes the optimal code length defined by Shannon [8].
- (ii) For $u_i = 1$ for each i and $\beta = 1$, then (2.7) becomes a new mean code word length corresponding to the Tsalli’s entropy.

$$\text{i.e., } {}_{\alpha}L = \frac{1}{1-\alpha} \log_D \left[\sum p_i D^{-n_i(\alpha-1)} \right]. \quad (2.9)$$

- (iii) If $\beta = 1$, then (2.7) becomes a new mean codewords length corresponding to the entropy (2.2).

$$\text{i.e., } {}_{\alpha}L_u = \frac{1}{1-\alpha} \log_D \left[\frac{\sum u_i p_i D^{-n_i(\alpha-1)}}{\sum u_i p_i} \right].$$

- (iv) If $u_i = 1$, then (2.7) becomes a mean codewords length corresponding to the entropy (2.5).

$$\text{i.e., } {}_{\alpha\beta}L = \frac{1}{1-\alpha} \log_D \left[\frac{\sum p_i^\beta D^{-n_i(\alpha-1)}}{\sum p_i^\beta} \right].$$

We establish a result, that in a sense, provides a characterization of ${}_{\alpha\beta}H(U; P)$ under the condition of unique decipherability.

Theorem 2.1. Let $u_i, p_i, n_i, i=1, 2, \dots, N$, satisfy the inequality (2.8). Then

$${}_{\alpha\beta}L_u \geq {}_{\alpha\beta}H(U; P), \quad 1 \neq \alpha > 0, \beta > 0. \quad (2.10)$$

Proof: By Holder's inequality, we have

$$\left(\sum_{i=1}^N x_i^p \right)^{\frac{1}{p}} \left(\sum_{i=1}^N y_i^q \right)^{\frac{1}{q}} \leq \sum_{i=1}^N x_i y_i, \quad (2.11)$$

where $p^{-1} + q^{-1} = 1; p(\neq 0) < 1, q < 0$ or $q(\neq 0) < 1, p < 0; x_i, y_i > 0$ for each i .

Setting, $p = \frac{(\alpha-1)}{\alpha}, q = 1 - \alpha$, and

$$x_i = \left(\frac{(u_i p_i)^\beta}{\sum (u_i p_i)^\beta} \right)^{\frac{\alpha}{\alpha-1}} D^{-n_i \alpha}, \quad y_i = \left(\frac{(u_i p_i^\alpha)^\beta}{\sum (u_i p_i)^\beta} \right)^{\frac{1}{\alpha-1}}, \quad (2.12)$$

Putting these values in (2.11) and using the inequality (2.8), we get

$$\left(\frac{\sum (u_i p_i)^\beta D^{-n_i(\alpha-1)}}{\sum (u_i p_i)^\beta} \right)^{\frac{\alpha}{\alpha-1}} \left(\frac{\sum (u_i p_i^\alpha)^\beta}{\sum (u_i p_i)^\beta} \right)^{\frac{1}{\alpha-1}} \leq \frac{\sum (u_i p_i)^\beta}{\sum (u_i p_i)^\beta} \quad (2.13)$$

It implies

$$\left(\frac{\sum (u_i p_i^\alpha)^\beta}{\sum (u_i p_i)^\beta} \right)^{\frac{\alpha}{1-\alpha}} \leq \left(\frac{\sum (u_i p_i)^\beta D^{-n_i(\alpha-1)}}{\sum (u_i p_i)^\beta} \right)^{\frac{\alpha}{\alpha-1}} \quad (2.14)$$

Taking \log_D both sides, we get

$$\frac{1}{1-\alpha} \log_D \left[\frac{\sum (u_i p_i^\alpha)^\beta}{\sum (u_i p_i)^\beta} \right] \leq \frac{1}{1-\alpha} \log_D \left[\frac{\sum (u_i p_i)^\beta D^{-n_i(\alpha-1)}}{\sum (u_i p_i)^\beta} \right] \quad (2.15)$$

It is clear that the equality in (2.10) is true if and only if

$$D^{-n_i} = p_i^\beta \quad (2.16)$$

which implies that

$$n_i = \log_D \frac{1}{p_i^\beta} \quad (2.16)$$

Thus, it is always possible to have a codeword satisfying the requirement

$$\log_D \frac{1}{p_i^\beta} \leq n_i < \log_D \frac{1}{p_i^\beta} + 1,$$

which is equivalent to

$$\frac{1}{p_i^\beta} \leq D^{n_i} < \frac{D}{p_i^\beta}. \quad (2.17)$$

In the following theorem, we give an upper bound for ${}_{\alpha\beta}L_u$ in terms of ${}_{\alpha\beta}H(U; P)$.

Theorem 2.2. By properly choosing the lengths n_1, n_2, \dots, n_N in the code of Theorem 2.1, ${}_{\alpha\beta}L_u$ can be made to satisfy the following inequality:

$${}_{\alpha\beta}L_u < D^{(1-\alpha)} {}_{\alpha\beta}H(U; P) + \frac{1}{\alpha-1} (1 - D^{(1-\alpha)}) \quad (2.18)$$

Proof: From (2.17), it is clear that

$$D^{-n_i} > D^{-1} p_i^\beta. \quad (2.19)$$

We have again the following two possibilities.

(i) Let $\alpha > 1$. Raising both sides of (2.19) to the power $(\alpha-1)$, we have

$$D^{-n_i(\alpha-1)} > D^{1-\alpha} p_i^{\beta(\alpha-1)}.$$

Multiplying both sides by $(u_i p_i)^\beta$ and then summing over i . we get

$$\sum (u_i p_i)^\beta D^{-n_i(\alpha-1)} > D^{(1-\alpha)} \sum (u_i p_i^\alpha)^\beta. \quad (2.20)$$

Obviously (2.20) can be written as

$$\frac{\sum (u_i p_i)^\beta D^{-n_i(\alpha-1)}}{\sum (u_i p_i)^\beta} > D^{(1-\alpha)} \frac{\sum (u_i p_i^\alpha)^\beta}{\sum (u_i p_i)^\beta}. \quad (2.21)$$

Since $\alpha-1 > 0$ for $\alpha > 1$, we get the inequality (2.18) from (2.21).

(ii) If $0 < \alpha < 1$, the proof follows similarly. But the inequality (2.21) is reversed.

Theorem 2.3. For arbitrary $N \in \mathbb{N}, 1 \neq \alpha > 0, \beta > 0$, and for every codeword lengths $n_i, i=1, 2, \dots, N$ of

Theorem 2.1, ${}_{\alpha\beta}L_u$ can be made to satisfy the following inequality:

$${}_{\alpha\beta}L_u \geq {}_{\alpha\beta}H(U; P) > {}_{\alpha\beta}H(U; P) + \frac{1}{1-\alpha} \cdot \quad (2.22)$$

Proof: Suppose,

$$\bar{n}_i = \log_D \frac{1}{p_i^\beta}, \beta > 0. \quad (2.23)$$

Clearly \bar{n}_i and $\bar{n}_i + 1$ satisfy the equality in Holder's inequality (2.11). Moreover, \bar{n}_i satisfies (2.8). Suppose \bar{n}_i is the unique integer between \bar{n}_i and $\bar{n}_i + 1$, then obviously, \bar{n}_i satisfies (2.8).

Since $1 \neq \alpha > 0$, $\beta > 0$, we have

$$\frac{\sum (u_i p_i)^\beta D^{-n_i(\alpha-1)}}{\sum (u_i p_i)^\beta} \leq \frac{\sum (u_i p_i)^\beta D^{-\bar{n}_i(\alpha-1)}}{\sum (u_i p_i)^\beta} < D \left(\frac{\sum (u_i p_i)^\beta D^{-\bar{n}_i(\alpha-1)}}{\sum (u_i p_i)^\beta} \right) \quad (2.24)$$

$$\text{Since, } \frac{\sum (u_i p_i)^\beta D^{-\bar{n}_i(\alpha-1)}}{\sum (u_i p_i)^\beta} = \frac{\sum (u_i p_i^\alpha)^\beta}{\sum (u_i p_i)^\beta}.$$

Hence (2.24) becomes

$$\frac{\sum (u_i p_i)^\beta D^{-n_i(\alpha-1)}}{\sum (u_i p_i)^\beta} \leq \left(\frac{\sum (u_i p_i^\alpha)^\beta}{\sum (u_i p_i)^\beta} \right) < D \left(\frac{\sum (u_i p_i^\alpha)^\beta}{\sum (u_i p_i)^\beta} \right).$$

Which gives (2.22).

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Hermeneutics from Islamic Perspective

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ABSTRACT

Hermeneutics is the science of interpretation. The source material of Hermeneutics is texts and other utterances, and the goal is to achieve understanding of their meanings. In religious studies the study of texts and utterances is not an end in itself, but a means to say something about religion and religious processes in a society. Because this field of science was initiated by Western scholars in the name of Biblical interpretation and unlike very few Muslim theologians who used it in the interpretation of their divine book the Quran, many opposed it and thought it a conspiracy against Islam to deviate Muslims from true teachings of divine book the Quran. This article first of all gives a brief account of definition, types and history of Hermeneutics, how and what kind of role Hermeneutics plays in the interpretation and exegesis of divine texts; shares views of Muslim scholars about this field of science secondly; and finally give concluding remarks.

Keywords: Hermeneutic, Interpretation, Exegesis, Divinity & Theology.

I. INTRODUCTION

Hermeneutics Defined

Webster's dictionary defines Hermeneutics as: The science of interpretation and explanation; exegesis; esp., that branch of theology which defines the laws whereby the meaning of the Scriptures is to be ascertained.

Conner and Malmin (1983: 1) explain it: "It is (1) a *science* because it is concerned with principles within an ordered system. It is meant to derive and classify the principles which are necessary for the proper interpretation of scripture. It is also (2) an *art* because it is concerned with the application of derived principles. The application of these principles cannot be mechanical, but must involve the skill of the interpreter".

MILTON S. TERRY (Undated: 17) defines the Hermeneutics as: "the science of interpretation. The word is usually applied to the explanation of written documents and may therefore be more specifically

defined as the science of interpreting an author's language".

He also considers Hermeneutics as both the Science and Arts.

F. P. A., Demeterio III (Undated: 1) however introduces Hermeneutics as: Hermeneutics is derived from the Greek word (hermeneuein), which means *to interpret*, and its derivative (hermeneia) means *interpretation*. He further writes: "In its barest sense, Hermeneutics can be understood as a theory, methodology and praxis of interpretation that is geared towards the recapturing of meaning of a text, or a text-analogue, that is temporally or culturally distant, or obscured by ideology and false consciousness".

II. METHODS AND MATERIAL

A. Hermeneutics Classified

Conner and Malmin (1983: 2-4) have classified Hermeneutics into:

1. General Hermeneutics

It refers to the various sets of rules, which are used in the interpretation of the materials presented through the many forms of communication. General Hermeneutics is the science of interpreting the communication of man to man". Some scholars have referred this type as Secular Hermeneutics.

2. Biblical Hermeneutics

It is the science of interpreting the communication of God to human. This Divine communication has come to human in the form of sacred literature - the Bible.

MILTON S. TERRY (Undated: 17-18) classifies Hermeneutics as:

1. General Special Hermeneutics:

This is philosophical & methodical, and searches for methods & principles.

2. Special Hermeneutics:

This is a practical and almost empirical science and searches after rules and solutions.

3. Biblical or Sacred Hermeneutics:

This is the science of interpreting the Holy Scriptures of the Old and New Testaments.

F. P. A., Demeterio III (Undated: 3-8) has classified Hermeneutics as:

1. Romanticist Hermeneutics:

It conceptualises textuality as some kind of a floating signifier which without its temporal and cultural contexts is incomplete.

2. Phenomenological Hermeneutics:

Like the Romanticist Hermeneutics, Phenomenological Hermeneutics also assumes that a proper context or a mental frame is needed for any object in order to be fully interpreted. But instead of considering the irrelevant historical and cultural contexts,

phenomenological Hermeneutics argues that the text reflects its own mental frame. Therefore interpreting a text means to isolate it methodically from all non-pertinent things including the subject's biases and allow it to communicate its meaning to the subject. The goal of phenomenological Hermeneutics is to acquire the truth of the text as it is.

3. Dialectical Hermeneutics:

It argues that an object or text can contain a number of meanings. Therefore, unlike the romanticist and the phenomenological Hermeneutics, dialectical Hermeneutics is not interested in capturing a single and unified meaning, but rather in an existential one, the meaning of the here and now.

4. Critical Hermeneutics:

It mentions that textuality can be infiltrated with forces and powers that were formerly considered irrelevant to it and practically harmless. These irrelevant forces and powers are capable of penetrating deep into the text by weaving into its linguistic fabric. The goal of this hermeneutic system is to diagnose the hidden pathology of texts and to free them from their ideological distortions.

5. Post-structural Hermeneutics:

It expresses that the subject has lost its primacy that had been taken for granted by the previous philosophical systems, it is now decentred, and is presently considered a mere intersection of point of the various cultural and socio-economic forces that shape the human individual.

B. Role of Hermeneutics in the Interpretation of Divine Texts:

The Role played by Hermeneutics in the Biblical/Quranic exegesis can be understood from the following statement:

"The word "exegesis" comes from the Greek word 'exhegesthai' which means "to guide or lead out". It refers to bringing out the meaning of any writing that might otherwise be difficult to be understood. This branch of science involves the *application* of the rules of Hermeneutics. While Hermeneutics provides us with the tools, exegesis refers to the actual *use* of these tools.

Hermeneutics supplies the *principles* of interpretation, while exegesis is the *process* of interpretation. Exegesis then can be thought of as 'applied Hermeneutics'." (Conner & Malmin: 1983: 6)

C. History

Hermeneutics was developed in antiquity in a period when a distinction was made between literal and allegorical meanings, for instance in the reading of Homer and Greek mythology and in Philo of Alexandria's interpretations of the Septuagint. Christian authors distinguished between different layers of meaning in the Bible. Origen (185–254) drew a distinction between the spiritual sense, the literal sense and the moral sense of Scripture. In practice such distinctions often boiled down to a division between the allegorical and the literal meaning. In the Renaissance Hermeneutics was combined with source criticism, connected closely to philology, and seen as the primary method of the humanities. With the Reformation, individual Christians started to read and interpret the Bible on their own, which led to a new focus on interpretation. The Lutheran theologian Johann Conrad Dannhauer (1603–66) coined the word 'Hermeneutics' and used it in the title of a book, *Hermeneutica sacra*, in 1654.

Hermeneutics was later extended to include not only Classic texts and the Bible, but texts from other cultures as well. Today Hermeneutics is also applied to text-like objects such as art, drama, photography and film, and to text-analogues such as speech and non-verbal communication—in fact to any system of codes and sense-making processes (Yanow 2006:15–16). Culture and religion can be seen as 'textual' and as webs of signs which can be analyzed by means of hermeneutical methods. (Ingvild S. G. 2011: 275-276)

III. RESULTS AND DISCUSSION

The Approach of Muslim Theologians Towards Hermeneutics:

What we have mentioned up to now, was the viewpoint of Western scholars. Now we will analyse the position of this branch of science in the eyes of Muslim scholars, which is the actual purpose of this article to reach to

some point where we can be able to determine the actual advantages and disadvantages of applying Hermeneutics for the interpretation and exegesis of divine books specially the Quran.

By looking thoroughly into this matter we find that on one hand this science gets warm welcome by some Muslim scholars like Amin Al-Khuli of Egypt, Harun Nasution of Indonesia, Fazlur Rahman & Riffat Hasan of Pakistan, Fatima Al-Mernisi of Morocco, Ameena Wadood of South Africa (the author of "Islam & Women" who got fame and publicity by leading Friday Prayer in New York USA) and Ali Mirmoosavi of Iran. Hermeneutic was even considered necessary and demand of time by some of them like Ali Mirmoosavi (2009: 125) who while addressing the issue of freedom of religion posed some questions and wrote: "These questions lead us to Hermeneutics and the possibility of new interpretations. In light of dominant and current interpretations, religious freedom is not consistent with Islam."

On the other hand there are some Muslim scholars who not only oppose Hermeneutics but consider it a threat to pure Arabic and Islamic heritage like Abdul Wahab Al-Maseeri (al-Maseeri Undated: 5: 656) who terms Heretical Hermeneutics as "Jewish Deconstruction" or "Jewish Disruption" (اليهودية التقويضية/اليهودية التفكيكية) and Dr Hasan Al-Shafai who (al-Shafii: Undated) wrote a detailed article on this issue naming "The Required Response to Feminist Reinterpretations of the Qur'an" which reflects the viewpoint of opposing group, the abstract of which is as under :

-He defines Hermeneutics as an old Christian theological term used to understand the religious scripts. And going through historical transformations, this term has been meant for different purposes like:

- As an ideological principle aiming at explanation of theological scripts.
- Used as basis for exegesis of Bible
- Or used as an ideological science and practical art related to explanation of old scripts
- Or as an ideology for understanding of religious, philosophical and literal scripts
- Or as an ideology for understanding of literal scripts only
- Or it is an understanding of the different forms of human existence.

According to Hasan al-Shafaii (al-Shafii: Undated): The theory of Hermeneutics enters into Muslim academic world by the name of Feminist reinterpretation of Islamic divine texts. This movement is an attempt to exegete Quran ignoring the principles of *Tefsir* (exegesis) and Laws of *Taweel* (interpretation).

He calls this movement as Christian and western created on the basis of a hypothesis that Islamic Laws are Male dominant and it is the requirement of modern time to review them from feminist perspective to create equality among man and woman.

This movement was initiated (among the Muslims) in the second half of last century by people specially women who got education in western countries and were impressed by them and they had little opportunity to live in some Muslim country.

And they can be divided into two categories:

a) Moderate:

Those who exegete Quran on their own and refuse those Ahadith of Prophet which they suppose are against the rights of women.

b) Liberal:

Those who refuse the whole of Ahadith of Prophet Peace be upon him and even challenge the Quranic text (some verses) as being divine and their use as an argument/evidence.

Some examples:

-Haroon Nasution (1919) who grew up in Indonesia, did his Bachelors from Egypt and United States of America and finally travelled to Canada and got Doctorate and returned to his country to participate in Pancasila Movement for modernizing the Islamic ideology and Islamic way of life in his country. He got the idea of Hermeneutics from his teacher Toshihiko Izutsu at McGill University.

-Fazlur Rahman (1919-1989) a Pakistani scholar who studied in Canada, the colleague of Haroon Nasution. He also got the theory of Hermeneutics from his teacher Toshihiko Izutsu. He was of the view that there is some part of revelation, which was specific to Prophet SAW. He was perhaps the first one who applied Hermeneutics on Quran.

-Dr. Riffat Hassan, a Pakistani Shia scholar who did her Doctorate from U.K. Her thoughts are based on

Feminist Theology. She applied Hermeneutics to Quran considering that the orthodox way of Quranic exegesis is the reason of giving disrespect to woman in Islamic Sharia. She refused Ahadith of Prophet peace be upon him for the same reason.

-Ameena Wadood born and brought up in South Africa, embraced Islam in 1972, did Masters and Doctorate from USA, taught in International Islamic University Malaysia. She had thoughts same like Riffat Hassan. She does not believe in polygamy and divorce system of Islam and says that the presence of these two in Islamic principles is the result of misunderstanding the Islam and Quran.

-Fatima Al-Mernisi of Morocco: Did Bachelors in political science from Rabat and PhD from USA. Wrote many books about Hijab, Islam & democracy, certain aspects of Islamic history, Islam & woman etc. Won International Award in 2003 for her work in Feminist Movement. She was impressed by the works of Professor Arkoun, 'Abd al-Hadi 'Abd al-Rahman who doubted the originality and the authenticity of current Quran claiming that the context of real Quran became mixed with the myths and urged upon the recompilation of Quran.

He (Hasan Shafai) considers this movement as threat to Islamic heritage and Arabic Languages as it is based on linguistic studies and urges to avoid the traditional Islamic sciences.

IV. CONCLUSION

To understand the position of Hermeneutics in Islam we have to remember a general principle of Islam that it does not denounce any new invention, idea etc unless it goes against the set rules & regulations of Islam. Similarly if we apply Hermeneutic to any Islamic text keeping the basic principles of Islam intact and derive out some result, which is not against those principles, then there is no harm to benefit from this important branch of science.

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Iteration in Asynchronous System

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ABSTRACT

We present a couple of traditional iterative strategies for unravelling straight comparisons; such routines are broadly utilized, particularly for the arrangement of substantial issues, for example, those emerging from the discrimination of direct fractional differential mathematical statements. We depict the iterative or backhanded systems, which begin from a rough guess to the genuine arrangement and if concurrent, infer a grouping of close estimates the cycle of reckonings being rehashed till the obliged precision is gotten.

Keyword: asynchronous system, P-RAM, MPI, Parallel, Distributed, Interconnection network.

I. INTRODUCTION

In this chapter, we present a couple of traditional iterative strategies for unraveling straight comparisons; such routines are broadly utilized, particularly for the arrangement of substantial issues, for example, those emerging from the discrimination of direct fractional differential mathematical statements. We depict the iterative or backhanded systems, which begin from a rough guess to the genuine arrangement and if concurrent, infer a grouping of close estimates the cycle of reckonings being rehashed till the obliged precision is gotten. It implies that in iterative routines the measure of processing relies on upon the precision obliged and we have additionally talked about JACOBI and Gauss-Seidel calculation with P-RAM and MPI Programming.

II. METHODS AND MATERIAL

A. Method Iteration

Given a distributed algorithm, for each processor, there is a set of times at which the processor executes some computations, some other times at which the processor sends some messages to other processors, and yet some other times at which the processor receives messages from other processors[4]. The algorithm is termed synchronous, in the sense of the Preceding subsection, if it is mathematically equivalent to one for which the times of computation, message transmission, and message reception are fixed and given a priori. We say

that the algorithm is asynchronous if these times can vary widely in two different executions of the algorithm with an attendant effect on the results of the computation [4]. The most extreme type of asynchronous algorithm is one that can tolerate changes in the problem data or in the distributed computing system, without restarting itself to some predetermined initials conditions. Iterative methods, also known as trial and error methods, are based on the ideas of successive approximation. They start with one or more initial approximation to the root and obtain a sequence of approximations by repeating a fixed sequence of steps till the solution with reasonable accuracy is obtained. Iterative methods, generally, give one root at a time. Iterative methods are very cumbersome and time-consuming for solving non-linear equations manually. However, they are best suited for use on computers, due to following reasons:

- Iterative methods can be concisely expressed as computational algorithms.
- It is possible to formulate, using trial and error, algorithms which tackle a class of similar problems. For instance a general computational algorithm to solve polynomial equations of order n (where n is an integer) may be written.
- Routing errors are negligible in trial and error procedures compared to procedures based on closed form solutions.

In computational mathematics an iterative method is a mathematical procedure that generates a sequence of

improving approximate solutions for a class of problems. A specific implementation of an iterative method, including the termination criteria, is an algorithm of the iterative method. An iterative method is called convergent if the corresponding sequence converges for given initial approximations. A mathematically rigorous convergence analysis of an iterative method is usually performed; however, heuristic-based iterative methods are also common.

A method uses iteration if it yields successive approximations to a required value by repetition of a certain procedure.

B. Iteration Steps

An "iterative" process can be explained by the flowchart given in Fig. 1. There are four parts in the process, namely, initialization, decision, computation and update. The functions of the four parts are as follows: [7]

1. **Initialization:** The parameters of the function and a decision parameter in this part are set to their initial values. The decision parameter is used to determine when to exit from the loop.
2. **Computation:** The required computation is performed in this part.
3. **Decision:** The decision parameter is to determine whether to remain in the loop.
4. **Update:** The decision parameter is updated, and a transfer to the next iteration results.

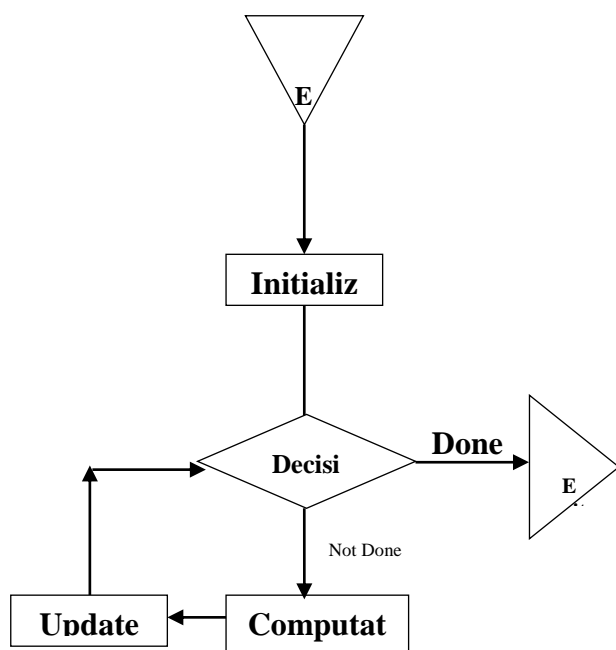


Figure: 1.1 Iteration Explain by flow chart [6 &7]

Lemma 1: Iteration is geometry of nature and its represent to geometry progration.

Proof: for $i = 1$ to x
 for $j = 1$ to x
 $y = x^2$

Where, x^2 is representation of geometry progration.

C. P-Ram Model

The P-RAM model allows parallel algorithm designers to treated processing power as an unlimited resource, much as programmers of computers with virtual memory are allowed to treat memory as an unlimited resource. The P-RAM model is unrealistically simple; it ignores the complexity of interprocessor communication. Because communication complexity is not an issue, the designer of P-RAM algorithms can focus on the parallelism inherent in a particular computation.

A P-RAM model consists of a control Unit, global memory, and an unbounded set of Processors, each with its own private memory (Fortune and Wyllie 1978) [25] (see figure: 1.1). Although active processors execute identical instructions, every processor has a unique index, and the value of a processor's index can be used to enable or disable the processor or influence which memory location it accesses.

A P-RAM computation begins with the input stored in global memory and a single active processing element. During each step of the computation an active, enabled processor may read a value from a single private or global memory location, perform a single RAM operation, and write into one local or global memory location. All active, enabled processors must execute the same instruction, albeit on different memory location. The computation terminates when the last processors halts.

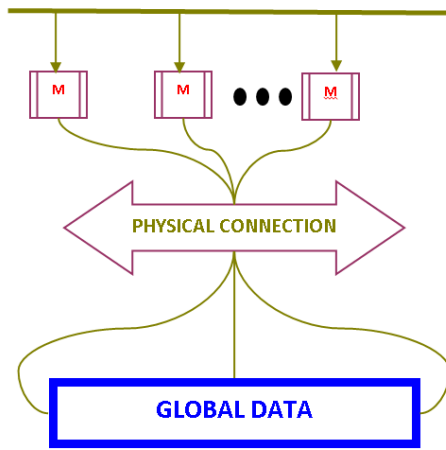


Figure: 1.2 Advance Representation of PRAM Model

Explanation: Let x_1, x_p, x_l be subsets of Euclidean spaces R^{n_1}, \dots, R^{n_p} respectively. Let $n = n_1 + \dots + n_p$, and let $x \in R^n$ be the Cartesian product $X = \prod_{i=1}^p X_i$. Accordingly, any $x \in R^n$ is decomposed in the form $x = (x_1, \dots, x_p)$, we write each x_i belonging to R^{n_i} . For $l = 1, \dots, p$, let $f_l: X \rightarrow X_l$ be a given function and let $f: X \rightarrow X$ be the function defined by $f(x) = (f_1(x), \dots, f_p(x))$ for every $x \in X$. We want to solve the fixed - point problem $x = f(x)$. To this end we will consider the iteration $x := f(x)$

We will also consider the more general iteration-

$$x_l = \begin{cases} f_l & \text{if } l \in l \\ x_l & \text{otherwise} \end{cases} \quad (1.1)$$

Where l is a subset of the component index set $\{1, \dots, p\}$, which may change from one iteration to the next. Let the system be given by

$$\begin{aligned} a_{11}x_1 + a_{12}x_2 + a_{13}x_3 + \dots + a_{1n}x_n &= b_1 \\ a_{21}x_1 + a_{22}x_2 + a_{23}x_3 + \dots + a_{2n}x_n &= b_2 \\ a_{31}x_1 + a_{32}x_2 + a_{33}x_3 + \dots + a_{3n}x_n &= b_3 \\ &\dots \\ &\dots \\ a_{n1}x_1 + a_{n2}x_2 + a_{n3}x_3 + \dots + a_{nn}x_n &= b_n \end{aligned} \quad (1.2)$$

In which the diagonal elements a_{ij} do not vanish, if this is not the case, then the equation should be rearranged so that this condition is satisfied.

Now we can rewrite the above systems as follow -

$$x_2 = \frac{b_2}{a_{22}} - \frac{b_{21}}{a_{22}} x_1 - \frac{a_{23}}{a_{22}} x_3 - \dots - \frac{a_{2n}}{a_{22}} x_n$$

$$\begin{aligned} x_3 &= \frac{b_3}{a_{33}} - \frac{b_{31}}{a_{33}} x_1 - \frac{a_{32}}{a_{33}} x_2 - \dots - \frac{a_{3n}}{a_{33}} x_n \\ &\dots \\ &\dots \\ x_n &= \frac{b_n}{a_{nn}} - \frac{b_{n1}}{a_{nn}} x_1 - \frac{a_{n2}}{a_{nn}} x_2 - \dots - \frac{a_{n(n-1)}}{a_{nn}} x_{n-1} \end{aligned} \quad (1.3)$$

Now, we can write the above equation in the form of matrix. Let A be a $n \times n$ matrix, let b be a vector in R^n , and consider the system of linear equations- $Ax = b$

Where, x is an unknown vector to be determined. We assume that A is invertible, so that $Ax = b$ has a unique solution. We write the i^{th} equation of the systems $Ax = b$ as

$$\sum_{j=1}^n a_{ij} x_j = b_i$$

Where a_{ij} are the entries of A ; also, x_j and b_i are the components of x and b , respectively, we assume that $a_{ii} \neq 0$ and solve for x_i to obtain -

$$x_i = \frac{1}{a_{ii}} \left[\sum_{j=1}^n a_{ij} x_j - b_i \right] \quad (1.4)$$

If all the components $x_j, j \neq i$, of the solution of $Ax = b$ are known, the remaining component x_i can be determined from Eq.(1.4). If instead some approximate estimates for the components $x_j, j \neq i$, are available, then we can use Eq. (1.4) to obtain an estimate of x_i . This can be done for each component of x simultaneously, leading to the following algorithm:

o **Iteration in Jacobi Algorithm**

In this, we start with some initial vector $x(0) \in R^n$, evaluate $x(t), t = 1, 2, \dots$ using the iteration -

$$x_i(t+1) = \frac{1}{a_{ii}} \left[\sum_{j=1}^n a_{ij} x_j(t) - b_i \right] \quad (4.5)$$

The Jacobi algorithm produces an infinite sequence $\{x(t)\}$ of elements of R^n . If this sequence converges to a limit x , then by taking the limit of both sides of Eq. (1.5) as i

tend to infinity, we see that x satisfies Eq. (1.4) for each i , which is equivalent to x being a solution of $Ax = b$ of course; it is possible that the algorithm diverges.

In the above algorithm, each component of $x(t + 1)$ was evaluated based on Eq. (1.4) and the estimate $x(t)$ of the solution. If this algorithm is executed on a serial computer, by the time that $x_i(t + 1)$ is evaluated, we already have available some new estimates $x_j(t + 1)$ for the components of x with index j smaller than i . It may be preferable to employ these new estimates of x_j , $j < i$ when updating x_i . This leads to the next (gauss-seidel) algorithm. The above Jacobi method can be explained easily with this following example:

Example: Find the solution, using Jacobi method to three decimals, of systems.

$$83x + 11y - 4z = 95 \quad (1)$$

$$7x + 52y + 13z = 104 \quad (2)$$

$$3x + 8y + 29z = 7 \quad (3)$$

The above equation (1) can be written as follows;

$$83x = 95 - 11y + 4z$$

$$x = \frac{95}{83} - \left(\frac{11}{83}\right)y + (4/83)z$$

$$x_{n+1} = \frac{1}{83\{95 - 11y_n + 4z_n\}} \quad (4)$$

The equation (2) also may be written as follows:

$$52y = 104 - 7x - 13z$$

$$y_{n+1} = \frac{1}{52\{104 - 7x_n - 13z_n\}} \quad (5)$$

The equation (3) may be written are as follows:

$$29z = 71 - 3x - 8y$$

$$z_{n+1} = \frac{1}{29\{71 - 3x_n - 8y_n\}} \quad (6)$$

Now we take initial values of x , y and z , so take initial values;

$$x_0 = y_0 = z_0 = 0$$

Now we calculate the first iteration:

Iteration – I:

$$x_{n+1} = \frac{1}{83\{95 - 11y_n + 4z_n\}} \quad (4)$$

Here $n = 0$, so

$$x_1 = \frac{1}{83\{95 - 11*0 + 4*0\}}$$

$$= \frac{95}{83}$$

$$x_1 = 1.1445783$$

$$y_1 = 1/52\{104 - 7 * 0 - 13 * 0\}$$

$$= \frac{104}{52}$$

$$= 2$$

$$z_1 = \frac{1}{29\{71 - 3*0 - 8*0\}}$$

$$= 71/29$$

$$= 2.4482758$$

Now we calculate the second iteration, in this we use the recent value of x_1 , y_1 and z_1 .

Iteration – II:

Then here $n = 1$, so

$$x_2 = 1/83\{95 - 11y_1 + 4z_1\}$$

$$= 1/83\{95 - 11 * 2 + 4 * 2.4482758\}$$

$$x_2 = .9975072$$

$$y_2 = 1/52\{104 - 7x_1 - 13z_1\}$$

$$= \frac{1}{52\{104 - 7*1.1445783 - 13*2.4482758\}}$$

$$= 1.2338532$$

$$z_2 = 1/29\{71 - 3x_1 - 8y_1\}$$

$$= 1/29\{71 - 3 * 1.1445783 - 8 * 2\}$$

$$= 1.77814707$$

Iteration – III:

Here $n = 2$

$$x_3 = 1/83\{95 - 11y_2 + 4z_2\}$$

$$= \frac{1}{83\{95 - 11*1.2338532 + 4*1.77814707\}}$$

$$= 1.0667494$$

$$y_3 = 1/52\{104 - 7x_2 - 13z_2\}$$

$$= 1/52\{104 - 7 * .9975072 - 13 * 1.77814707\}$$

$$= 1.4211834$$

$$z_3 = 1/29\{71 - 3x_2 - 8y_2\}$$

$$= 1/29\{71 - 3 * .9975072 - 8 * 1.2338532\}$$

$$= 2.0047121$$

Now, the value of three x , y and z are repeated so we may stop.

So, the value of x , y and z are as follows:

$$x = 1.057$$

$$y = 1.367$$

z = 1.961

Iteration – IV:

Here n=3

$$x_4 = 1/83\{95 - 11y_3 + 4z_3\}$$

$$= 1/83\{95 - 11 * 1.4211834 + 4 * 2.0047121\}$$

$$= 1.0528413$$

$$y_4 = 1/52\{104 - 7x_3 - 13z_3\}$$

$$= 1/52\{104 - 7 * 1.0667494 - 13 * 2.0047121\}$$

$$= 1.35522109$$

$$z_4 = 1/29\{71 - 3x_3 - 8y_3\}$$

$$= 1/29\{71 - 3 * 1.0667494 - 8 * 1.4211834\}$$

$$= 1.9458718$$

Iteration – V:

Now n = 4

$$x_5 = 1/83\{95 - 11y_4 + 4z_4\}$$

$$= 1/83\{95 - 11 * 1.35522109 + 4 * 1.9458718\}$$

$$= 1.0587476$$

$$y_5 = 1/52\{104 - 7x_4 - 13z_4\}$$

$$= 1/52\{104 - 7 * 1.0528413 - 13 * 1.9458718\}$$

$$= 1.3718034$$

$$z_5 = 1/29\{71 - 3x_4 - 8y_4\}$$

$$= 1/29\{71 - 3 * 1.0528413 - 8 * 1.35522109\}$$

$$= 1.9655071$$

The *pseudo-code* of sequential Jacobi algorithm is as follows: [M.J. Quinn, 1994]

Input

n {size of linear system}
 ∈ {convergence criterion}
 a[1...n][1...n] {coefficient of linear equation}
 b[1...n] {constant associated with equation}

Output

x[1...n]{old Estimate of solution vector}

Global

new x[1...n] {new estimate of solution vector}
 diff{maximum change of any element of solution}

i,j {loop indices}

Begin

{Estimate values of elements of x}

for i ← 1 to n do

$$x[j] \leftarrow \frac{b[j]}{a[i][i]}$$

end for

{Refine estimates of x until value converge}

do

diff ← a

for i ← 1 to n do

new x[i] ← b[i]

for j ← 1 to n do

if j ≠ then

new x[i] ← newx[i] - a[i] [j] * x[j]

endif

endfor

$$\text{newx}[i] \leftarrow \frac{\text{newx}[i]}{a[i][j]}$$

endfor

for i ← 1 to n do

diff ← max (diff, [x[i] - newx[i])

x[i] ← newx[i]

endfor

while diff > ∈

end

Hence, it is a sequential implementation of the Jacobi Algorithm.

o **Iteration in Gauss-Seidel Algorithm:**

Starting with some initial vector $x_e(0) \in R^n$, evaluate $x(t)$, $t = 1, 2, \dots$ using the iteration-

$$x_i(t+1) = \frac{1}{a_{ii}} \left[\sum_{j<i} a_{ij} x_j(t+1) + \sum_{j>i} a_{ij} x_j(t) - b_i \right] \quad (3)$$

In above equation, we first update x_1 , then x_2 , etc. It is equally meaningful to start by updating x_n , then x_{n-1} and proceed backwards, with x_1 being updated last. Any other order of updating is possible. Different orders of updating may produce substantially different results for the same system of equation.

The *pseudo-code* of Sequential Gauss Seidel method is as follow:

Sequential_GS

input A, b, $x^{(0)}$, tolerance

for k = 0 to k_max do the following

for i = 1, ..., n

sum = 0

for j = 1, 2, ..., i - 1

sum = sum + $a_{ij} x_j^k$

end j

```


$$x_i^{(k+1)} = (b_i - \text{sum})/a_{ii}$$

end i
if  $||x^{(k+1)} - x^{(k)}|| < \text{tolerance}$  then output the solution,
stop
end k
end Sequential_GS

```

Hence, it is a sequential implementation of Gauss-Seidel method.

D. Message Passing

It is a concept from computer science, i.e. used extensively in the design and implementation of modern software applications. This concept is used with software and hardware both. Generally, message passing is the indication of passes message from n different nodes, by wired or wireless medium. Another words, it is a way of invoking behavior through some intermediary service or infrastructure of process. According to the concepts of this, when more then to autonomous machines, which are intermediary connected with each others, and passes bundles and packets through established channel or link this think is known as “*Message Passing*”.

E. Discrete Vs Continuous Massege Passing

We explain the discrete and continuous message passing, as follows:

- **Discrete Message Passing:** It is possible for the receiving object to be busy or not running when the requesting object sends the message. It requires additional capabilities for storing and retransmitting data for systems that may not run concurrently. In this, all the capabilities that naturally occur when trying to synchronize system and data are handled by an intermediary level of software. With discrete message passing the sending system does not wait for a response. It simply sends the data bus and the buses stored the message and returns the result when it is available.
- **Continuous Message Passing:** In this, message passing occurs between objects that are running at the same time. It based on typically object-oriented programming, such as: JAVA and Smalltalk.
Message Passing: It is less complex; the sender sends a message and gets a response the same as simply invoking a function or procedure call.

Continuous systems require the sender and receiver to wait for each other to transfer the message.

III. RESULTS AND DISCUSSION

A. Message Passing Models

The message passing technologies have various types of modes. Either some are conceptual or some are practical. Here we explain several models of MPI as per my knowledge.

- **Mathematical Model:**

There are two prominent mathematical models of message passing, as:

1. **Actor model:** This model was inspired by physics (include relativity and quantum physics). It was also influenced by the programming languages like as: LISP, Simula63 and Smalltalk[2]. Its development was "motivated by the prospect of highly parallel computing machines consisting of dozens, hundreds or even thousands of independent microprocessors, each with its own local memory and communications processor, communicating via a high-performance communications network [2]. The actor model in computer science is a mathematical model of concurrent computation that treats "actors" as the universal primitives of concurrent computation, in response to a message that it receives; an actor can make local decisions, create more actors, send more messages, and determine how to respond to the next message received. The actor model originated in 1973 [1]. It has been used both as a framework for a theoretical understanding of computation and as the theoretical basis for several practical implementations of concurrent systems. An actor is a computational entity that, in response to a message it receives, can concurrently:
 - ✓ Send a finite number of messages to other actors.
 - ✓ Create a finite number of new actors.
 - ✓ Designate the behavior to be used for the next message it receives.

There is no assumed sequence to the above actions and they could be carried out in parallel. The Actor model enabling asynchronous communication and

control structures as patterns of passing messages [3]. Recipients of messages are identified by address, sometimes called "mailing address". Thus an actor can only communicate with actors whose port addresses it has. The Actor model is characterized by inherent concurrency of computation within and among actors, dynamic creation of actors, inclusion of actor addresses in messages, and interaction only through direct asynchronous message passing with no restriction on message arrival order.

2. **Pi Calculus:** In theoretical computer science, the π -calculus (or **pi-calculus**) is a process calculus. The π -calculus allows channel names to be communicated along the channels themselves, and in this way it is able to describe concurrent computations whose network configuration may change during the computation[3]. The π -calculus is elegantly simple clarification is needed yet very expressive[1]. Functional programs can be encoded into the π -calculus, and the encoding emphasizes the dialogue nature of computation, drawing connections with game semantics. Extensions of the π -calculus, such as the **π -calculus** and applied π , have been successful in reasoning about cryptographic protocols.

Definition: The π -calculus belongs to the family of process calculi, mathematical formalisms for describing and analyzing properties of concurrent computation. In fact, the π -calculus, like the λ -calculus, is so minimal that it does not contain primitives such as numbers, Booleans, data structures, variables, functions, or even the usual control flow statements (such as if-then-else, while).

• **B. Parallel Processing Model For Distributed System**

In here, machine architecture represents the programming model, we explain figure 4.3 in our words.

- Each processor P_i has its own memory and clock.
- Local memory is not accessible by anywhere through the other processors.
- All processors P_i are connected by a special physical medium i.e., either network of communication or other communication device which are available in present scenario.

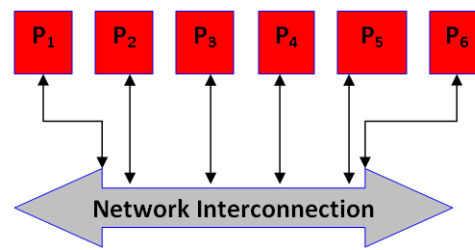


Figure: 1.3 Parallel MPI for Distributed System In architecture

Data and information must be explicitly distributed by the programmer; Communication of processors (i.e., exchanging data's in between processors) is achieved by MPI.

According to above architecture we refers pseudo-code for adding two vector by OPEN MPI:

Source code:

```
#include "mpi.h" /* Include MPI header file */
int main (int argc, char **argv)
{
    int rnk, sz, n, l, info;
    double *x, *y, *buff;
    n = atoi (argv[1]); /* Get input size */
    /* Initialize threaded MPI environment */
    MPI_Init_thread (&argc, &argv, MPI_THREAD_FUNNELED, &info);
    MPI_Comm_size(MPI_COMM_WORLD, &sz); /* Find out how many
    MPI procs */
    chunk = n / sz; /* Assume sz divides n exactly */
    MPI_Scatter(buff,chunk,MPI_DOUBLE,x,chunk,MPI_DOUBLE,0,MPI_
    COMM_WORLD);
    MPI_Scatter(&buff[n],chunk,MPI_DOUBLE,y,chunk,MPI_DOUBLE,0,M
    PI_COMM_WORLD);
    #pragma omp parallel for private(i,chunk) shared(x, y)
    for (i=0; i<chunk; i++) x[i] = x[i] + y[i]!
    MPI_Gather(x,chunk,MPI_DOUBLE,buff,chunk,MPI_DOUBLE,0,MPI_
    COMM_WORLD);
    MPI_Finalize();
}
```

B. Representation of Array Pattern of Processing Elements (P.E.): [5,8]

Consider a case of three dimensional array patterns with $n^3 = 2^{3q}$ (Processing Elements) PEs [E.D. Dekel, Nassimi, S. Sabni, M.J. Quinn.]. Conceptually this PEs may be regarded as arranged, in $n \times n \times n$ array pattern. If we assume that the PEs are row major order, the PE (i,j, k) in position (i,j, k) of this array has 2 index in $2^i + jn + k$ (note that array indices are in the range [0, (n - 1)]). Hence, if $r_{3q-1} r_0$ is the binary representation of the PE position (i,j, k) then $i = r_{3q-1} \dots r_{2q}$, $j = r_{2q-1} \dots r_q$, $k = r_{q-1} \dots r_0$ using $A(i,j, k)$, $B(i,j, k)$ and $C(i,j, k)$ to

represent memory locations in $P(i,j, k)$, we can describe the initial condition for matrix multiplication as $A(0,j, k) = A_{jk}$, $B(0,j, k) = B_{jk}$, $0 < j < n, 0 < k < n$ and A_{jk} and B_{jk} are the elements of the two matrices to be multiplied. The desired final configuration is $C(0,j, k) = C_{jk}$, $0 < j < n, 0 < k < n$

Where,

$$C_{jk} = \sum_{i=0}^{n-1} A_{ij}B_{ik} \dots \dots \dots$$

The algorithm has three distinct phases. In the first, element of A & B are distributed over the n PEs so that we have $A(1,j, k) = A$ and $B(1,j, k) = B$. In the second phase the products $C(1,j, k) = A(1,j, k) * B(1,j, k) = A_n B_n$ are computed. Finally, in third phase the C_{jk} are computed. The details are spelled out in Dekel, Nassimi and Sahni 1981 [E.D. Dekel, Nassimi, S. Sabni,]. In this procedure all PE references are by PE index (Recall that the index of PE (i, j,k) as $i + j_n + k$).

• **P-RAMf Asyncheonous System: [5,8]**

```

Begin (1)
Repeat log n times do
for all (ordered) pair (i,j, k), 0 < k ≤ n, 0 < i,j, k ≤ n and q = log n in
parallel do
a(22q i + 2qj + k) = a(i, j)
a(22qi + zqj + k) = a(i, i)
b(22qi + zqj + k) = b(i)
end for
for all (order)pair (i, k), i < k < n, i > 0,j > i and q = log n
x(j) =  $\frac{b[i]}{a[i][i]}$ 
end for
[Refine estimates of x untill value converge]
Repeat log n times do
diff = 0
for all (order)pair (i, k), i < k < n, i > 0,j > i and q = log n
new x[i] =b[i]
for all (order)pair (i, k), i < k < n, i > 0,j > i and q = log n
if j ≠ i then
new [x] =new x[i] - a[i][j] * x[i]
end if
end for new x [i] = new  $\frac{x[i]}{a[i][i]}$ 
end for
for all (order)pair (i,j, k), i < k < n, i > 0,j > i and q = log n
diff = max(diff, [x[i] - new x[i]])
x[i] = new x[i]
endfor
while diff > ε
end

```

• **MPI For Asynchronous System:**

Here, we use MPI for asynchronous system as a terms of again matrix multiplication in different manner. The pseudo-code are given below:

```

/* MATRIX MULTIPLICATION PROGRAM USING MPI*/
#include<stdio.h>
#include<conio.h>
#define NUM_ROWS_A 4
#define NUM_COLUMN_A 4
#define NUM_ROWS_B 4
#define NUM_COLUMN_B 4
#define MASTER_TO_SLAVE_TAG 1
#define SLAVE_TO_MASTER_TAG 4
void make AB ( );
void print Array( );
int rank;
int size;
int i, j;
double mat_a [NUM_ROWS_A] [NUM_COLUMN_A]
double mat_b [NUM_ROWS_B] [NUM_COLUMN_B]
double mat_result [NUM_ROWS_A] [NUM_COLUMN_B]
double start_time;
double end_time;
int low_bound;
int upper_bound;
int portion;
MPI_Status status;
MPI_Request request;
int main (int argc, char *argv[ ])
{
MPI_Init(&argc, &argv);
MPI_comm_rank(MPI_comm_word, &size);
/*MASTER INITIALIZES WORK*/
if (rank == 0)
{
Make AB ( );
Start_time = MPI_wtime( );
for(i= 1; i< size; i++)
portion = (NUM_ROWS_A)/(size-1);
low_bound = (i-1) * portion;
if (((i+1) == size) && ((Num_ROWS_A%(size-1)) != 0))
{
upper_bound = NUM_ROWS_A;
}
}
else
{
upper_bound = low_bound + portion;
}
MPI_isend(&low_bound,1,MPI_INT,i,MASTER_TO_SLAVE_TAG,MPI_COMM_WORLD, &request);
MPI_isend (&mat_a [low_bound] [0], (upper_bound - low_bound) * NUM_COLUMNS_A,MPI_DOUBLE,i,MASTER_TO_SLAVE_TAG+2,MPI_COMM_WORLD, &request);
}
}
MPI_Bcast(& mat_b, NUM_ROWS_B * NUM_COLUMN_B, MPI_DOUBLE,0,MPI_COMM_WORLD);
if (rank>0)
{
MPI_Recv(&low_bound,1,MPI_INT,i,MASTER_TO_SLAVE_TAG,MPI_COMM_WORLD, &status);
MPI_Recv(&upper_bound,1,MPI_INT,i,MASTER_TO_SLAVE_TAG,MPI_COMM_WORLD, &status);
}
}

```

```

MPI_isend (&mat_a [low_bound] [0], (upper_bound - low_bound) *
NUM_COLUMNS_A,MPI_DOUBLE,0,MASTER_TO_SLAVE_TAG+2,
MPI_COMM_WORLD, &status);
for(i= low_bound; i< upper_bound; i++)
{
for(j= 0; j< NUM_COLUMNS_B; j++)
mat_result[i][j]+= (mat_a [i][j] * mat_b [i][j] );
}
}
MPI_isend(&low_bound,1,MPI_INT,0,SLAVE_TO_MASTER_TAG,MPI
_COMM_WORLD, &request);
MPI_isend(&upper_bound,1,MPI_INT,0,SLAVE_TO_MASTER_TAG+
1,MPI_COMM_WORLD, &request);
MPI_isend (&mat_result [low_bound] [0], (upper_bound - low_bound) *
NUM_COLUMNS_B,MPI_DOUBLE,0,SLAVE_TO_MASTER_TAG+2,
MPI_COMM_WORLD, &request);
}
/*MASTER GATHERS PROCESSED WORK*/
if (rank == 0)
{
for(i= 1; i< size; i++)
MPI_Recv(&low_bound,1,MPI_INT,i,SLAVE_TO_MASTER_TAG+1,M
PI_COMM_WORLD, &status);
MPI_Recv(&upper_bound,1,MPI_INT,i,SLAVE_TO_MASTER_TAG+1,
MPI_COMM_WORLD, &status);
MPI_Recv (&mat_result [low_bound] [0], (upper_bound - low_bound) *
NUM_COLUMNS_B,MPI_DOUBLE,i,SLAVE_TO_MASTER_TAG+2,M
PI_COMM_WORLD, &request);
}
end_time – MPI_wtime( );
printf("\n Runing Time = %f\n\n", end_time_start_time);
print Array( );
}
MPI_Finalize( );
return 0;
}
void make AB ( );
{
for(i= 0; i< NUM_ROWS_A; i++)
{
for(j= 0; j< NUM_COLUMNS_A; j++)
{
Mat_a[i][j] = i+j;
}
}
for(i= 0; i< NUM_ROWS_B; i++)
{
for(j= 0; j< NUM_COLUMNS_B; j++)
{
Mat_b[i][j] = i+j;
}
}
}
void printarray( );
{
for(i= 0; i< NUM_ROWS_A; i++)
{
printf("\n");
for(j= 0; j< NUM_COLUMNS_A; j++)
printf("%8.2f", mat_a[i][j]);
}
printf("\n\n\n");
for(j= 0; j< NUM_COLUMNS_B; j++)
printf("%8.2f", mat_b[i][j]);
}
printf("\n\n\n");
}

```

```

for(i= 0; i< NUM_ROWS_A; i++)
{
printf("\n");
for(j= 0; j< NUM_COLUMNS_B; j++)
printf("%8.2f", mat_result[i][j]);
}
printf("\n\n\n");
}

```

IV. CONCLUSION

In this, we examine circulated calculation, for every processor, there is a situated of times at which the processor executes a few processing's, some different times at which the processor sends a few messages to different processors, but some different times at which the processor gets messages from different processors. And, also represented message passing between gobal host to local host through interconnected physical medium.

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A Survey of Packrat Parser

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ABSTRACT

Two recent developments in the field of formal languages are Parsing Expression Grammar (PEG) and packrat parsing. The PEG formalism is similar to BNF, but defines syntax in terms of recognizing strings, rather than constructing them. It is, in fact, precise specification of a backtracking recursive-descent parser. Packrat parsing is a general method to handle backtracking in recursive descent parsers. It ensures linear working time, at a huge memory cost. This paper begins with discussion of PEG and packrat parsing introduced by Bryan Ford Followed by various approaches over improvement of packrat parsing to reduce the memory requirement. This paper also describes the approaches to handle the left-recursion problem for PEG. The described Approaches handle the direct and indirect left-recursion problem for PEG. The paper concludes with the application of packrat parsing and throws a light on future scope in packrat parsing.

Keywords: PEG; Recursive Descent Parser; Packrat Parser; TDPL

I. INTRODUCTION

Parsing is the act of discovering the structure of text with respect to a particular grammar and parser is a program to facilitate this parsing process. In order to create a parser for a particular language, or even just to reason formally about what kinds of strings are meaningful or well-formed in that language, we must have a way of expressing and understanding the language's syntactic structure. For this purpose we commonly use a grammar, which is a concise representation of the structure of one language, expressed in another (ideally very small and simple) language. Being able to express the syntactic structure of a language concisely with a grammar is especially important for programming languages and other languages expressly designed for precision and machine-readability, because grammars can be used to reason about the properties of a language mathematically or with the help of mechanical tools.

The most common type of grammar in use today is the context-free grammar (CFG), typically expressed in the ubiquitous Backus-Naur Form (BNF). A context-free grammar essentially specifies a set of mutually recursive

rules that describe how strings in the described language may be written. Each rule or production in a CFG specifies one way in which a syntactic variable or nonterminal can be expanded into a string. Bottom up parsing recognizes the smallest constructs first by applying productions to group tokens, then grouping those constructs into larger constructs and top down does in reverse way. Parsing algorithms such as LR (k) and LL (k) parsing were developed alongside the first generation of high level programming languages to parse subsets of the full class of CFGs. By limiting the class of parseable languages, such algorithms are both time and space efficient, considerations that were of huge practical importance given the performance limitations of hardware available at the time.

Another method of expressing syntax formally is through a set of rules describing how the strings in a language are to be read rather than written. This approach is called recursive descent parsing. Recursive-descent parsers have been around for a while. Already in 1961, Lucas [16] suggested the use of recursive procedures that reflect the syntax of the language being parsed. His design did not allow backtracking; an explicit assumption about the syntax was identical to

what later became known as LL (1). The great advantage of recursive-descent parsers is transparency: the code closely reflects the grammar, which makes it easy to maintain and modify. However, manipulating the grammar to force it into the LL (1) mold can make the grammar itself unreadable. The use of backtracking removes the LL (1) restriction. Complete backtracking, meaning an exhaustive search of all alternatives, may require an exponential time. A reasonable compromise is limited backtracking, also called "fast-back" in [17]. In that approach, we discard further alternatives once a sub-goal has been recognized. Limited backtracking was adopted in at least two of the early top-down designs: the Atlas Compiler of Brooker and Morris [18, 19], and TMG (the TransMoGrifier) of McClure [20]. The syntax specification used in TMG was later formalized and analyzed by Birman and Ullman [21, 22]. It appears in [23] as "Top-Down Parsing Language" (TDPL) and "Generalized TDPL" (GTDPL). TDPL was developed at around the same time most of the classic CFG parsing algorithms were invented, but at that time it was used only as a formal model for the study of certain top-down parsing algorithms. The speed of modern computers means that relatively inefficient approaches to parsing are now often practical. For example, Earley's algorithm [24] can parse the entire class of CFGs; while it is $O(n^3)$, even a simple implementation can parse in the low thousands of lines per second [25]. For many people, parsing is a solved problem: there are a wide variety of well understood algorithms, with a reasonable body

ALTHOUGH THE PARSING PROBLEM IS SUPPOSED TO BE SOLVED, COMPILER DESIGNERS STILL FACE SOME LIMITATIONS WHILE DESIGNING THE COMPILER USING EXISTING WIDELY TECHNIQUES:-

1. From the Perspective of Language Extensibility

Using a parser generator to create a parser has an important advantage over a handwritten parser: the grammar provides a concise specification of the corresponding language. As a result, we generally expect it to be easier to modify the machine-generated parser than the handwritten one. However, LALR (1) grammars for the popular Yacc tool [26] and similar parser generators are fairly brittle in the face of change. A grammar writer can avoid the need for disambiguation

by factoring such prefixes by hand, but this requires extra effort and obfuscates the language specification.

2. Many sensible syntactic constructs are inherently ambiguous

When expressed in a CFG, commonly leading language designers to abandon syntactic formality and rely on informal metarules to solve these problems. The ubiquitous "dangling ELSE" problem is a classic example, traditionally requiring either an informal meta-rule or severe expansion and obfuscation of the CFG.

3. An additional problem common to both LR and LL

Parser generators are the separation of lexing and parsing:

This can make it unnecessarily hard to add new tokens to a grammar.

4. Limited lookahead Capability

As mentioned above LR (k) and LL (k) algorithms uses k symbols of lookahead in parsing an expression. Typically k is 2 for most of these algorithms because going further requires more resources and complicates the grammar.

II. METHODS AND MATERIAL

A. Related work

Packrat parsing is a novel technique for implementing parsers in a lazy functional programming language. A packrat parser provides the power and flexibility of top-down parsing with backtracking and unlimited lookahead, but nevertheless guarantees linear parse time. Any language defined by an LL(k) or LR(k) grammar can be recognized by a packrat parser, in addition to many languages that conventional linear-time algorithms do not support. This additional power simplifies the handling of common syntactic idioms.

Parsing Expression Grammar (PEG) is a new way to specify syntax, by means of a top-down process with limited backtracking. It can be directly transcribed into a recursive-descent parser. The parser does not require a separate lexer, and backtracking removes the usual LL(1) constraint. This is convenient for many applications, but there are two problems: PEG is not well understood as a language specification tool, and backtracking may result

in exponential processing time. Excessive backtracking does not matter in small interactive applications where the input is short and performance not critical. But, the author had a feeling that the usual programming languages do not require much backtracking

a. Motivation

The idea to choose this topic is to address the following problems arising while implementing packrat parsing.

1. Space Consumption

Probably the most striking characteristic of a packrat parser is the fact that it literally squirrels away everything it has ever computed about the input text, including the entire input text itself. For this reason packrat parsing always has storage requirements equal to some possibly substantial constant multiple of the input size. In contrast, LL (k), LR (k), and simple backtracking parsers can be designed so that space consumption grows only with the maximum nesting depth of the syntactic constructs appearing in the input, which in practice is an often order of magnitude smaller than the total size of the text. Although LL (k) and LR (k) parsers for any nonregular language still have linear space requirements in the worst case, this “average-case” difference can be important in practice. Even with such optimizations a packrat parser can consume many times more working storage than the size of the original input text

Tabling everything consumes main memory at a high rate and so risks starting thrashing, thus dropping the program from DRAM speed to disk speed. While theoretician may say the performance is still linear, that will not prevent complaints from users. The fact that many languages nowadays (including Java and Mercury) include a garbage collector (which must scan the tables at least once in a while, but will not be able to recover memory from them) just makes this even worse. For this reason there are some application areas in which packrat parsing is probably not the best choice. For example, for parsing XML streams, which have a fairly simple structure but often encode large amounts of relatively flat, machine-generated data, the power and flexibility of packrat parsing is not needed and its storage cost would not be justified.

b. Objective & Scope of Study

The main objective behind this research work is to reduce the space consumption required for memoization with guarantee of linear parse time. Another aim is to avoiding the mutual recursive function calls. The scope of study is limited to implementation of efficient parser for parsing expression grammar. The efficiency of this parser will be measured from two perspectives mainly reduction in storage requirement for memorization and avoiding the mutual recursive function calls of parser to improve the efficiency directly, it helps to expand the applicability of packrat parsing in broader areas.

Although PEGs are a recent tool for describing grammars introduced by Ford in [1] with implementation of the packrat parser in Haskell programming language called peppy, their theory has solid foundations. Ford [2] showed how they can be reduced to TDPLs from the 1970s. The semantic predicates have also been successfully applied in the ANTLR LL (k) parser.

In [3] Roman shows that primitive recursive-descent parser with limited backtracking and integrated lexing is a reasonable possibility for parsing Java 1.5 where performance is not too critical. Also in [4] he shows that PEG is not good as a language specification tool. The most basic property of a specification is that one can clearly see what it specifies. And this is, unfortunately, not true for PEG. Further with slight modification in C grammar it gives reasonable performance.

And also in [5] he shows that the classical properties like FIRST and FOLLOW can be redefined for PEG and are simple to obtain even for a large grammar. One difference is that instead of letters are terminal expressions, which may mean sets of letters, or strings. FIRST and FOLLOW are used to define conditions for choice and iteration that are analogous to the classical LL(1) conditions, although they have a different form and meaning. Checking these conditions produces useful information like the absence of reprocessing or language hiding. This helps to locate places that need further examination. Unfortunately, most results obtained here have the form of implications that cannot, in general, be reversed. The properties FIRST and FOLLOW are kind of upper bounds, and conditions using them are sufficient, but not necessary. This results in false

warnings. In particular, the lookahead operator "!" may trigger a whole avalanche of them. This paper addresses a need for proper handling of this operator as a future work.

In [6] a new approach is proposed for implementing PEGs, based on a virtual parsing machine, which is more suitable for pattern matching. Each PEG has a corresponding program that is executed by the parsing machine, and new programs are dynamically created and composed. The virtual machine is embedded in a scripting language and used by a pattern matching tool.

In [7] Robert grimm parsing technique which has been developed originally in the context of functional programming languages, practical for object-oriented languages. Furthermore, this parser generator supports simpler grammar specifications and more convenient error reporting, while also producing better performing parsers through aggressive optimizations.

In [8] the addition of cut operators was proposed to parsing expression grammars (PEGs), on which packrat parsing is based, to overcome its disadvantage. The concept of cut operators, which was borrowed from Prolog [6], enables grammar writers to control backtracking. By manually inserting cut operators into a PEG grammar, an efficient packrat parser that can dynamically reclaim unnecessary space for memoization can be generated. To evaluate the effectiveness of cut operators, a packrat parser generator called Yapp was implemented that accepts cut operators in addition to ordinary PEG notations. The experimental evaluations showed that the packrat parsers generated using grammars with cut operators inserted can parse Java programs and subset XML files in mostly constant space, unlike conventional packrat parsers. In [9] methods are proposed that achieve the same effect in some practical grammars without manually inserting cut operators. In these methods, a parser generator statically analyzes a PEG grammar to find the points at which the parser generator can insert cut operators without changing the meaning of the grammar and then inserts cut operators at these points.

Paper [10] argues (a) packrat parsers can be trivially implemented using a combination of definite clause grammar rules and memoing, and that (b) packrat parsing may actually be significantly less efficient than

plain recursive descent with backtracking, but (c) memoing the recognizers of just one or two nonterminals, selected in accordance with Amdahl's law, can sometimes yield speedups.

Warth [11] presents a modification to the memoization mechanism used by packrat parser implementations that makes it possible for them to support (even indirectly or mutually) left-recursive rules. While it is possible for a packrat parser with this modification to yield super-linear parse times for some left-recursive grammars, experiments were carried out to show that this is not the case for typical uses of left recursion.

Finally, in [15] Coq formalization of the theory of PEGs is described and, based on it, a formal development of TRX: a formally verified parser interpreter for PEGs. This allows writing a PEG, together with its semantic actions, in Coq and then to extract from it a parser with total correctness guarantees. That means that the parser will terminate on all inputs and produce parsing results correct with respect to the semantics of PEGs. Considering the importance of parsing, this result appears as a first step towards a general way to bring added quality and security to all kinds of software.

B. Proposed Work

Packrat Parsing is a variant of recursive decent parsing technique with memoization by saving intermediate parsing result as they are computed so that result will not be reevaluated. It is extremely useful as it allows the use of unlimited look ahead without compromising on the power and flexibility of backtracking. However, Packrat parsers need storage which is in the order of constant multiple of input size for memoization. This makes packrat parsers not suitable for parsing input streams which appears to be in simple format but have large amount of data.

In this project instead of translating productions into procedure calls with memoization, an attempt is made to eliminate the calls by using stack without using memoization for implementation of ordered choice operator in Parsing expression Grammar (PEG). The experimental results show the possibility of using this stack based algorithm to eliminate the need of storage for memoization to improve the performance of packrat parser in terms of storage space.

III. RESULTS AND DISCUSSION

It is expected that the proposed approach improve the performance of packrat parser from two perspectives mainly reduction in storage requirement for memorization and avoiding the mutual recursive function calls of parser.

IV. CONCLUSION

Packrat parsers need storage which is in the order of constant multiple of input size for memoization. This makes packrat parsers not suitable for parsing input streams which appears to be in simple format but have large amount of data. The future work will be translating productions into procedure calls with memoization, an attempt is made to eliminate the calls by using stack without using memoization for implementation of ordered choice operator in Parsing expression Grammar (PEG). The experimental results show the possibility of using this stack based algorithm to eliminate the need of storage for memoization to improve the performance of packrat parser in terms of storage space.

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Mitigation of Intruders and TCP bad Connection Detection in WAN Environment using Wireshark

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ABSTRACT

A couple of people achieve certifiable work over the Internet, and some must secure tricky or restrictive data. Ordinarily, a firewall's inspiration is to keep the intruders out of the framework while letting to do the occupation. In this proposition work critical highlight is on setup and progression of filtering standards to deny/grant the framework action. These rules are created using the announcement, which support distinctive highlights like the relationship taking after highlight of IP Tables is an incredibly profitable thing. It can be used to deflect most TCP hijackings for non-IP Masqueraded clients that experience the evil impacts of poor TCP plan number randomization. Correspondingly, it can be used to turn away UDP bundle.

Keywords: TCP, UDP, IP, Wireshark, WAN, ICMP, SMTP, ICMP, DN, Spoofing, DDoS Attack

I. INTRODUCTION

Computer networks by their very nature are designed to allow the flow of information. Network technology is such that, today, you can sit at a workstation in Delhi, and have a process connected to a system in London, with files mounted from a system in California, and be able to do work just as if all of the systems were in the same room.

Impeding the free flow of data is contrary to the basic functionality of the network, but the free flow of information is contrary to the rules by which companies and governments need to conduct business. Information and sensitive data must be kept insulated from unauthorized access yet security must have a minimal impact on the overall usage of the network.

The purpose of a firewall is to provide a point of defense and a controlled and audited access to services, both from within and to an organizations private network. This requires a mechanism for selectively permitting or blocking traffic between the Internet and the network being protected. Routers can control traffic at an IP level, by selectively permitting or denying traffic based on

source/destination address or port. Hosts can control traffic at an application level, forcing traffic to move out of the protocol layer for more detailed examination. To implement a firewall that relies on routing and screening, one must permit at least a degree of direct IP-level traffic between the Internet and the protected network.

Network Security is a branch of Information Security which deals with systems that operate primarily at the network level. This includes the management of network devices such as Firewalls, Wiresharks, Proxies, Wireshark solutions, Wireshark, as well as the management and protection of the network infrastructure.

Commerce has become one of the vital parts of the modern life. Online payment is the supportive application for the payment of money for the products we buy. For the past years online security breach created a major problem and lots of money had been stolen. The proposed document deals by securing the payment through iris recognition [1]. This method also adds the method of using visual cryptography for securing the user credentials. This visual cryptography method was formerly invented by Moni Naor and Adi Shamir in 1994[6].

II. METHODS AND MATERIAL

A. Related Work

Without security measures and controls in place, data might be subjected to an attack. Some attacks are passive, meaning information is monitored others are active, meaning the information is altered with intent to corrupt or destroy the data or the network itself. Networks and data are vulnerable to any of the following types of attacks if do not have a security plan in place.

2.1 Wireshark : A denial-of-service attack (DoS attack) or distributed denial-of-service attack (DDoS attack) is an attempt to make a computer resource unavailable to its intended users. Perpetrators of DoS attacks typically target sites or services hosted on high-profile web servers such as banks, credit card payment gateways, and even root name servers. One common method of attack involves saturating the target (victim) machine with external communications requests, such that it cannot respond to legitimate traffic, or responds so slowly as to be rendered effectively unavailable.

2.2 Website Defacement: Website defacement is an attack on a website that changes the visual appearance of the site. These are typically the work of system crackers, who break into a web server and replace the hosted website with one of their own. Website Defacement increasing tremendously experts no longer keep record of defaced sites. Attacker probes web services through normal Internet connection and modifies HTML or JAVA code, which changes website.

2.3 Viruses and Worms: viruses are computer programs that make computer systems not to work properly. There is a subtle difference between Virus and Worm; both can replicate itself, but when traveling on the network. Virus can't travel on its own on the network, whereas Worms can travel on its own without anything. It doesn't actually need any infected file to stick in. Viruses and Worms are really annoying problem for all systems. The ultimate aim of these Viruses and Worms are making a good working system to malfunction and sometimes worms can sniff in and steal private information to send it to its creator. Earlier days, Viruses were spreading through floppy diskettes. Nowadays, it spreads

through Internet, which is a broad gateway for these malicious programs.

2.4 Spoofing: The exact meaning of spoofing is deceiving others. It is actually fooling other computer users to think that the source of their information is coming from a legitimate user. There are several methods of spoofing. Some of them are as follows:

IP Wireshark

It changes the source-address of an IP packet to show that it is from a legitimate source, but really it might be coming from a hacker. Thus, the hacker attacks the system and at the same time hides his IP address from the eyes of firewalls. The targeted systems for IP Spoofing are UNIX systems and RPC services.

DNS Spoofing

This will direct the users to incorrect location. In other words, directing the users to a different website and collecting personal information through web forms illegally. DNS Spoofing is actually very dangerous threat, because DNS is the one that manages domain names and creates equivalent IP addresses. Suppose, if the domain name is `www.dell.com` `<http://www.dell.com/>` and DNS calculates an IP address that is related to a hacker's site, the users will be directed to the hacker's website. If the hacker maintains his website similar to dell, then the users may think that the hacker's website is the real dell- website and may provide all bank or credit card information when trying to purchase something. Now, the hacker can get that information easily without any difficulties.

B. Proposed Work

Proposed system will used the concept of classification to check abnormality in the network and host both. Classification will be based on the normal and abnormal profile of the network

1. Wireshark network data after capturing in real time our anomaly classifier checks the following-
 - Check the anomaly in TCP packet and behavior during making connection.
 - DNS activities for the intrusion of flooding
 - UDP for UDP flood attack.
 - And ARP/RARP for LAN (second layering

attack).

- a. Sniff real time traffic from wireshark
- b. Extract TCP protocol traffic and UDP
- c. Apply IDS detection scheme

```

{
    Calculate the length and Control bits of the TCP protocol
    Len[TCP]
    Len [TCP]
    COUNTER (UDP)
    COUNTER(DNS_ERRPR per minute)
    void TCP_cntr ()
    {
        If ( S-F > 23)
            FLAG = "Alert- traffic suspicious"
        Else
            FLAG = OK
    }
}

```

Following Key point has been set and planned while implementing the proposed work:

Threshold:

The value of threshold for anomaly based IDS for the Flow matrices:

```

S-F > 23
AND
S-F > 17

```

III. RESULTS AND DISCUSSION

RESULTS I/O Graph

Most important facility provided by Wireshark is to draw I/O graph of the captured packets. At a time we can draw graph of five protocols of different colours with different tick interval and pixels per tick on X-axis and units and scale on Y-axis. Styles can also be changed instead of lines shown you can select impulse, Fbar, dot from the drop down and you get a different look of the graph. A line graph of TCP, HTTP, and ARP protocol is shown to you in Figure 1

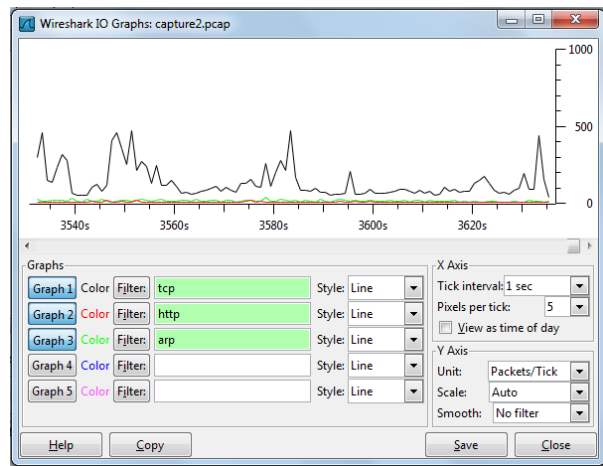


Figure 1. I/O Graph of Captured Trace

Network traffic from a live network is shown by taking various traces and monitoring and analysis is done on that captured files and then statistics is built. Detailed analysis and summary as well as conversations between two end points are shown. One interesting option which Wireshark give is objects which we captured or say user who are on the network using whatever sites can be listed in this object list. Graphs of captured files are shown and other attractive features are shown which make Wireshark a great tool for network analysis. The Output graphs generated through captured packets provide details of network dynamics and insight into the problems that lead to network slowness, network performance etc.

The main objective to concrete on developing a novel approach to finding out unknown types of attack using the anomaly (or profile based) approach, with producing low false rate integrating the automatic response mechanism against intrusive activity.

ICMP Protocol: - Internet Control Message Protocol. It is a part of IP protocol and seen by Type 8 echo (ping) request in the window pane. Computer send echo request, it should receive echo reply in response as shown in Figure 2. Next Packet is transmitted back from remote computer and is marked as

34228	15:26:08	192.168.26.136	192.168.25.1	ICMP	74 Echo (ping) request	id=0x0001, seq=5/1280, ttl=128
34229	15:26:08	192.168.25.1	192.168.26.136	ICMP	74 Echo (ping) reply	id=0x0001, seq=5/1280, ttl=64
34365	15:26:09	192.168.26.136	192.168.25.1	ICMP	74 Echo (ping) request	id=0x0001, seq=6/1536, ttl=128
34366	15:26:09	192.168.25.1	192.168.26.136	ICMP	74 Echo (ping) reply	id=0x0001, seq=6/1536, ttl=64
34732	15:26:10	192.168.26.136	192.168.25.1	ICMP	74 Echo (ping) request	id=0x0001, seq=7/1792, ttl=128
34745	15:26:10	192.168.25.1	192.168.26.136	ICMP	74 Echo (ping) reply	id=0x0001, seq=7/1792, ttl=64

Figure 2. ICMP Protocol showing request /reply response

HTTP request: Http request and transmission from one source to destination starting with sequence no. 0 in packet 974 in Figure 3. and GET message in packet 980. But this is not found by particular destination so it send HTTP/1.0 Not found message to source and end this conversation with Wireshark message in packet 987.

974	15:33:00	192.168.25.20	192.168.25.1	TCP	66	50591 >	http-alt [SYN]	Seq=0	Win=8192	Len=0	MSS=1460	WS=4	SA
975	15:33:00	192.168.25.1	192.168.25.20	TCP	66	http-alt >	50591 [SYN, ACK]	Seq=0	Ack=1	Win=5840	Len=0	MSS=1	
976	15:33:00	192.168.25.20	192.168.25.1	TCP	60	50591 >	http-alt [ACK]	Seq=1	Ack=1	Win=17520	Len=0		
980	15:33:00	192.168.25.20	192.168.25.1	HTTP	536	GET	http://www.svalza.com/search-results.php?id=4&net=160see						
981	15:33:00	192.168.25.1	192.168.25.20	TCP	60	http-alt >	50591 [ACK]	Seq=1	Ack=503	Win=6912	Len=0		
983	15:33:00	192.168.25.20	192.168.25.1	TCP	60	50589 >	http-alt [ACK]	Seq=436	Ack=339	Win=17180	Len=0		
984	15:33:00	192.168.25.20	192.168.25.1	HTTP	414	GET	http://www.dealsryou.biz/FavIcon.ico HTTP/1.1						
985	15:33:00	192.168.25.1	192.168.25.20	TCP	60	http-alt >	50589 [ACK]	Seq=339	Ack=796	Win=7984	Len=0		
986	15:33:00	192.168.25.1	192.168.25.20	HTTP	560	HTTP/1.0	404 Not Found (text/html)						
987	15:33:00	192.168.25.1	192.168.25.20	TCP	60	http-alt >	50589 [FIN, ACK]	Seq=845	Ack=796	Win=7984	Len=0		

Figure 3. HTTP Protocol showing conversation between two end points

IV. CONCLUSION

In this paper, work has been done on capturing the live traffic using the network protocol analyzer Wireshark and on the basics of analyzed data packets further explored and designed the script using IPtables to allow/deny the network traffic on the basics of the IP address of the computer sending the packets, the IP address of the computer receiving the packets, the type of packet (TCP, UDP, etc.), The port number, and URL's etc. This enables us to protect our system from a wide variety of hazards, including service attacks and hack attempts. The script discussed here can be used for the purpose of network Security. Web traffic sent on HTTP can be analyzed. Denying of ICMP, SMTP data packets. Configuring of host based packet filtering firewall to deny various type of attacks like spoofing, Stop bad packets, Stop Xmas Tree type scanning, null scanning, syn flood and, ping flood attack etc. Deny P2P file sharing traffic.

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Recycle Of High Quality Water From Sewage

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ABSTRACT

Water is a valuable resource for all living beings. Availability of water without chemical and microbiological contaminants is getting fewer these days. To overcome this challenge, we have made an attempt to convert sewage water to reusable water. The sewage from our college consists of effluents from hostel, canteen, laboratories and other environmental pollutants. The experimental setup consists of Stainless steel Backwashable Microfilter, Ultrafilter membrane and Reverse Osmosis membrane. Raw sewage water is pumped through this setup and the samples are collected at appropriate positions. The sample containing chemical parameters like Total Suspended Solids (TSS), pH, Conductivity, Bio-chemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Chlorides and Sulphates were analyzed and reported. The samples are also tested for the presence of bacterial colonies and the results are reported. All these results provided supporting evidence that the RO permeate water can be reused. Our future work aims to utilize the sewage sludge for the production of Bio-gas using Anaerobic Membrane Bio-reactor.

Keywords: Microfilter, Membrane Assembly, RO Membrane, Chemical Analysis

I. INTRODUCTION

Water is an essential resource. Increase of chemical and microbial contaminants make it unfit for reuse. In the current scenario water pollution is one of the greatest problems that could be resolved in order to bring out ecological balance. One of the finest methods for reducing water pollution is the sewage water treatment. Comprehensive sewage water treatment is an eco-friendly activity. It consists of several physical, chemical and biological treatment steps [1]. Physical treatment step involves filtration, clarification and reverse osmosis. Chemical treatment involves the addition of chemicals like urea, Diammonium phosphate and sodium hypochlorite. Biological treatment involves the growth of microbes in the aeration tank where Aerobic Biological Oxidation process takes place in which organic matter is converted into carbon dioxide, water, ammonia and new cells [2]. In this research work, a series of membranes are assembled for treatment of sewage and we have analyzed some of the important

chemical and microbiological parameters at various sampling points. Based on the results of the analysis, the quality of the RO permeate water is compared with the Tap water and reported.

- Stainless steel Backwashable Microfilter.
- Ultrafilter membrane.
- Reverse Osmosis membrane.
- Booster Pump and pipes and fittings.

Block diagram

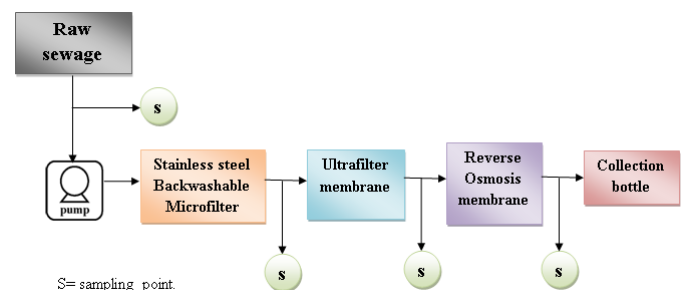


Figure 1: Experimental Setup

II. METHODS AND MATERIAL

The sewage water is first sent to the Stainless steel Backwashable Microfilter in which, solids are separated while the water enters into the Ultrafilter membrane. Samples are collected at the sampling points for analysis. The Total Suspended Solids (TSS) and the microbial content present in the water are greatly reduced in Ultrafilter [3]. Permeate from Ultrafilter is

sent to Reverse Osmosis (RO) membrane for further processing whereas the reject from Ultrafilter is utilized for backwashing the Microfilter. The RO membrane still reduces the color, turbidity and conductance. The RO membrane outlet is collected in sample bottles. The experimental setup is shown in Fig.1. Chemical and microbiological analyses of the samples are carried out based on the procedures given by Indian Standards [4].

III. RESULTS AND DISCUSSION

Table 1: Chemical Analysis of influent sewage and effluents after different treatments

Chemical parameters	Sewage Sample (1)	Microfilter Sample (2)	Ultrafilter Sample (3)	Reverse Osmosis (4)	Tap water sample (5)
pH	6.65	6.78	6.74	6.8	6.75
TSS (mg/l)	2966.5	0	0	0	0
Conductivity (mS)	4.29	4.21	1.25	0.751	3.49
BOD (mg/l)	11.5	0	0	0	0
COD (mg/l)	24	56	40	0	8
Chlorides (mg/l)	425.4	212.7	141.8	10	212.7
Sulphates (mg/l)	965.6	504.21	121.41	76.1	730.17

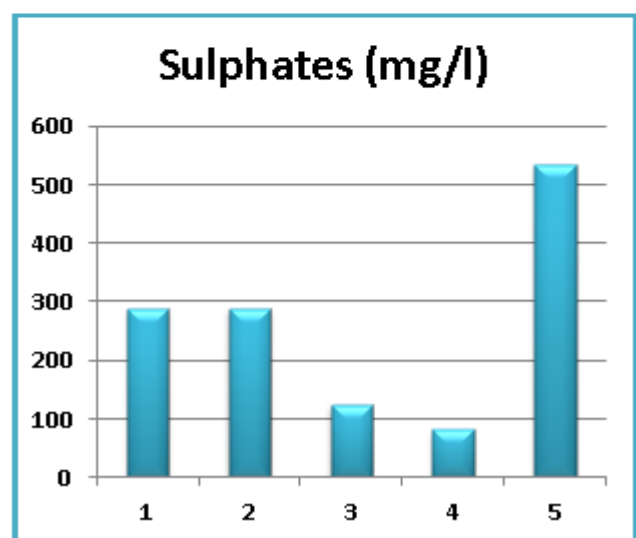
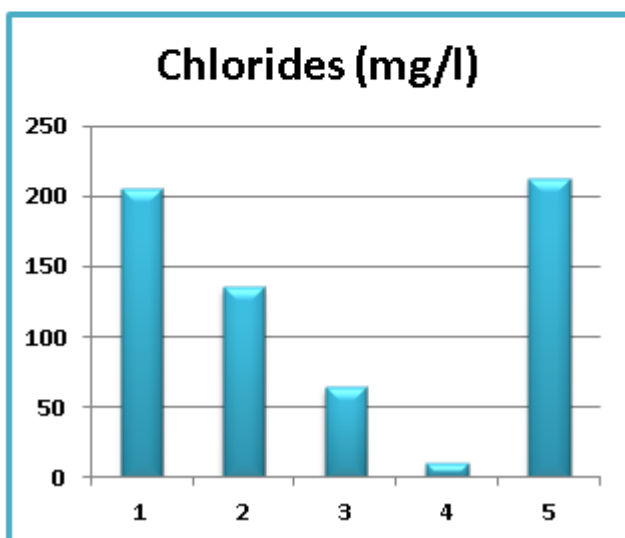
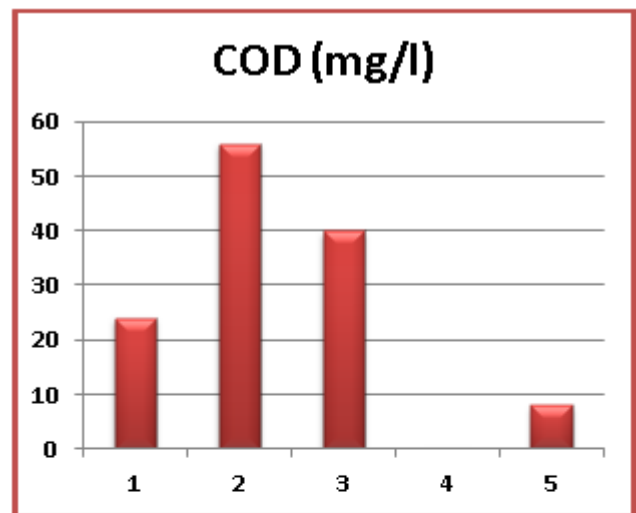
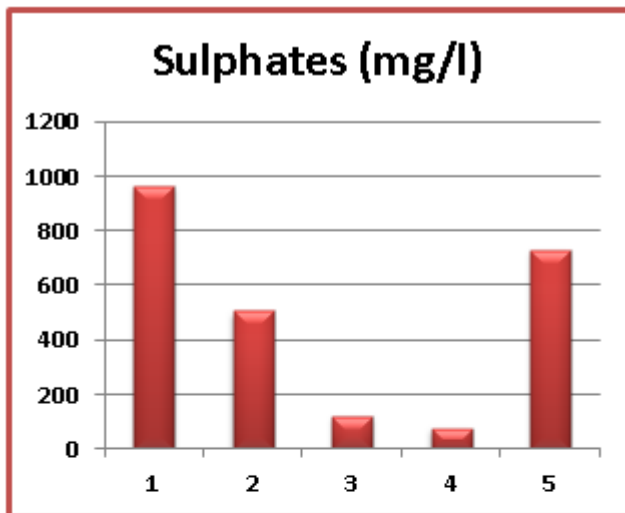
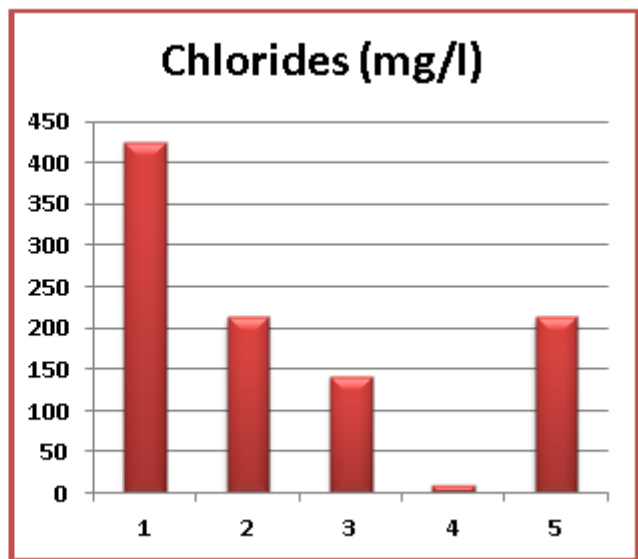
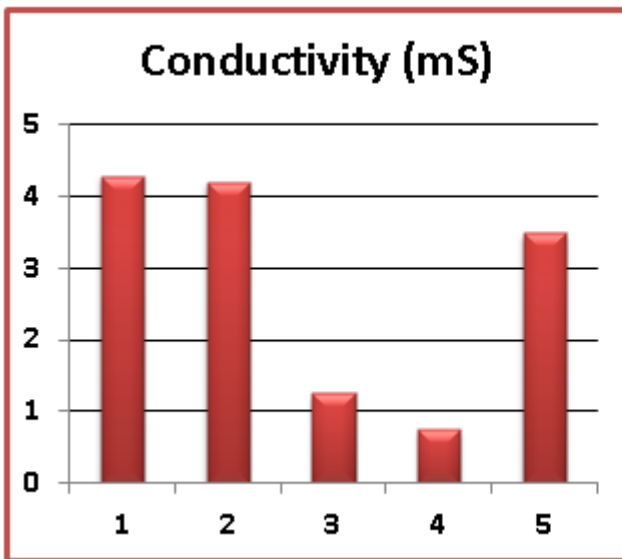
The chemical and microbial analysis of the samples at various sampling points is given in Table 1, 2 and 3. Results indicate that raw sewage is slightly acidic and having high TSS (Total Suspended Solids), Conductance, BOD (Biochemical Oxygen Demand) and COD (chemical Oxygen Demand). After passing through the series of membranes, chemical parameters like conductance, sulphates and chlorides, BOD and COD have reduced. The reverse osmosis sample gives better results than tap water and it is of high quality. On the other hand, microbial analysis shows the absence of colony forming units in the Ultrafilter and RO samples.

Table 2: Chemical Analysis of Influent sewage and effluents after different treatments

Chemical parameters	Sewage Sample (1)	Microfilter Sample (2)	Ultrafilter Sample (3)	Reverse Osmosis (4)	Tap water sample (5)
pH	7.42	7.36	7.14	6.68	6.75
TSS (mg/l)	1400	0	0	0	0
Conductivity (mS)	3.25	3.19	3.18	0.65	3.49
BOD (mg/l)	17.8	0	0	0	0
COD (mg/l)	20.0	32.0	28.3	0	10
Chlorides (mg/l)	205.6	134.8	63.8	10.6	212.7
Sulphates (mg/l)	288.1	288.1	123.48	82.32	535.08

Comparison of chemical parameters

Iteration -1 parameters are shown in red colors and Iteration -2 parameters are shown in blue colors.



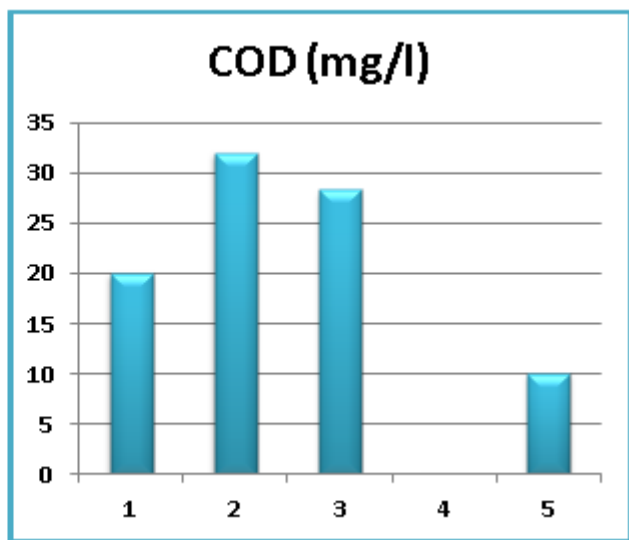
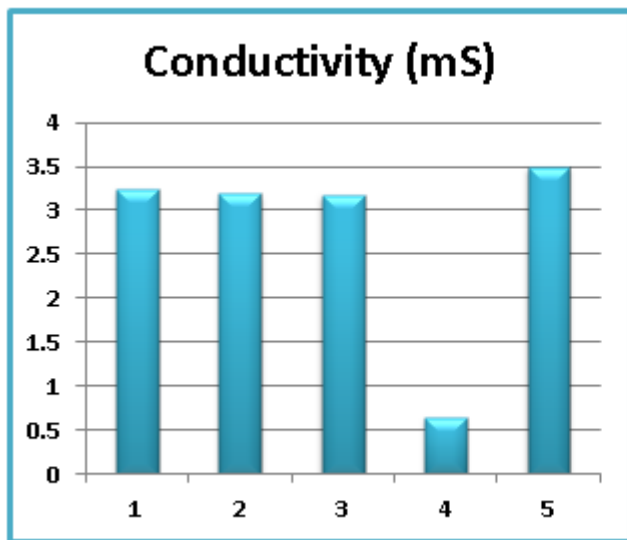


Table 3: Results of microbial analysis showing the reduction in count of bacterial colonies

Sewage sample (cfu/ml)	Microfilter sample (cfu/ml)	Ultrafilter sample (cfu/ml)	Reverse Osmosis sample (cfu/ml)	Tap water sample (cfu/ml)
2.67	1.32	0	0	0.55

IV. CONCLUSION

Results of chemical and microbial analyses of Reverse Osmosis outlet shows that the permeate water is purer than the tap water. Number of bacterial colonies in RO permeate is zero compared to that of tap water is 0.55×10^7 cfu/ml. Chemical analysis shows that Conductivity of RO permeate and Tap water are 0.751 mS and 3.49 mS, sulphates of RO permeate and Tap water are 76.1 ppm and 730.17 ppm and chlorides for RO permeate and Tap water are 10 ppm and 212.7 ppm respectively. BOD and COD are also lower for RO permeate than the Tap water. This clearly indicates that RO permeate water can be used for High-end applications like process water for Industries. This water can be used for Toilet flushing and other domestic applications other than drinking.

The Ultrafilter outlets which also do not have biological colonies can be utilized for gardening. Based on the requirement of recycle water for gardening and other applications, this process can be flexibly used to achieve better economy.

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Comparative Analysis of Milk Quality Collected from Holstein Cows and Sicilo-Sarde Sheep Breed in Tunisia

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ABSTRACT

The objective of this study was to compare the quality of milk produced from Tunisian Holstein cows and Sicilo-Sarde ewes during their milking period. The experience concerned 80 Holstein (mean age 5.2 years; mean weight = 530 kg) and 54 of Sicilo-Sarde ewes (mean age = 6 years; mean weight = 45 kg). The milk samples were taken from the morning and the afternoon milking and added with potassium dichromate. Refrigerated samples were used to determine milk content in fat (MG) and protein (MP) using Milkoscan 4000 after 24 hours of conservation for both cows and ewes. ANOVA was carried using SAS software (version 1997). The results showed that for cows the mean rate of fat (MG) and protein (MP) was respectively 3.3 ± 0.5 % and 3.4 ± 0.5 %. However, for ewe MG and MP were respectively 7.3 ± 0.7 % and 6.3 ± 1.1 %. We found also that the milk component in MG and MP cow's varied during the milking period ($p < 0.05$) compared to the milk ewe's which present only a variation in MG component during the milking period ($p < 0.05$). Besides, the total milk production for ewes was affected by the sex of foetus and the rank of milking ($p < 0.05$). We conclude that the milk quality of Tunisian Sicilo-Sarde ewe contains rates of fat and protein greater than those in Tunisian Holstein cows. The chemical quality of the two kinds of milks is also affected by the stage of lactation. Moreover, milk ewe production is also affected by the sex of foetus and the rank of milking.

Keywords: Quality of Milk, Holstein Cows, Sicilo-Sarde Ewes, Fat, Protein

I. INTRODUCTION

Milk is the secretion result of mammary gland of the mammal animals. It is complex and possesses many chemical and physical components [1]. These later varied among species. In fact, some studies reported that cow milk contains 3.8% fat, 4.6% lactose, 3.1% proteins and 87.5% water [2]. However, milk sheep contains 6% fat, 5.2% proteins and 4.9% lactose [3]. The components of the two kinds of milks are important not only for the nourishment of young, but also for cheese processing [4]. That's why an analysis of milk quality of the dairy cows and sheep is allowed to determine differences in rate component and which factors influencing the yield production [5].

In this context, our paper aims to compare the milk quality of two Tunisian dairy species: cows and ewes.

II. METHODS AND MATERIAL

Animals

The study undertook on 80 Holstein cows (mean age = 5.2 years; mean height = 530 kg) and 54 Sicilo-Sarde ewes (mean age = 6 years; mean height = 45 kg) conducted respectively on intensive and semi-extensive system in the north region of Tunisia. The cows were in free stall housing.

Milk Sample Collection

Milk sample (20 ml) was taken during the milking periods of cows and ewes. For dairy cows, milk samples were taken twice a day, from the morning and the afternoon milking. For dairy ewes, milk samples were taken once a day, from the afternoon milking. Both kind of samples were added with potassium dichromate and refrigerated until the quality analysis.

Milk Quality Analysis

The milk quality analysis was performed in the laboratory of the office of livestock and pasture of Tunisia after 24 hours of conservation. Refrigerated samples of cows and ewes were used to determine milk content in fat (MG), protein (MP) using Milkoscan 4000.

Statistical Analysis

Statistical analysis was carried with SAS software. ANOVA was carried using the General Linear Model procedure (GLM) to determine variation factors on milk quality.

III. RESULTS AND DISCUSSION

Milk production and quality

The results showed that the mean daily milk production varied from 0.4 ± 0.07 L for ewes to 17 ± 7.5 L for cows. We found that the total milk production varied from 108.5 ± 17.6 to 115.7 ± 24.4 L respectively for primiparous and multiparous ewes ($p < 0.05$).

Moreover, for cows the mean rate of fat (MG) and protein (MP) was respectively 3.3 ± 0.5 and 3.4 ± 0.5 %. However, for ewe MG and MP were respectively 7.3 ± 0.7 and 6.3 ± 1.1 % (Figure 1).

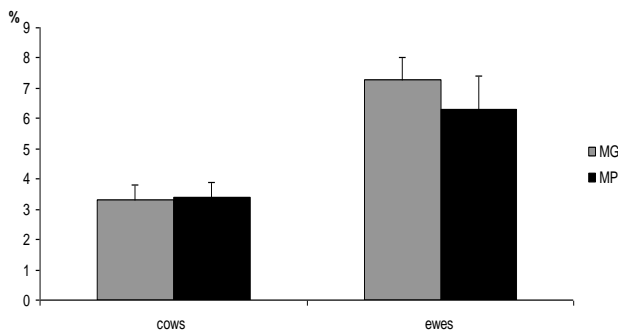


Figure 1: Variations of fat (MG) and protein (MP) in Tunisian Holstein cow and Sicilo-Sarde ewe milks.

These findings showed that the milk of the Sicilo-Sarde ewe is richer in fat and protein component than the milk of the Hostein cows. Our results are in agreement with those of Boquier and Caja [6] and Coulon et al. [7]. In fact, thanks to their highly rates in fat and protein, the milk ewes is more appropriate to cheesemaking. They reported also that it having a high rate in lactose and solid component [6, 7].

Milking Stage

Furthermore, the milk component in MG ewe's varied during the milking period ($p < 0.05$). In fact, we found that only MG increased at the end of the milking stage compared to the beginning of the milking stage (Figure 2). However, the milk component in MG ($p < 0.1$) and MP ($p < 0.05$) cow's varied during the milking period. MP increased at the end of the milking stage compared to the beginning of the milking stage (Figure 3).

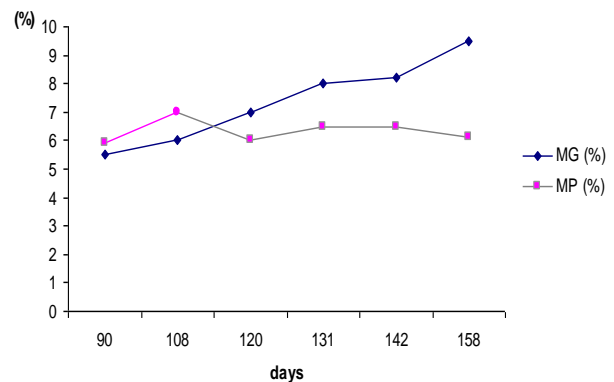


Figure 2: Variation of milk quality of Tunisian Sicilo-Sarde ewes during the milking period.

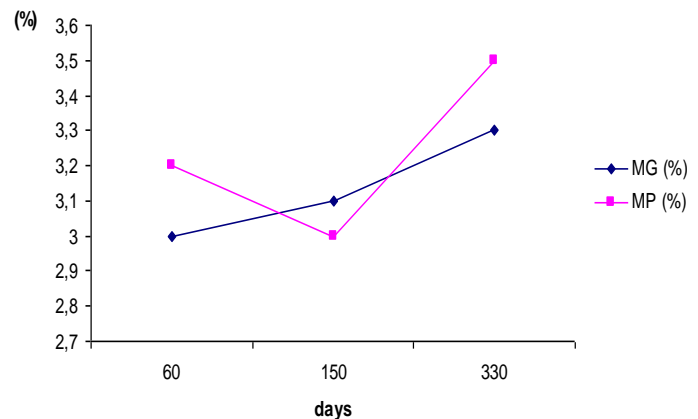


Figure 3: Variation of milk quality of Tunisian Holstein cows during the milking period.

It is clear that milks of cows and ewes are both important for human nutrition but their production and quality component are affected by several factors. In our study, we find that the production and the component in fat and protein of the two kinds of milks are affected by the milking stage. This result is agree with those reported by Coulon et al. [8], Bousslimi et al. [9]. These later have shown that mainly protein increased at the end of the milking period of cow [9,10]. However, there is

fat increasing at the end of the milking period of ewe [6]. This variation has an effect on milk coagulation and cheese yield [11].

Sex of the foetus and rang of lactation

Our statistical analysis showed that the total milk production for ewes was affected by the sex of foetus and the rank of milking ($p < 0.05$).

In this way, Djemali et al. [12] found also that the month of lambing and sex lamb affected the milk production of the ewe.

IV. CONCLUSION

Our study reports that milk of Tunisian Sicilo-Sarde ewe contains rates of fat and protein greater than those in the milk of Tunisian Holstein cows. But the chemical quality of the two kinds of milks is affected by the stage of lactation. Moreover, we found that milk ewe production is also affected by the sex of foetus and the rank of milking.

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Network Denial of Service Threat Security on Cloud Computing A Survey

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ABSTRACT

Cloud computing is one of the most important communication model nowadays since it's provides a sets of resources and multiple types of services offered through the internet. The services and resources provided by cloud computing are cheaper because of no maintenance cost required in the core of clouds, since all services were offered to the clients based on services availability by providers only and clients are free to manage and maintains the resources machines. People use the cloud computing only when they need it, for this reasons cloud computing may be called a services over internet on demand. Companies also use the clouds to reduce their operation costs by resting virtual machines for digital services from cloud providers. With the growth of data every day which require a more services and resources in cloud computing, a security issues are creates a new demands and opportunities for security models that because cloud computing facing many types of attack threats with increasing of clouds . Network Denial of services is one of the most famous attack threats that make sense in a cloud computing context and may be divided into network distributed denial of services and DNS denial of services knows as availability threats. This paper reviews the types of network denial of services attacks also classify the methods of security defences and then compare between all of them.

Keywords: Cloud computing, Denial of Service, DNS DoS, Network Distributed DoS, availability threats, Security.

I. INTRODUCTION

Cloud computing as a model enables on demand access to servers, networks, and applications provide an options for people to use the major benefits of clouds computing of flexible and scalable infrastructures, reduced implementation and maintenance costs [1]. The cloud computing data center is usually composed of thousands of commercial computers, and these computers are connected by network with computing programming model to help user to use cloud resources without concerning the details of implementation [2]. Cloud computing enables clients to access resources online through the internet, from anywhere at any time without worrying about technical management and maintenance issues of the original resources [3]. The security issues related to cloud computing are very important that because of the increasing of clouds of services and resources accessed by clients [4]. Denial of service attack has become an increasingly prevalent security threat, people realize that protecting systems against

DoS attack is also one of the key security issues. Network Distributed Denial of Service (DDoS) attacks are one of the biggest concerns for security professionals in which a multitude of compromised systems attack a single target, thereby causing denial of service for users of the targeted system. Other type of denial of services is a DNS denial of services known as Domain Name System (DNS) denial of service, it's a Domain Name System (DNS) flooding attack aims to consumption of critical system resources in order to paralyze the provided services and make them unavailable to its legitimate users [5].

This study is focusing over the security methods that used to ensure security cloud computing against the two types of network attack threats based on denial of services threats; they are distributed and DNS denial of services tacking all considerations related to the solutions of denial of services security. The rest of the paper organized as follows; Section 2 presents the concepts of the denial of services, then reviews the

threats that related to availability of cloud computing, explains the two types of threats network denial of services. Section 3 focuses on networks distributed denial of service attack methods and DNS attacks on cloud computing. Section 4 illustrates the modern defense methods against denial of services attacks.

The list of possible defenses against the two types of availability threats denial of services, and discussion in more depth of the security models related to those threats will be reviewed in section 5. Section 6 briefly review the comparison between the model of security taken as a defense technique for Network Denial of Service Threat in cloud computing. Finally section 7 concludes the paper and provides some future ideas for security in cloud computing.

II. METHODS AND MATERIAL

A. Denial of Service

Denial of service (DOS) has become an increasingly prevalent security threat, users realize that protecting systems against DoS attack is also one of the key security issues. Although DoS attack is becoming a fast growing concern. A Denial of Service attack is a method of blocking service from its intended users. The severity of this attack varies with the magnitude of loss and the duration of attack. DoS attacks could be extended to Distributed Denial of Service (DDoS) attacks which does damage in a massive scale. DoS attacks on DNS wherein attackers flood the name servers of a cloud area to disrupt resolution of resource records belonging to the area and consequently, any of its sub areas [5].

(i). Distributed Denial of Service

A distributed denial of service (D-DoS) is one in which a multitude of compromised systems attack a single target, thereby causing denial of service for users of the targeted system. The flood of incoming messages to the target system essentially forces it to shut down, thereby denying service to the system to legitimate users. A hacker begins by exploiting vulnerability in one computer system and making it the D-DoS master .It is from the master system that the intruder identifies and communicates with other systems by loading cracking tools available on the Internet on multiple compromised systems. With a single command, the intruder instructs

the controlled machines to launch one of many flood attacks against a specified target. The flood of packets to the target causes a denial of service [5].

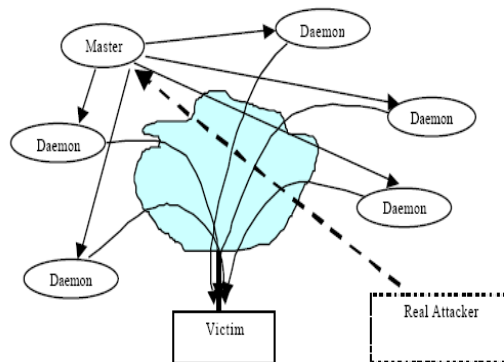


Figure 1: Distributed Denial of Service Attack Components

(ii). DNS Denial of Service

The domain name system (DNS) is a hierarchical distributed system providing the necessary mapping or binding between human comprehensible domain names and the corresponding numerical IP addresses. This mapping procedure is also known as address resolution service. In the root of this hierarchy tree is located the mapping of top level domains, like “.gr”, “.com”, “.org” etc, to the IP addresses of the corresponding authoritative DNS server. Each of these domains and the subsequent sub-domains form a specific zone.

The leaf of each zone in this hierarchy stores the mapping of a specific domain name to its IP address; this information is kept in the corresponding DNS Resource Record (RR). The main goal of any flooding attack is the consumption of critical system resources in order to paralyze the provided services and make them unavailable to its legitimate users.

Flooding attacks against DNS are similar to other well documented Internet services flooding attacks and could be launched in two distinct ways. In the first one the attacker sends a large number of bogus DNS requests either from a single or multiple sources, depending on the flooding architecture utilized for example of multiple sources flooding architecture attack against a DNS is depicted in Figure 2.

According to this scenario, the attacker orchestrates usually innocent hosts, called zombies, to

simultaneously generate fake DNS requests aiming at disrupting the normal DNS operation by consuming its resources; mainly memory and CPU [6].

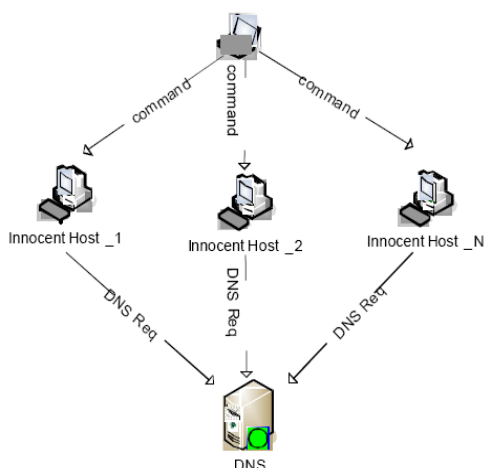


Figure 2: DNS flooding attack architecture

B. Network Denial of Service Attacks

Network denial of service attack might divide into categories; distributed denial of services and DNS denial of services known as availability threats. Distributed Denial of service has the cohesive strength of many compromised systems working towards a single cause. The first stage of this attack is to build its platform with many host systems that can work under remote commands. The attacker group would first scan networks to hunt for vulnerable systems that are weak in security features. According to researchers there are millions of host machines that are vulnerable without secure patches and proper updates that often fall victims to these attackers. Once the scanning procedure is completed, attackers would bring these hosts into control using software exploitations like buffer overflow, dangling pointers, code injection [7].

i Distributed DOS Attacks

The distributed denial of services D.DOS attack attempt to exhaust the victim's resources such as network bandwidth. There are two types of DDoS attacks; a network centric attack which overloads a service by using up bandwidth and an application layer attack which overloads a service or database with application calls. In network centric attack type the attack will take place through traffic or bandwidth. The traffic flooding attacks send a huge volume of TCP, UDP and ICMP packets to the target. Legitimate requests get lost and these attacks may be accompanied by malware

exploitation. Bandwidth attacks overload the target with massive amounts of junk data. This results in a loss of network bandwidth and equipment resources and can lead to a complete denial of service [7]. In application layer attack, the application layer data messages can deplete resources in the application layer, leaving the target's system services unavailable. The application layer attacks are the most deadly kind of attacks as they can be very effective with as few as one attacking machine generating a low traffic rate, this makes these attacks very difficult to pro-actively detect and mitigate. These attacks have come to prevalence over the past three or four years and simple application layer flood attacks using HTTP flood have been one of the most common DDoS attacks seen in the wild [7].

ii Domain Name System DOS attacks

In the denial of services against domain name system (DNS), a TCP/IP stack of the DNS server machines attacked to cause them to drop incoming DNS queries, or exhaust the resources of DNS servers. One may be able to force name servers to drop DNS queries by attacking the TCP/IP stack of name server machines, for example, by exploiting IP fragmentation reassembly vulnerabilities to exhaust memory or CPU resources. Another approach is to exhaust the CPU and memory resources of a DNS server, for example, by bombarding name servers with a lot of DNS queries so that they do not have enough resources to process all the DNS queries they receive [7].

C. Defense Methods against Denial of services attacks

The challenge in preventing DDoS attacks lies in the nature of the traffic and the nature of the attack. Because most often the traffic is legitimate as defined by protocol. To identify the attacks the difference between volumetric and application-level attack traffic must also be understood clearly. Application level attacks exploit specific applications or services on the targeted system. They typically bombard a protocol and port a specific service uses to render the service useless and the attack take place by HTTP or DNS. Volumetric attacks use an increased attack footprint that seeks to overwhelm the target. This traffic can be application specific, but it is most often simply random traffic sent at a high intensity

to over utilize the target's available resources using DNS or SYN floods. There are many types of defense methods those used against denial of services attacks, these methods like Route Filtering, Unicast Reverse Path Forwarding, Geographic Dispersion, Tightening Connection Limits and Timeouts, Reputation Based Blocking, and control accessing method [8].

i. Route Filtering Techniques

A Remotely triggered black hole (RTBH) filtering can drop undesirable traffic before it enters a protected network by what is called black holes. When an attack has been detected, black holing can be used to drop all attack traffic at the network edge based on either destination or source IP address, and regarding RTBH filtering for further information [9].

ii. Unicast Reverse Path Forwarding

Network administrators can use Unicast Reverse Path Forwarding (uRPF) to help limit malicious traffic flows occurring on a network, as is often the case with DDoS attacks. This security feature works by enabling a router to verify the reachability of the source address in packets being forwarded. It can limit the appearance of spoofed addresses on a network, by discarding packets if the source IP address is not valid [9].

iii. Geographic Dispersion

To mitigating DDoS attacks, distributing the footprint of DDoS attacks is used in clouds which make the targets not individually saturated by the volume of attack traffic. This solution uses a routing concept known as Any cast to allows traffic from a source to be routed to various nodes via the nearest hop node in a group of potential transit points and its provide geographic dispersion [10].

iv. Tightening Connection Limits and Timeouts

Anti-spoofing used to limiting connections and enforcing timeouts in a network environment seek to ensure that DDoS attacks are not launched or spread from inside the network.

v. Reputation Based Blocking

Reputation based blocking is an essential component to web filtering provides URL analysis and establishes a reputation for each URL to limits the impact of

untrustworthy URLs. Its uses to defense against malware, botnet activity, and other web-based threats attack [10].

vi. Control Accessing

Access Control Lists provide a flexible option to a variety of security threats and exploits, including DDoS, which provide a reactive mitigation for DDoS attacks by ordered set of rules and rule specifies a set of conditions that a packet must satisfy to match the rule plays as traffic filter. Firewalls, routers, and even switches support, and when of each these devices determine that an ACL applies to a packet, it tests the packet against the conditions of all rules and determine whether the packet is permitted or denied, and continues processing packets that are permitted and drops packets that are denied [10].

D. Network Denial of Service Threat Security Methods

Many studies have proposed to defenses against a network denial of service attack, in both types distributed network and domain name system denial of services attacks. In the following sections we present a review of different security methods against distributed network denial of services attacks. These different studies were collected from several researches based on the mechanisms and the security type used in the proposed research.

i. Artificial Intelligent and Prediction Based Models

Suriadi, S et al [11], describe a mechanism for integrating a hash based puzzle into web services frameworks available and analyze the effectiveness of the countermeasure using different scenarios on a network test bed. This study presents techniques to defense the clouds against flooding attacks using client puzzles which they can also mitigate certain types of semantic based attacks.

Joshi, B. et al [12], propose a mechanism to test the efficiency of a cloud trace back model in dealing with DDoS attacks using back propagation neural network to predicts safe models which finds that the model is useful in tackling distributed denial of service attacks.

T. Siva, E.S. Phalguna Krishna [13], provide security to cloud resources by denial of service (DoS) attacks and their related sub domains also to security of application denial of service (ADoS) attacks which comes under DDOS attacks concentrate on SaaS in cloud computing. The research present different types of cloud based DDOS attacks and their solutions, also give most dangerous application DoS attacks scenario and their remedy mechanisms, by introducing new port hopping scheme as true random number generation (TRNG) based port hopping in cloud computing environment. This hopping scheme by using pseudo random number Generation (PRNG) over comes the disadvantage of prediction of the port hopping sequence and is periodic in nature.

Upma Goyal et al [14], propose a defense mechanism against the DDoS attacks which is known as cloud specific intrusion detection system. This defense mechanism will be able to detect the attack before the DDoS attack succeeds. The mechanism includes two methods of intrusion detection they are; behavior based method which compares the recent user actions to the usual behavior and the knowledge based method which detects known attacks. The behavior deviation is analyzed using artificial intelligence. With all the responses, the IDS detect the attack and alert the other nodes. The cloud Intrusion detection model will be detecting the attack traffic with the help of Entropy and The Anomaly based detection system.

N. Ch. S. N. Iyengar et al [15] propose a fuzzy logic based defense mechanism that can be set with predefined rules by which it can detect the malicious packets and takes proper counter measures to mitigate the DDoS attack. The predefined traffic parameters used are vary significantly between a normal traffic pattern and attack traffic pattern .However for any particular data center, from DDoS traffic pattern, the parameters can be changed based upon specific requirements.

ii. Filtering Based Models

J. RAMESHBABU et al [16] study focus on the impact of DDoS attacks in cloud and the NEIF technique available to overcome the attacks of distributed denial of service DDoS on the clouds. NEIF installed at the ISPs' edge routers plays as a dual role in shielding DDoS

attacks using ingress filtering to discover and prevent the DDoS attacks from its customer, and also been extensively deploying to avoid source IP spoofing. The mechanism discarding packets which have a source address which is not allocated to customers. It can ensure an SP's network do not participate in flooding DDoS attacks.

Priyanka Negi et al [17], proposed a modification to the confidence based filtering method (CBF) which is investigated for cloud computing environment based on correlation pattern to mitigate DDoS attacks on Cloud. The modification introduces nominal additional bandwidth and tries to increase the processing speed of the victim initiated server. In the enhanced confidence based filtering method legitimate packet is the one whose confidence based filtering value is above the discarding threshold. Those packets with scores lower than the discarding threshold are regarded as attack ones.

iii. Monitoring and Identifying Based Models

Chu-Hsing Lin et al [18], analyze native modules of the PHP dynamic pages and find the amount of system resources consumed by parts of the native modules. The study propose a method based on semantic concept to formulate rules to identify and monitoring malicious browsing behaviors in order to improve performance of web services and to slice the cost.

Ashley chonka et al [19], study some of the current attacks that attackers may initiate as HTTP and XML. the proposed research offer a solution to trace back through cloud trace back (CTB) to find the source of these attacks, and introduce the mechanism, called cloud protector, to detect and such attack traffic. The results show that proposed idea able to detect most of the attack messages and were able to identify the source of the attack within a short period of time.

A.M. Lonea et al [20], provide a combination between the evidences obtained from intrusion detection systems (IDSs) deployed in the virtual machines (VMs) of the cloud systems and a data fusion methodology in the front end. Specifically. The VM based IDS will yield alerts when the attacks appear, which will be stored into the MySQL database placed within the cloud fusion unit (CFU) of the front end server. the study propose a quantitative solution for analyzing alerts generated by

the IDSs, using the Dempster Shafer theory (DST) operations in 3 valued logic and the fault tree analysis (FTA) for the flooding attacks. The solution to identify these attacks is to use the Dempsters combination rule to fuse evidence from multiple independent sources. The proposed solution represents the imprecision and efficiently utilizes it in IDS to reduce the false alarm rates by the representation of the ignorance.

A. S. Syed Navaz et al [21], Propose a combination scheme between hereto merge entropy based system with anomaly detection System for providing multilevel distributed denial of service (DDoS). The proposed idea taking two steps; first, users are allowed to pass through router in network site in that it incorporates detection algorithm and detects for legitimate user. then secondly, again it pass through router placed in cloud site in that it incorporates confirmation algorithm and checks for threshold value, if it's beyond the threshold value it considered as legitimate user, else it's an intruder found in environment. This system is represented and maintained by as third party. When attack happens in environment, it sends notification message for client and advisory report to cloud service provider (CSP) to identify the attacks.

Mettildha Mary et al [22], propose a novel solution, named DDoS and EDoS Shield, to avoid the denial of service and economic denial of sustainability (EDoS) attack in the cloud computing systems. The main idea of the proposed scheme is to verify whether the requests coming from the users are from a legitimate person or generated by bots. This work will test the efficiency of a cloud trace back model using a new data set based upon deterministic packet marking (DPM) algorithm. This scheme will check the cloud trace back model using flexible deterministic packet marking, which provides a defense system with the ability to find out and identify the real sources of attacking packets that traverse through the network.

Bing Wang et al [23], propose a graphic model based attack detection system that can deal with the dataset shift problem. The core of the attack detection system is a graph model. It stores known traffic patterns as a relational graph between patterns and their labels (malicious or normal). When new network traffic arrives, the system uses this graph to determine whether it is malicious. The mechanism of DDoS attack mitigation

architecture integrates a highly programmable network monitoring to enable attack detection and a flexible control structure to allow fast and specific attack reaction. The proposed architecture can effectively and efficiently address the security challenges brought by the new network paradigm.

iv. Networking and Data Based Models

N. Jeyanthi et al [24], proposed spoofing detection algorithm to detect DDoS attacks is used to detect address spoofing for each request to a service. The proposed algorithm consists of a cloud authentication system (CAS) that will authenticate the connections between the DC requester and the cloud service provider, and which will ensure that the incoming request packet is legitimate. CAS will be embedded in the cloud service provider, and receive all the incoming packets from the requester, who may be legitimate, attacker or a combination of bot before it is allowed to reach the service.

Sanchika Gupta et al [25], identifies vulnerabilities responsible for well-known network based attacks on cloud and does a critical analysis on the security measures available in cloud environment. The proposed study focuses on a nonconventional technique for securing cloud network from malicious insiders and outsiders with the use of network profiling. The profile is created for each virtual machine (VM) in cloud that describes network behavior of each cloud user. The behavior gathered is then used for determination and detection of network attacks on cloud. The novelty of the approach lies in the early detection of network attacks with robustness and minimum complexity. The proposed technique can be deployed with minimal changes to existing cloud environment.

Namrata and Prof. D. S. Datar [26], design a cloud computing based collaborative network security management system using botnet which balances the load in the network and check for each and every file transferring in the cloud for the bot. If the file contains the bot then the folder in which that file is saved, will be deleted from that client. The proposed system is to protect the cloud from botnet and prevent the cloud from botnet attack. During the systems operation, the collaborative mechanism runs as expected to balance the load in the network, and to check the file transferring in

the network as instructed by the security center or the server machine.

Danveer Singh et al [27], describe how to detect DDoS violence, in view of that cloud providers will alert to assign resources to users even in denial of service violent behavior in in the distance ahead. The paper proposes types of detections like network traffic analysis based DDoS detection, and data analysis based DDoS detection.

Osanaie [28], discusses different methods for detecting spoofed IP packet in cloud computing and proposes host based operating system fingerprinting that uses both passive and active method to match the operating system and applications of incoming packet from its database.

III. RESULTS AND DISCUSSION

Security Models Comparison

The proposed models which they are mentioned in the above sections were gathered from many researches based on four issues they are, artificial intelligent and prediction, filtering, monitoring and identifying, networking and data. The following table shows the comparison between all the discussed security models based on investigation area, proposes, and mechanism.

Table 1: Security Models Comparison

<i>Proposed Models by Authors</i>	<i>Investigation Area</i>	<i>Investigation Propose</i>	<i>Mechanism Used</i>
Suriadi, S et al [11]	Web Services clouds	Defense against flooding attacks	client puzzles to mitigate certain types of semantic based attacks
Joshi, B. et al [12]	cloud trace back dealing with DDoS attacks	test the efficiency of a cloud trace back model	back propagation neural network production
T.Siva, E.S. Phalguna	SaaS in cloud computing	security to cloud resources by	true random number generation

Krishna [13]		(DoS) attacks application DOS attacks	(TRNG) based port hopping scheme
Upma Goyal et al [14]	Behavior of user actions	detect the attack and alert the other nodes	Artificial intelligent, Entropy and Anomaly based detection system.
N.Ch.S.N. Iyengar et al [15]	malicious packets attack	predefined traffic parameters to detect the malicious packets	fuzzy logic based defense
J.RAMES HBABU et al [16]	IP spoofing and unauthorized customer address	Defense against unauthorized packets	NEIF technique and ingress filtering
Priyanka Negi et al [17]	correlation pattern to mitigate DDoS attacks	Discards an trusted packets	confidence based filtering method (CBF)
Chu-Hsing Lin et al [18]	PHP dynamic pages	monitoring malicious browsing behaviors	semantic concept
Ashley chonka et al [19]	HTTP and XML	find the source of attacks	cloud protector
A.M. Lonea et al [20]	intrusion detection systems (IDS)	reduce the false alarm rates of attacks	data fusion methodology with VM based IDS
A.S.Syed Navaz et al [21]	Attack notification	Notify the client and cloud service provider (CSP) to identify the attacks.	hereto merge entropy based system and anomaly detection System
Mettildha Mary et al [22]	economic denial of sustainability	verify the requests coming from	deterministic packet marking

		the users (legitimate person or generated by bots)	(DPM) algorithm
Bing Wang et al [23]	graphic model based attack	graph model to determine malicious	relational graph between patterns (normal or malicious)
N. Jeyanthi et al [24]	address spoofing	ensure that the incoming request packet is legitimate	cloud authentication system (CAS)
Sanchika Gupta et al [25]	malicious insiders and outsiders	early detection of network attacks	Profile Based Network Intrusion Detection and Prevention System
Namrata and Prof. D. S. Datar [26]	Botnet attack	balances the load in the network	based collaborative network
Danveer Singh et al [27]	denial of service violent behavior	detect DDoS violence	network traffic and data analysis based DDoS detection
Osanaiye [28]	operating system and applications attacks	detecting IP spoofing	host based operating system fingerprinting

IV. CONCLUSION

With large amount of clouds in networks today, attacks increase more and more by using several attack techniques, methods and tools. The most important type of attacks are related to the network denial of services concepts such as distributed network denial of services and domain name system denial of services. In this paper we present a main point of attacks methods in clouds related to denial of services and review of possible security threads models those will used to make

some of defense against mentioned attacks. The revision of security models depends on the investigated area that represents the type of attack and on the methodology taken to make defense such as artificial intelligent methods, monitoring and identifying method, filtering and network based methods. In this paper we propose many models for security issues in denial of services attacks, and most of these models investigate on flooding attack, spoofing and on unauthorized access. The proposed security based on three schemes detecting attacks, monitoring / identifying attack, and filtering to discard attack.

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VI. Authors Biography

Elmustafa Sayed Ali Ahmed received his M.Sc. degree in electronic engineering, Telecommunication from Sudan University of science and technology in 2012, and B.Sc. (Honor) degree in electrical engineering, Telecommunication from Red Sea University in 2008. He was a wireless networks (Tetra system, Wi-Fi and Wi-Max) engineer in Sudan Sea Port Corporation for four years and a head department of electrical and electronics engineering, faculty of engineering in Red Sea University for one year. He published papers on wireless communications and networking in peer-reviewed academic international journals and book chapters in big data clouds. His areas of research interest include MANETs, wireless networks, VANETs, image processing, computer networks, and Cloud computing.

Rasha Eltayeb Abd Elatif received her B.Sc. degree in aeronautical engineering, avionics from Sudan university of science and technology in 2006. She was a teacher assistant for one year in Sudan university of science and technology 2007-2008 then she worked as technical engineer in Sudan university of science and technology engineering college aeronautical department from 2008 to present. She mandated to Red Sea university department of electrical engineering since

Productive Energy Conservation Model for Wireless Sensor Network using NS3 Simulator

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ABSTRACT

A WSN primary outline issue for a sensor system is protection of the vitality accessible at every sensor node. We propose to convey different, versatile base stations to delay the lifetime of the sensor system. We split the lifetime of the sensor system into equivalent stretches of time known as rounds. Base stations are migrated toward the begin of a round. Our strategy utilizes a whole number straight program to focus new areas for the base stations and in view of steering convention to guarantee vitality proficient directing amid every round. We propose four assessment measurements and look at our answer utilizing these measurements. Taking into account the reproduction results we demonstrate that utilizing various, versatile base stations as per the arrangement given by our plans would altogether expand the lifetime of the sensor system.

Keywords: WSN, Lifetime, Sensor Networ, NBC, WSN, AODV, CMAX

I. INTRODUCTION

A remote sensor system comprising of little estimated gadgets which has detecting and correspondence abilities. These sensors screen physical or natural conditions, for example, temperature, weight, movement or contaminations in distinctive regions. Such sensor systems are relied upon to be generally sent in a tremendous assortment of situations for business, common, and military applications, for example, observation, vehicle following, atmosphere and natural surroundings checking, insight, therapeutic, and acoustic information gathering. Remote Sensor Networks (WSNs) are imagined to watch extensive situations at short proximity for broadened times of time. WSNs are by and large made out of an extensive number of sensors with moderately low reckoning limit and constrained vitality supply [3].

Wireless sensor networks (WSN) may consist of several to thousands of homogeneous or heterogeneous sensors that share the need to organize for data collaboration or network data collection sink routing. Small system platforms which integrate sensors, processors, and transceivers are referred to as motes. Remote sensing platforms are typically characterized by reduced

processing capabilities, limited memory capacities, and fixed battery supplies. As technology makes the hardware smaller, WSN research continues developing innovative, energy-saving techniques at all network protocol layers in order to engineer sensor platforms which can operate unattended for months or even years. The WSN networks must also be scalable to support extremely dense sensor fields. Applications for energy-efficient WSN networks include homeland defense nuclear/biological/chemical (NBC) sensing, military surveillance, and environmental sensing [MaP02][SzM04][SzP04]. These applications generally work in a self-organizing, clustered environment that supports either a single application or collaborative applications. WSN network design requires tradeoffs in throughput and latency to extend network lifetimes.

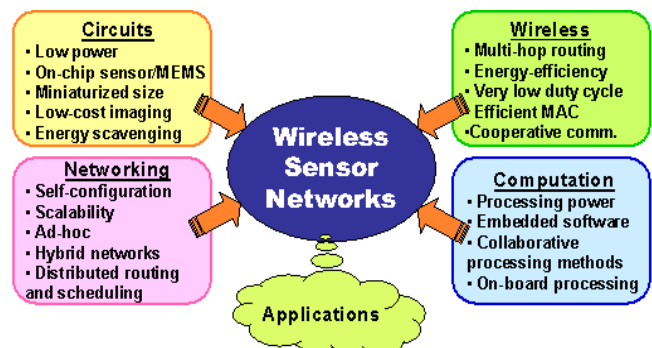


Figure 1: Wireless Sensor Network

II. METHODS AND MATERIAL

A. Related Work

A survey on sensor networks [1] *I.F. Akyildiz, Weilian Su, Sankarasubramaniam, E. Cayirci* IEEE Communications, Aug 2002

The authors present a communication architecture for sensor networks and proceed to survey the current research pertaining to all layers of the protocol stack: Physical, Data Link, Network, Transport and Application layers.

A sensor network is defined as being composed of a large number of nodes which are deployed densely in close proximity to the phenomenon to be monitored. Each of these nodes collects data and its purpose is to route this information back to a sink. The network must possess self-organizing capabilities since the positions of individual nodes are not predetermined. Cooperation among nodes is the dominant feature of this type of network, where groups of nodes cooperate to disseminate the information gathered in their vicinity to the user.

Major differences between sensor and ad-hoc networks:

- Number of nodes can be orders of magnitude higher.
- Sensor nodes are densely deployed.
- Sensor nodes are prone to failure.
- Frequent topology changes.
- Broadcast communication paradigm.
- Limited power, processing and power capabilities.
- Possible absence of unique global identification per node.

The authors point out that none of the studies surveyed has a fully integrated view of all the factors driving the design of sensor networks and proceeds to present its own communication architecture and design factors to be used as a guideline and as a tool to compare various protocols. After surveying the literature, this is our impression as well and we include it in the open research issues that can be explored for future work. The design factors listed by the authors:

- **Fault Tolerance:** Individual nodes are prone to unexpected failure with a much higher probability

than other types of networks. The network should sustain information dissemination in spite of failures.

- **Scalability:** Number in the order of hundreds or thousands. Protocols should be able to scale to such high degree and take advantage of the high density of such networks.
- **Production Costs:** The cost of a single node must be low, much less than \$1.
- **Hardware Constraints:** A sensor node is comprised of many subunits (sensing, processing, communication, power, location finding system, power scavenging and mobilizer). All these units combined together must consume extremely low power and be contained within an extremely small volume.
- **Sensor Network Topology:** Must be maintained even with very high node densities.
- **Environment:** Nodes are operating in inaccessible locations either because of hostile environment or because they are embedded in a structure.
- **Transmission Media:** RF, Infrared and Optical.
- **Power Consumption:** Power conservation and power management are primary design factors.

Energy-efficient communication protocol for wireless microsensor networks [30] *W.R. Heinzelman, A. Chandrakasan, H. Balakrishnan* IEEE Hawaii International Conference on System Sciences, 2000

The authors present a 2-level hierarchical routing protocol (LEACH) which attempts to minimize global energy dissipation and distribute energy consumption evenly across all nodes. This is achieved by the formation of clusters with localized coordination, by rotating the high-energy cluster heads and by locally compressing data.

The model used in this paper makes the following assumptions:

- There exists one fixed base station with no energy constraints and a large number of sensor nodes that are mostly stationary, homogeneous and energy constrained.
- The base station is located at some distance from the sensor nodes and the communication between a sensor node and the base station is expensive.

- The purpose of the network is to collect data through sensing at a fixed rate (i.e. there is always something to send) and convey it to the base station. The raw data is too much and must be locally aggregated into a small set of meaningful information. The nodes self-organize into local clusters with one node in each cluster acting as a cluster head. Once a cluster has formed, the cluster members send their data to the cluster head (low energy transmission) which in turn combines the data and sends it to the base station (high energy transmission). This organization of the nodes creates a 2-level hierarchy.
- In the analysis only a 100-node network network is considered, which at least one order of magnitude is less than the envisioned number of nodes.

Energy concerns in wireless networks [36] A. Ephremides IEEE Wireless Communications, Aug 2002
Problem

The operation of the protocol is broken up into rounds, during which the clusters are dissolved and recreated. During each round, a node decides probabilistically whether to become a cluster head. This decision is based on the suggested percentage of cluster heads for the network (determined a priori) and the number of times the node has been a cluster head so far. The cluster heads advertise their intention and the rest of the nodes decide which cluster to join, usually based on signal strength. Once the clusters are formed, the cluster head creates a TDMA schedule and sends it to its cluster members. To reduce interference, each cluster communicates using different CDMA codes.

This paper focuses on the major energy efficiency issues in ad-hoc networks (not only sensor networks) which are defined as infrastructureless networks that require multiple hops for connecting all the nodes to each other. Vertical layer integration and criticality of energy consumption are the two main characteristics of ad-hoc networks that drive their design. The separation of network functions into layers is characterized as the original sin in networking.

For their analysis, the authors compare their scheme with a direct communication protocol (each sensor sends data directly to the base station) and the minimum-energy routing protocol. In the latter, data destined for the base station is routed through many intermediate nodes that can each be reached with minimum energy transmission. A static clustering scheme is also used where cluster heads are not rotated. Their results indicate that LEACH reduces communication energy by as much as 8x. Also, the first node death in LEACH occurs over 8 times later and the last node dies over 3 times later.

For any wireless node there are three major modes of operation: transmitting, receiving and listening. When the node is in listening mode the energy expenditure is minimal. However, if the node spends most of the time listening then this mode is responsible for a large portion of the consumed energy (as is the case in sensor networks).

B. Proposed Work

Development of the energy efficient routing protocols for the WSN – first OLM (online Maximum lifetime) and Capacity Maximization (CMAX)). Author has proposed a new routing based heuristics based on poison distribution and two matrixes CMAX and OLM. The main problem with the authors proposed work is computational overhead of CMAX and OLM.

Some criticisms about LEACH ([4]):

- Not taking into account the possibility of nodes failing due to hostile environment.
- There is no provision for the cluster heads to be uniformly distributed with respect to their geographic location. Since in each round a node becomes a cluster head with a certain probability, it is possible that parts of the network will be left without a cluster head.

To overcome the authors computational overhead we have adopted the idea of basic initial energy model which gives the node based on their energy remain. And then routed will be chooses, the benefit of this scheme is to simplicity due to energy model THAT REDUCES THE OVERHEAD OF TWO MATRIX COMPUTATION (CMAX and OLM) into one.

1. We will have to form wireless sensor network depending on user requirement of number of nodes.
2. Apply the Random 2D direction mobility model for creating topology between mobile nodes in WSN.

- Apply the routing protocol AODV(on demand routing algorithm) for communication with efficient routing between mobile nodes.
- Calculating energy of mobile nodes during communication and generate routing table for each mobile nodes in WSN.

Energy Mathematical Calculations Model :

$$E(N,M)=ln>0(lm=nETack+lm!=nERack)+m>0(lm=nETpck+ lm!=nERpck)$$

E (N, M) =energy spent at node N due to node M

ETack=energy spent for transmission of one acknowledgement packet

ETpck= energy spent for transmission of one data packet

ERack= energy spent for reception of one acknowledgement packet

ERpck= energy spent for reception of one data packet

lp= p is true if value is 1

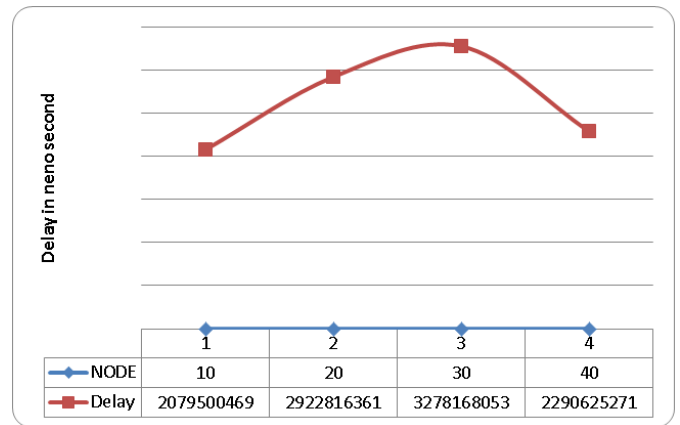
0 otherwise

III. RESULTS AND DISCUSSION

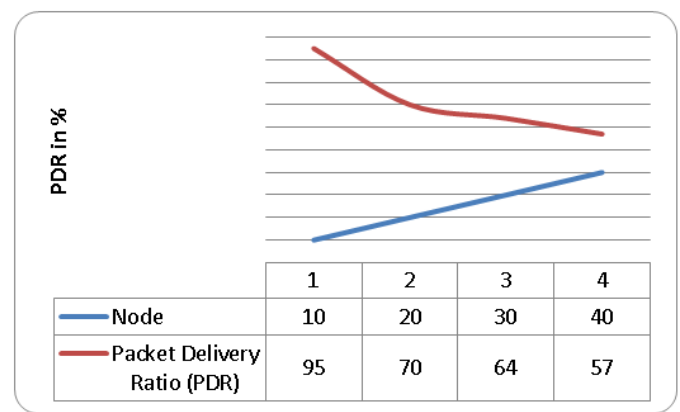
Our simulation on NS 3 ns (from network simulator) is a name for series of discrete event network simulators, specifically ns-1, ns-2 and ns-3. All of them are discrete-event network simulator, primarily used in research and teaching. Ns-3 is free software, publicly available under the GNU GPLv2 license for research, development, and use.

The goal of the ns-3 project is to create an open simulation environment for networking research that will be preferred inside the research community

(A) Flows Monitor Result During data transmission from nodes to sink node, delay in data packet delivery in a time interval during Data Transmission phase are explained.

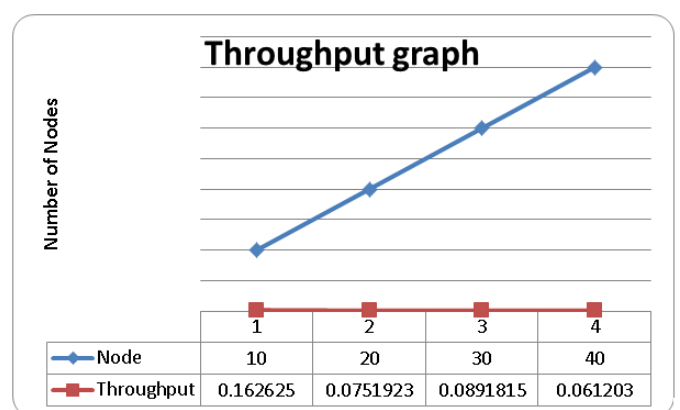


(B) Packet Delivery Ratio



Number of packets received at sink node and transmitted from sensor node in a given time interval.

(C) Throughput



This graphs shows increasing throughput in megabits per seconds based on node transmission rate and each node transmit data in different transmission rate.

IV. CONCLUSION

In this paper, we address the essentialness conservation issue to enable group in-framework get ready in broad scale WSNs. We consider WSNs made out of homogeneous remote sensors accumulated into gatherings, inside which applications are iteratively executed. Since imperativeness use capability is a champion amongst the most essential thoughts for any WSN game plan, our proposed plans intend to achieve essentialness adequacy from various viewpoints. To redesign information get ready utmost in WSNs, plan length streamlining is moreover bit of our framework objectives. The dedication of this investigation can be packed as takes after. Centers may be equipped with different sensors recognizing particular events.

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In Vitro Propagation of *Phaius luridus Thwaites* - A Terrestrial and Endemic Orchid of Western Ghats

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ABSTRACT

Family Orchidaceae constitutes one of the largest families of flowering plants, having around 20,000 species. They are unique in forms, colors and flower structure. The genus *Phaius luridus Thwaites* is the terrestrial orchid, endemic to the Western Ghats and is an endangered species. A rapid *in vitro* seed germination technique is described here. MS, VW, B5 and KC media supplemented with various concentrations of auxins and cytokinins were used in combination for asymbiotic seed germination and plantlet formation. In the evaluation of the media MS medium supplemented with 2 mg BAP/L⁻¹+ 5mg NAA/L⁻¹ was found to be suitable with both liquid and solid. Even B5 solid and liquid medium supplemented with 2 mg BAP/L⁻¹+1mg IAA/L⁻¹ was found to be suitable. Further, hormonal concentrations of auxins and cytokinins were evaluated for minimal and optimal levels in the medium. Hardened plants were transferred to green house after *ex vitro* rooting technique. Significance of the present work is discussed here.

Keywords: *Phaius luridus Thwaites*, PLB's, MS, VW, B5, BAP, NAA, IAA, CM, *Ex Vitro* Rooting.

I. INTRODUCTION

The terrestrial orchids, the jewel orchids, are grown mainly for their attractively patterned foliage. There are several genera which occur naturally in the deep shade of tropical forests, growing in the leaf litter⁽¹⁰⁾.

The genus *Phaius luridus Thwaites*^(1,3) was established in 1790 by Jao De Loureiro during 1790, in his Flora Cochinchinensis. It is a terrestrial genus represented with about 40 species, distributed in tropical Africa, Madagascar, tropical and subtropical Asia to Oceania; six species are estimated from India^(4,11). One such species is *Phaius luridus Thwaites* found in Western Ghats in Shimoga district of Sagar.

Phaius luridus produces large, thin pleated leaves, usually few in number, which grow to about 3' in height. The inflorescence arises from a pseudobulb (a short, fleshy shoot found in most orchids) or rhizome, and consists of an erect four foot raceme of showy, fragrant flowers. Individual flowers of the nun's orchid are large, up to 5" across, rusty brown with a purplish lip.^(5,6)

Flowers are believed to be initiated in response to short day length, mainly late winter and spring. Each inflorescence opens over a period of up to six weeks. The Flowering is between May and June⁽⁸⁾.

Asymbiotic germination on basal nutrient medium⁽⁹⁾ and a combination of various growth regulators⁽²⁾ are an efficient and fast method for mass multiplication of orchids. Hence this investigation was undertaken for judicious use of growth regulators⁽⁷⁾ during *in vitro* seed germination of *Phaius luridus Thwaites*.

II. METHODS AND MATERIAL

Phaius luridus Thwaites was collected from Sagar, Shimoga district and were grown in Green house at St. Joseph's College Post Graduate and Research Centre. The fruit capsules approximately 90 days old were collected for culture. Two protocols were used for surface sterilization of capsules.

Inoculations of disinfected explants and sub-culturing were carried out under aseptic environment, in a

horizontal Laminar Air Flow Unit. Explants were placed on the nutrient medium in culture bottles/tubes with a sterilized forceps. Various basal media like MS, B5, KC and VW were used supplemented with various combinations of Auxins and Cytokinins. PH of the medium was maintained at 5.6 -5.8 the medium with MS and B5 gave good results.

Culture Conditions

- The cultures were incubated at 25± 2°C temperature
- Photoperiod 16/8 h with 4000- 5000 lux illumination from cool white fluorescent tubes (“Philips”, India).
- Humidity level with air condition was between 50-60%.

Maintenance of Cultures

- Cultures were regularly sub-cultured based on the type of cultures, designed in an experiment.
- The sub culturing was done every 2 weeks and observation was made for both solid and liquid medium.
- Each experiment was repeated twice and consisted of 3 replicates of 10 explants for each treatment.

Technique of Hardening Process

90 days old plantlets with good in vitro rooting and with 3-4 leaf conditions were selected for hardening. Tissue

cultured bottles with plantlets were shifted from growth room conditions and were exposed to natural light conditions inside the laboratory area for 4 days. Further plantlets were transferred to the thumb pots containing solrite (a mixture of perlite and peatmoss). Plants were covered with perforated plastic cup with optimum humidity conditions. Plants were shifted to green house after 10 days.

OBSERVATION

MS medium with (2 mg BAP/L⁻¹+ 5mg NAA/L⁻¹) favoured production of maximum number of shoots. Both solid and liquid medium gave good results.

***In vitro* rooting:** *In vitro* rooting was successful with VW medium supplemented with (2.0 mg BAP/L, NAA 5mg/L, 50 ml CM and 500 mg of activated charcoal) induced good rooting. B5 medium with (2 mg BAP/L, 1 mg IAA/L with 500 mg of activated charcoal) also gave good results.

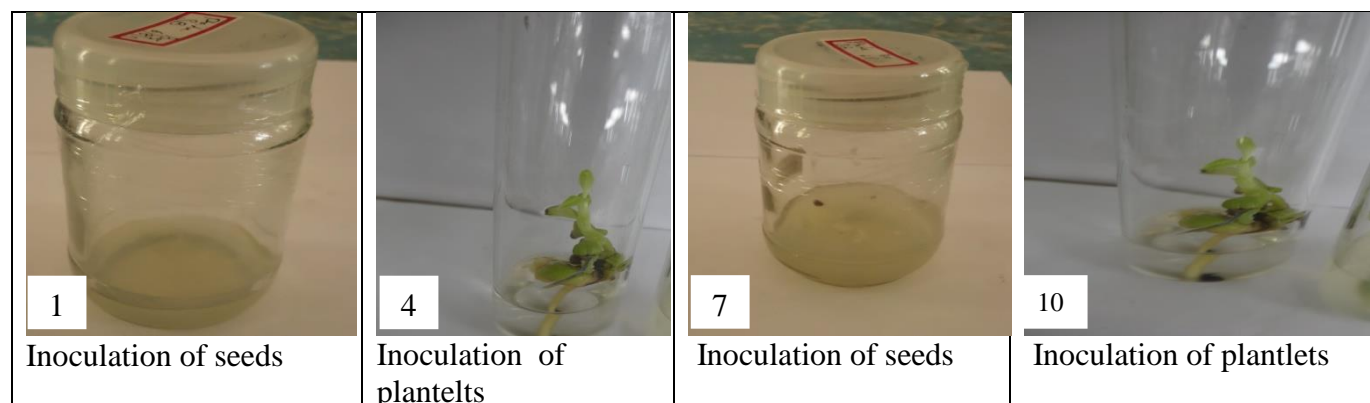
***Ex vitro* rooting:** The basal ends of healthy shoots from the shoot multiplication medium were dipped in an auxin solution, 10 ml of IAA (made in distilled water) then planted in thumb pots containing solrite (mixture of perlite and peatmoss) and sprayed with bavistin to avoid fungal infection. *In vitro* rooted plants in the portrays containing potting mixture maintained under mist chamber and covered with perforated plastic cups.

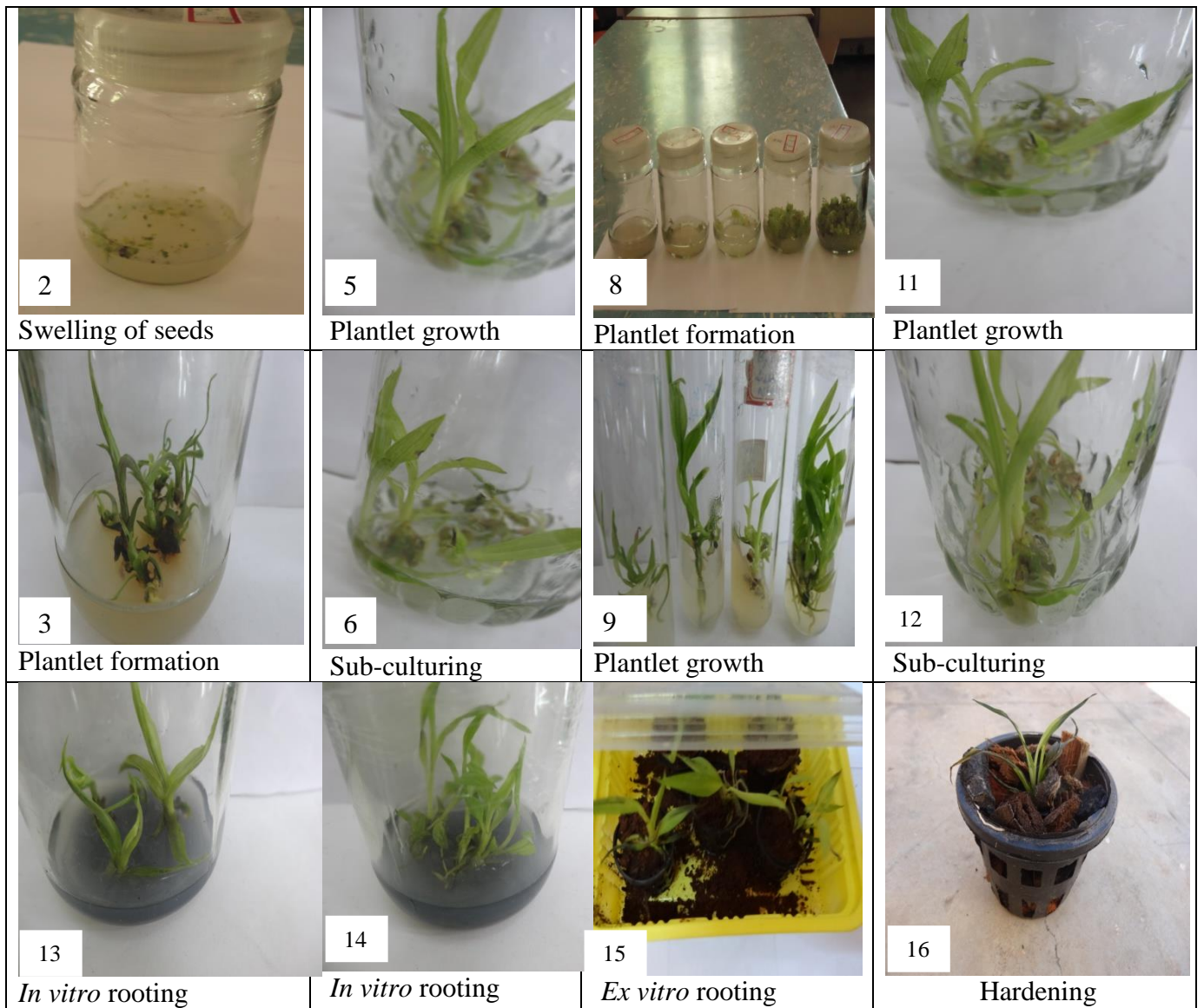
MS with

MS with

B5 with

B5 with





III. RESULTS AND DISCUSSION

MS medium gives good result comparing with B5 medium. Both the mediums are good for the raising of plantlets.

Plantlet formation with MS (solid and liquid) medium

Media Used	Media Composition	Results The average plantlets formation (percentage)									
MS (Solid Medium)	Basal MS Media + 1 mg BAP + 1 mg NAA	70%	<table border="1"> <caption>Data for Plantlet Formation Percentage</caption> <thead> <tr> <th>Media Composition</th> <th>Average Plantlets Formation (%)</th> </tr> </thead> <tbody> <tr> <td>Basal MS Media + 1 mg BAP + 1 mg NAA</td> <td>70</td> </tr> <tr> <td>Basal MS Media + 2 mg BAP + 2 mg NAA</td> <td>80</td> </tr> <tr> <td>Basal MS Media + 2 mg BAP + 5 mg NAA</td> <td>95</td> </tr> </tbody> </table>	Media Composition	Average Plantlets Formation (%)	Basal MS Media + 1 mg BAP + 1 mg NAA	70	Basal MS Media + 2 mg BAP + 2 mg NAA	80	Basal MS Media + 2 mg BAP + 5 mg NAA	95
	Media Composition	Average Plantlets Formation (%)									
	Basal MS Media + 1 mg BAP + 1 mg NAA	70									
Basal MS Media + 2 mg BAP + 2 mg NAA	80										
Basal MS Media + 2 mg BAP + 5 mg NAA	95										
Basal MS Media + 2 mg BAP + 2 mg NAA	80%										
Basal MS Media + 2 mg BAP + 5 mg NAA	95%										

MS (Liquid Medium)	Basal MS Media + 1 mg BAP + 1 mg NAA	70%	<p>A line graph with a red line and diamond markers. The y-axis ranges from 0 to 100 in increments of 20. The x-axis has three points. The data points are (1, 70), (2, 80), and (3, 95).</p>
	Basal MS Media + 2 mg BAP + 2 mg NAA	80%	
	Basal MS Media + 2 mg BAP + 5 mg NAA	95%	

Plantlet formation with B5 (solid and liquid) medium

Media Used	Media Composition	Results The average plantlets formation (percentage)	
B5 (Solid Medium)	Basal B5 Media + 1 mg BAP + 1 mg NAA	75%	<p>A line graph with a red line and diamond markers. The y-axis ranges from 65 to 95 in increments of 5. The x-axis has three points. The data points are (1, 75), (2, 80), and (3, 90).</p>
	Basal B5 Media + 2 mg BAP + 2 mg NAA	80%	
	Basal B5 Media + 2 mg BAP + 5 mg NAA	90%	
B5 (Liquid Medium)	Basal B5 Media + 1 mg BAP + 1 mg NAA	70%	<p>A line graph with a red line and diamond markers. The y-axis ranges from 0 to 100 in increments of 20. The x-axis has three points. The data points are (1, 70), (2, 80), and (3, 90).</p>
	Basal B5 Media + 2 mg BAP + 2 mg NAA	80%	
	Basal B5 Media + 2 mg BAP + 5 mg NAA	90%	

In vitro rooting with MS media

Media Used	Media Composition	Results The average plantlets formation (percentage)	
MS	Basal MS Media+ 2 mg BAP + 5 mg NAA + 150 ml CM + 500 mg AC	80%	<p>A line graph with a red line and diamond markers. The y-axis ranges from 70 to 100 in increments of 5. The x-axis has three points. The data points are (1, 80), (2, 90), and (3, 95).</p>
	Basal MS Media+ 1 mg BAP + 3 mg NAA + 150 ml CM + 500 mg AC	90%	
	Basal MS Media+ 0.5 mg BAP + 2 mg NAA + 150 ml CM + 500 mg AC	95%	

IV. CONCLUSION

It is observed that the present status of *Phaius luridus* is rare in habitat and the natural population in the study regions is very meager. If a regular thread persists in the regions, it will push the species in threatened status in natural habitat. Therefore, conservation of habitat is most necessary for the protection of this species in Karnataka.

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System Safety Assessment by Developing Hazard Rate Function Based on 5 years Incidents in an Oil Refinery Using Weibull Analysis and its Estimators

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ABSTRACT

A comprehensive study on system safety assessment of an Indian Oil Refinery incident for five year was done considering the effect of incidents on refinery infrastructure and human injury/causality. The impact of incidents has been assessed by two parameter first the time between two successive incidents and seconds its consequences. The hazard rate function and cumulative risk function for distinguished category of incident in oil refinery were developed. The study evaluated the status of safety level as well as the scope of improvement for the particular oil refinery safety.

Keywords: Hazard Rate Function, TBO, System Safety Assessment, Safety Analysis.

I. INTRODUCTION

Oil refineries are the major source of world's fuel consumption. The oil refineries are enrich with the hazardous process and operations which includes higher pressure and temperature. The existing system of oil refining and process around the country have been subjected to deterioration due to aging, aggressive environmental factors, inadequate design and improper protect and maintenance. These facility often require extensive maintenance, repair, renewal practices and even replacement of certain components. The integrity of these facility is primary interest of oil refinery based company, governmental agencies, consumers and other stack holder due to potential adverse consequences related to public health, safety and heavy financial liabilities in case of systems failure.

The few large fire and explosion in petroleum and chemical industries which were attracted the attention of world society are as under.

II. METHODS AND MATERIAL

Table 1: List of Major Fire and Explosion accidents in Oil and Gas Industry

Date	Location	Cause	Material	Quantity (tones)	Death (d), injured (i)
7 July 1951	Port Newark, NJ, USA	Fire	Propane (70)	2600	14i
1955	Ludwigshafen, FRG	Railroad accident	LPG	*	2i
1955	Cottage Grove, OR, USA	Storage vessel failure	LPG	*	12d, 13i
8 January 1957	Montreal, Canada	Fire	Butane	5100	1d
1958	Michigan, USA	Overfilling	Butane	55	1d
4 January 1966	Feyzin, France	Fire	Propane	1000	18d, 83i
Date	Location	Cause	Material	Quantity (tones)	Death (d), injured (i)

Table 1.1 (Continued)

25 January 1969	Laurel, MS, USA	Fire (derail)	Propane	65	2d, 976i
21 June 1970	Crescent City, IL, USA	Fire (Derail)	Propane (5)	275	66i
30 March 1972	Rio de Janerio, Brazil	Fire	Propane	1000	37d
1972	Rio de Janeiro, Brazil	LPG	Storage spheres (five on site) and cylinders	*	37d, 53i
5 July 1973	Kingman, AZ, USA	Fire	Propane	100	13d, 95i
12 February 1974	Oneonta, NY, USA	Fire (Derail)	Propane (4)	288	25i
30 May 1978	Texas City, TX, USA	Fire	Butanes(6)	1500	7d 10i
19 November 1984	Mexico City, Mexico	Fire	Propane (20)	3000	650d, 6400i
August 1993	Panipat, India	Pressure build-up	Ammonia	*	6d, 25i
7 January 2001	Kanpur, India	Highway accident	LPG	*	12d, 6i
1 July 2001	Jamnagar, India	Damage	LPG	*	12d
19 January 2004	Skikida, Algeria	Explosion	LNG	*	13d, 75i
29 October 2009	Jaipur, India	Fire	Kerosine (SKO) Motor Spirit (MS)	1000	11d, 7i

A. Incident Pattern and Type

There is no general agreement about how accidents and incidents should be defined. In view of this author would like to focus on various types of data which might be included in these two categories and the practical implications. Most commonly used distinction between accidents and incidents is that accidents have a specific outcome while incidents have no outcome such as injuries, damage, fire, leakage etc. in an organization. Accident includes any undesired circumstances which give rise to ill-health, damage to property, plant, products, production loss and increased liabilities.

Incident includes all undesired circumstances which could cause accidents; it is preferable to think incidents as part of single, much larger, group of undesired events which leads to accident.

Table 2: The main types of accident and incident data

Quality	Environment	Injuries	Health	Asset damage and other losses
Customer complaints	Spillage	Injuries to employees at work	Sickness absence	Damage to organizations assets
Product non-conformances	Emissions above consent levels	Injuries to others at work	Chronic illness	Damage to other people's assets
Service non-conformances	Discharges above consent levels	Injuries during travel	Sensitization	Interruptions to production
		Injuries arising from unsafe products		Damage arising from unsafe products

B. Collection of Accident and Incident Data

One of the largest Oil Refinery of our country has been consider for this work and author had completed one month vocational training for the collection of accident and incident data for refinery. The major sources of accident and incident data within the oil refinery during vocational training includes Accidents Report, Accident / Incident Record, Accident notification and investigating report. In the oil refinery management system follow the chronology of an accident and the author identified the following states to accomplish the same.

1. The person, who sustains the injury, or someone else, reports that an accident/incident has happened, usually in a online system which is assessable to all EHS professional of refinery.
2. The EHS professional to whom the accident/incident is reported, makes a written record of the salient points, usually in a risk register form.
3. The accident is investigated and, if it is sufficiently serious, is reported to the relevant state authority which is Chief Factory Inspector Labor Department Govt. of M.P.

4. The EHS professional who investigates the accident writes a report on his or her findings, to which are added any suggestions for remedial action.
5. The EHS professional who investigates the accident report back to those involved in the outcome of the investigation and the action to be taken.

The vocational training follows the three major steps in collecting accident and incident data of the oil refinery. First step involve the critical examination of all reported accident and incident available with the EHS department of oil refinery. The second step for checking of non-reporting incident and accident was beginning. Personal interview with people who are likely to have experience or knowledge of the accident or incident were commenced. People are more willing to talk about accident or incident they did not report if they are confident that there will be no adverse consequences as a result of their revelations. The author has carried out an appropriate sample of interviews which make a reasonable accurate assessment of the proportion of accidents or incident which is going unreported. Inspections of locations where incident/ accident took place was done by author during these interviews and one set of incident record is keep ready for cross checking the statement given by individual person. A good data are available from year 2010 to 2015 for analysis of incident/accident within the oil refinery.

Classification of Accident/Incident Data

Incident type has been arranged date wise from last five years in risk register of the concern oil refinery. A short description about the incident/accident was found and based on which the type of incident/accident was categorize. The severity level broadly classified on to different aspect the first in terms of harm to personnel and second in terms of plant damage and loss production. The four major significant scales has been decided the severity level of individual incident which was took place. The detail description on these scales of consequences is given below.

We have set up a scale of harm to personnel as:

Minor - Reportable but non-disabling injuries causing over 3 days absence.

Critical – Disabling injury or severe injury requiring extensive recovery and 1 in 10 chance of fatality.

Severe – Critical injuries and possibly 1 fatality.

Catastrophic – One or more fatalities.

Also when a scale of loss in terms of plant damage and lost production is concern an incident/accident severity described as:

Minor - Short-term loss of production.

Critical - Damage to machines repairable in short time.

Severe - Damage to plant, major repair costs and serious loss of production.

Catastrophic - Substantial damage to plant and potential loss of overall plant.

C. Proposed Safety Assessment using Weibull Analysis

The Weibull Distribution

The weibull distribution is one of the most widely used lifetime distribution in reliability engineering. It is a versatile distribution that can take on the characteristics of other types of distributions, based on the value of the shape parameter and scale parameter. To apply Weibull distribution to the available data from Oil Refinery we have to categories the data in four major category and the estimates of the parameters of the Weibull distribution can be found graphically via probability plotting paper, using least squares (rank regression) analysis

Estimation of the Weibull Parameters

The steps for determining the parameters of the Weibull representing the data, using probability plotting, are First rank the time between occurrence in ascending order as shown in table for All four major category. The method of probability plotting takes of the cdf of the distribution and attempts to linearize it by employing a specially constructed paper. The following sections illustrate the steps in this method using 2 parameter Weibull distribution.

1. Linearize the unreliability function.
2. Construct the probability plotting paper
3. Determine the X and Y positions of the plot points.

Constructing the Paper

The next task is to construct the Weibull probability plotting paper with the appropriate y and x axes. The x-axis transformation is simply logarithmic of time between occurrence (TBO) and y-axis is a bit more

Complex requiring a double log reciprocal transformation as

$$y = \ln(\ln(1/(1 - \text{median rank of } y)))$$

$$x = \ln(\text{TBO})$$

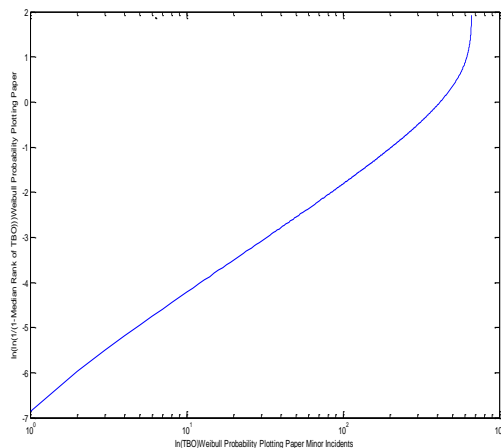


Figure 1: Weibull paper for Minor Incident 2010 to 2015

Least Square Analysis for Minor Incidents & Weibull Estimator

$$\hat{b} = \frac{\sum_{i=1}^{662} (\ln t_i) y_i - (\sum_{i=1}^{662} \ln t_i) (\sum_{i=1}^{662} y_i) / 662}{\sum_{i=1}^{662} (\ln t_i)^2 - (\sum_{i=1}^{662} \ln t_i)^2 / 662}$$

$$= \frac{833.598 - (227.5682)(-380.8489) / 662}{1141.255 - (277.5682)^2 / 662}$$

$$= \frac{833.598 + 130.92}{1141.255 - 78.2285} = \frac{703.598}{1063}$$

$$\hat{b} = 0.6618$$

$$\hat{a} = \frac{\sum_{i=1}^{662} y_i}{662} - \hat{b} \frac{\sum_{i=1}^{662} \ln t_i}{662}$$

$$= \frac{-380.8489}{662} - (0.6618 \times 227.5682) / 662$$

$$= -0.5753 - 0.2274$$

$$= -0.8027$$

$$\hat{\beta} = \hat{b} = 0.6618$$

$$\hat{\eta} = e^{-\hat{a} / \hat{b}}$$

$$= e - \left(\frac{-0.8027}{0.6618} \right)$$

$$= e^{1.2130}$$

$$\hat{\eta} = 3.363$$

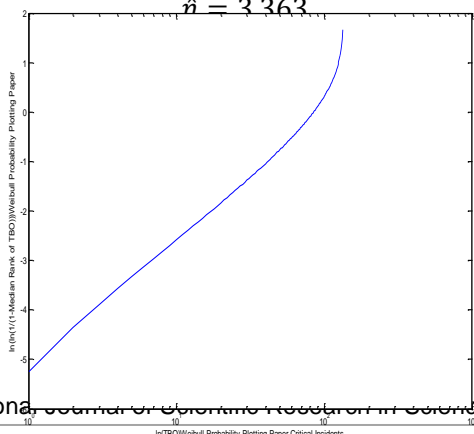


Figure 2: Weibull paper for Critical Incident 2010 to 2015

Least Square Analysis for Critical Incidents & Weibull Estimator

$$\hat{b} = \frac{\sum_{i=1}^{133} (\ln t_i) y_i - (\sum_{i=1}^{133} \ln t_i) (\sum_{i=1}^{133} y_i) / 133}{\sum_{i=1}^{133} (\ln t_i)^2 - (\sum_{i=1}^{133} \ln t_i)^2 / 133}$$

$$= \frac{109.0762 + (217.1707) \frac{(-75.7878)}{133}}{654.5238 - (217.1707)^2 / 133}$$

$$= \frac{109.0762 + 123.75}{654.5238 - 354.6098}$$

$$= \frac{232.8262}{299.914} = 0.7763$$

$$\hat{a} = \sum_{i=1}^{133} y_i - \hat{b} \frac{\sum_{i=1}^{133} \ln t_i}{133}$$

$$= \frac{-75.7878}{133} - 0.7763 \times \frac{217.1707}{133}$$

$$= -0.5698 - 1.2675$$

$$\hat{a} = 1.8337$$

$$\hat{\beta} = \hat{b} = 0.7763$$

$$\hat{\eta} = e^{-\hat{a} / \hat{b}}$$

$$= e^{-\left(\frac{-1.8337}{0.7763} \right)}$$

$$= e^{2.366}$$

$$\hat{\eta} = 10.6638$$

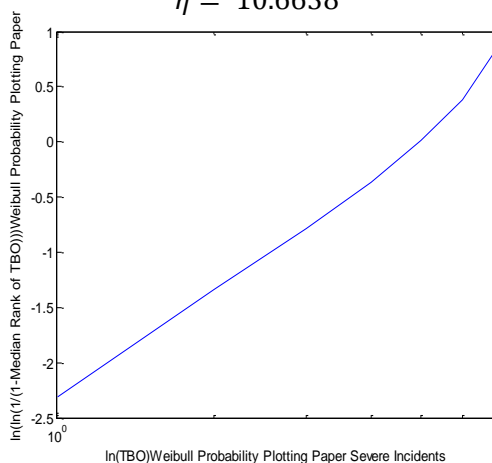


Figure 3: Weibull paper for Severe Incident 2010 to 2015

Least Square Analysis for Severe Incidents & Weibull Estimator

$$\hat{b} = \frac{\sum_{i=1}^{39} (\ln t_i) y_i - (\sum_{i=1}^{39} \ln t_i) (\sum_{i=1}^{39} y_i) / 39}{\sum_{i=1}^{39} (\ln t_i)^2 - (\sum_{i=1}^{39} \ln t_i)^2 / 39}$$

$$\begin{aligned}
&= \frac{1.9959 - (115.2579) \left(\frac{-21.7429}{39} \right)}{422.9738 - (115.2579)^2 / 39} \\
&= \frac{1.9959 + 64.2574}{422.9738 - 340.6252} \\
&\hat{b} = \frac{66.2533}{82.3485} = 0.8054 \\
\hat{a} &= \frac{\sum_{i=1}^{39} y_i}{39} - \hat{b} = \frac{\sum_{i=1}^{39} lnt_i}{39} \\
&= \frac{-21.7429}{39} - 0.8045 \times \left(\frac{115.2579}{39} \right) \\
&= -0.5575 - 2.3775 \\
\hat{a} &= 2.9350 \\
\hat{\beta} &= \hat{b} = 0.8045 \\
\hat{\eta} &= e^{-\frac{\hat{a}}{\hat{b}}} \\
&= e^{-\left(\frac{-2.9350}{0.8045} \right)} \\
&= e^{3.6482} \\
\hat{\eta} &= 38.4065
\end{aligned}$$

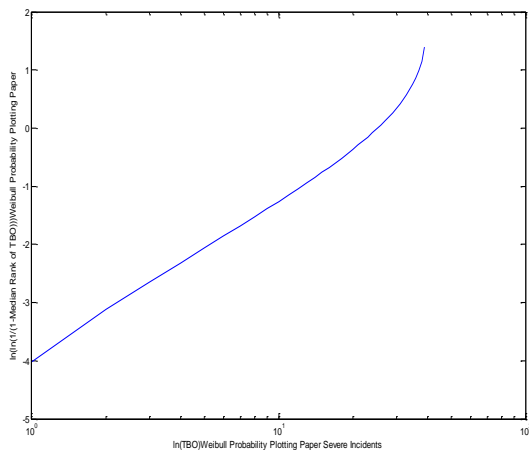


Figure 4: Weibull paper for Catastrophic Incident 2010 to 2015

Least Square Analysis for Catastrophic Incidents & Weibull Estimator

$$\begin{aligned}
\hat{b} &= \frac{\sum_{i=1}^7 (lnt_i) y_i - (\sum_{i=1}^7 lnt_i) (\sum_{i=1}^7 y_i) / 7}{\sum_{i=1}^7 (lnt_i)^2 - (\sum_{i=1}^7 lnt_i)^2 / 7} \\
&= \frac{5.6829 - (31.6077) \left(\frac{-3.5564}{7} \right)}{166.817 - (31.6077)^2 / 7} \\
&= \frac{5.6829 + 16.0585}{166.817 - 142.7209} \\
&= \frac{10.3756}{24.0961} = 0.4305
\end{aligned}$$

$$\begin{aligned}
\hat{a} &= \frac{\sum_{i=1}^7 y_i}{7} - \hat{b} = \frac{\sum_{i=1}^7 lnt_i}{7} \\
&= \frac{-3.5564}{7} - 0.4305 \times \left(\frac{31.6077}{7} \right) \\
&= -0.5080 - 1.9438 \\
\hat{a} &= 2.4518 \\
\hat{\beta} &= \hat{b} = 0.4305 \\
\hat{\eta} &= e^{-\frac{\hat{a}}{\hat{b}}} \\
&= e^{-\left(\frac{-2.4518}{0.5080} \right)} \\
&= e^{4.8} \\
\hat{\eta} &= 124.77
\end{aligned}$$

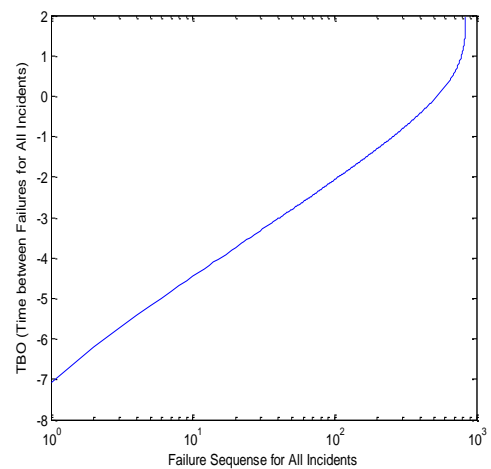


Figure 5: Weibull paper for All Incident 2010 to 2015
Least Square Analysis for All Incidents & Weibull Estimator

$$\begin{aligned}
\hat{b} &= \frac{\sum_{i=1}^{839} (lnt_i) y_i - (\sum_{i=1}^{839} lnt_i) (\sum_{i=1}^{839} y_i) / 839}{\sum_{i=1}^{839} (lnt_i)^2 - (\sum_{i=1}^{839} lnt_i)^2 / 839} \\
&= \frac{1069.634 - (131.06) (-482.97) / 839}{1242.06 - (131.06)^2 / 839} \\
&= \frac{1069.63 + 75.44}{1242.06 - 20.47} = \frac{1145.07}{1221.58} \\
\hat{b} &= 0.937 \\
\hat{a} &= \frac{\sum_{i=1}^{839} y_i}{839} - \hat{b} \frac{\sum_{i=1}^{839} lnt_i}{839} \\
&= \frac{-482.97}{839} - \frac{(0.937 \times 131.06)}{839} \\
&= -0.575 - 0.1463 \\
&= -0.7213 \\
\hat{\beta} &= \hat{b} = 0.937 \\
\hat{\eta} &= e^{-\frac{\hat{a}}{\hat{b}}} \\
&= e^{-\left(\frac{-0.7213}{0.937} \right)}
\end{aligned}$$

$$= e^{0.7699}$$

$$\hat{\eta} = 2.159$$

$$h(x)_{\text{Catastrophic incident}} = 0.053 x^{-0.569}$$

D. Probability Distribution Function and Hazard Rate Function Development

Weibull Probability Distribution function (PDF) is given by

$$F(x) = \left(\frac{\beta}{\eta}\right) \left(\frac{x}{\eta}\right)^{\beta-1} \exp\left(\frac{-x}{\eta}\right)^{\beta}$$

and Hazard function is given by

$$h(x) = \left(\frac{\beta}{\eta}\right) \left(\frac{x}{\eta}\right)^{\beta-1}$$

Put the value for all incidents as $\beta = 0.937, \eta$

$$= 2.159, \left(\frac{\beta}{\eta} = 0.433\right), \beta - 1$$

$$= -0.063$$

We have

$$f(x)_{\text{All incident}} = 0.45 x^{-0.063} \exp(-0.46 x)^{0.937}$$

$$h(x)_{\text{All incident}} = 0.45 x^{-0.063}$$

Put the value for Minor Incidents as $\beta = 0.6618, \eta$

$$= 3.363, \left(\frac{\beta}{\eta} = 0.196\right), \beta - 1$$

$$= -0.03382$$

$$f(x)_{\text{Minor incident}}$$

$$= 0.295 x^{-0.3382} \exp(-0.29 x)^{0.6618}$$

$$h(x)_{\text{Minor incident}} = 0.29 x^{-0.3382}$$

Put the value for Critical Incidents as $\beta = 0.7763, \eta$

$$= 10.66, \left(\frac{\beta}{\eta} = 0.072\right), \beta - 1$$

$$= -0.223$$

$$f(x)_{\text{Critical incident}}$$

$$= 0.00074 x^{-0.223} \exp(-0.09 x)^{0.7763}$$

$$h(x)_{\text{Critical incident}} = 0.00074 x^{-0.223}$$

Put the value for Severe Incidents as $\beta = 0.8045, \eta$

$$= 38.40, \left(\frac{\beta}{\eta} = 0.020\right), \beta - 1$$

$$= -0.1955$$

$$f(x)_{\text{Severe incident}} = 0.4 x^{-0.195} \exp(-0.26 x)^{0.8045}$$

$$h(x)_{\text{Severe incident}} = 0.4 x^{-0.195}$$

Put the value for Catastrophic Incidents as β

$$= 0.4305, \eta = 124.77, (\beta/\eta$$

$$= 3.4 \times 10^{-3}), \beta - 1 = -0.569$$

$$f(x)_{\text{Catastrophic incident}}$$

$$= 0.053 x^{-0.569} \exp(-0.008 x)^{0.4305}$$

III. RESULTS AND DISCUSSION

S. No.	Type of Incident	Value of β (shape parameter)	Value of η (scale parameter)	Probability Distribution function f(x)	Hazard Rate Function h(x)
1	All	0.937	2.159	$0.45 x^{-0.063} \exp(-0.46 x)^{0.937}$	$0.45 x^{-0.063}$
2.	Minor	0.6618	3.363	$0.295 x^{-0.3382} \exp(-0.29 x)^{0.6618}$	$0.29 x^{-0.3382}$
3.	Critical	0.7763	10.66	$0.00074 x^{-0.223} \exp(-0.09 x)^{0.7763}$	$0.00074 x^{-0.223}$
4.	Severe	0.8045	38.40	$0.4 x^{-0.195} \exp(-0.26 x)^{0.8045}$	$0.4 x^{-0.195}$
5.	Catastrophic	0.4305	124.77	$0.053 x^{-0.569} \exp(-0.008 x)^{0.4305}$	$0.053 x^{-0.569}$

IV. CONCLUSION

The hazard function defined as the limit of the failure rate as the interval approaches zero. Thus the hazard function is the instantaneous failure rate of any incident type. The quantity $h(x)dx$ represents the probability that a incident of particular category having time x will be took place within the small interval of time x to $x+dx$. Hazard function indicates the change in failure rate over the life of a population of point in time.

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Interconnection Network of Asynchronous System

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ABSTRACT

As we know that, interconnection means, bidirectional connection of more the two autonomous computer systems, which are transfer (include memory and clock also) data's between all ports. Apart from this when a computer network is implemented as low latency, high bandwidth, energy efficiency, and robustness are several properties that are seek in networks for parallel and distributed system, also same as for asynchronous and synchronous system. As per our knowledge the network performance is not depends on only the network architecture, it depends on the number of factors which are directly related to the network characteristics, mostly depends on the speed of data exchange rate, throughput and turnaround time.

Keyword: Interconnected Network, PDN, PDS, Asynchronous System, MPI.

I. INTRODUCTION

For the study of a large number of areas, many of the mathematicians, system designers and computer scientists has applied interconnection networks. As we know that, interconnection means, bidirectional connection of more the two autonomous computer systems, which are transfer (include memory and clock also) data's between all ports. Apart from this when a computer network is implemented as low latency, high bandwidth, energy efficiency, and robustness are several properties that are seek in networks for parallel and distributed system, also same as for asynchronous and synchronous system. As per our knowledge the network performance is not depends on only the network architecture, it depends on the number of factors which are directly related to the network characteristics, mostly depends on the speed of data exchange rate, throughput and turnaround time.

II. METHODS AND MATERIAL

Perfect Difference Network

Perfect Difference Network (PDN) that are based on mathematical notation of perfect difference sets, have already been shown to comprise an asymptotically optional method for connecting a number of nodes with

diameter 2 [5].

So, that all nodes are directly connected with one another node that means the data communicate in all direction where the nodes are placed. According to the definition of PDN, we can say that it is an example of interconnection network. In theoretically we explain this in terms of asynchronous system. We know the definition of *asynchronous system* and *distributed system* explains in our paper [6] according to that definition we assume all the nodes of PDN is represent processors, and the connection lines is like as a links or channel or communication medium (figure 5.). All processors are performing jobs individually (including sending or receiving messages and also the execution of task also). When the processor is working simultaneously it cannot share their memory and clocks. That means the interconnection network is an example of distributed system and transmitting data as asynchronously, i.e. an interconnection network is simulated as asynchronous system.

As we know," The perfect difference networks are depending on the mathematical notion of perfect difference sets, diameter of 2 in an asymptotically optimal manner" by J. M. Singer, we refer it constitute high performance interconnection networks for parallel and distributed system. Let's explain:

Let X be a n set of integer $0, 1, n-1$ module is N , D is a set of diameter, where,
 $D = d_1, d_2, d_3, \dots, d_k$.

Where,

k is a subset of x for every $a \neq 0$ i.e. mod N , the simple difference set for each of the possible difference is:

$$d_i, d_j, i \neq j \text{ such that}$$

$$d_i - d_j = a \pmod{N}$$

If D fulfill all requirement is called a perfect difference set, which is create an interconnection network. Those interconnection networks are transmitting data in all the possible exits, these exits are the processor ports. Thus, they are receiving data in every node.

According to the remainder theorem:

$$R = N - D * Q \quad (1)$$

$$N = R + D * Q \quad (2)$$

$$R = N \pmod{D} \quad (3)$$

2.1 Perfect Difference Set

PDS have already been show to comprise an asymptotically optimal method for connecting a number of nodes into a network with diameter 2. We know that PDS is a set of $\{\delta_0, \delta_1, \delta_2, \dots, \delta_n\}$ of $\delta+1$ integers having the property that their $\delta^2 + \delta$ differences $\delta_i - \delta_j$.

Where, $0 < i,$
 $j \leq \delta$

It represent congruent module i.e. $\delta^2 + \delta + 1$ to the integer in some order is a perfect difference set of which order is define as a terms of diameter.

Definition 2.1: PDS is a set of $\{s_0, s_1, s_2, \dots, s_\delta\}$ of $\delta+1$ integers having the property that their $\delta^2 + \delta$ difference $\delta_i - \delta_j, 0 \leq i \neq j \leq \delta$ are congruent module [5].

According to the definition of PDS, we have the result i.e. a sufficient condition that have their exists $\delta+1$ integers $s_0, s_1, \dots, s_\delta$, having the property that their $\delta^2 + \delta$ differences $s_i - s_j$,

where $i \neq j, 0 \leq i, j \leq \delta$ are congruent modulo $\delta^2 + \delta + 1$, is integers value always, $1, 2, \dots, \delta^2 + \delta$ in some order is that δ be a prime number or power of a prime

number.

We know, $\delta \rightarrow$ prime or power of prime

Then, $n = \delta^2 + \delta + 1. \quad (4)$

Definition 2.2: A $\{s_0, s_1, s_2, \dots, s_\delta\}$ of $\delta + 1$ integers value having the property that their $\delta^2 + \delta$ differences $s_i - s_j, 0 \leq i \neq j \leq \delta$ are concurrent module. Then the integer modulo $\delta^2 + \delta + 1$, to the integers $1, 2, \dots, \delta^2 + \delta$. In some order is a PDS of order δ . The simple difference set is also known as *perfect difference sets* 4, it is given that they correspond to the special $\lambda=1$ case of difference sets for which each of the possible difference is formed in exactly λ ways.

Then we have found that the PDS not satisfy the closer property that means a PDS need not contain an integer outside the interval $\{0.. \delta^2 + \delta\}$

The value of n is 7, 13, 31, 57,.....

By the equation: (3) we have several results as example,

δ	$\delta^2 + \delta$	$\delta^2 + \delta + 1$
2	6	7
3	12	13
5	30	31
7	56	57
9	90	91
11	132	133
13	182	183
17	306	307
19	380	381
23	552	553

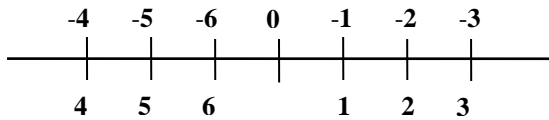
Table: 2.1

By the definition, any perfect difference set contains a pair of integers s_x and

s_y such that $s_x - s_y = 1 \pmod{\delta^2 + \delta + 1}$

If we assume $\delta = 2$ then the value of $n = 7$

Let explain in number scale



For all $n = 7$ the PDS is $\{\pm 0, \pm 1, \pm 3\}$ i.e. $\{0, 1, 3\}$
 According to the definition, for all intervals $\{0.. \delta^2 + \delta\}$
 the PDS is, if $n = 7$, then we get the PDS $\{0, 1, 3\}$. The
 normal PDS is reduced if it contains the integers 0 and 1.
 Hence the definition is

Definition 2.3: A PDS $\{s_0, s_1, s_3, \dots, s_\delta\}$ is reduced if
 it contains the integer number 0 and 1, A reduced PDS is
 satisfies follows condition.

- a) $s_i < s_{i+1} \leq \delta^2 + \delta$
- b) $0 \leq i < \delta$

But, the equivalent PDS have the same normal form $\{0, 1, s_2, \dots, s_\delta\}$
 hence the definition is for equivalent PDS.

Definition 2.4: If two different PDS's are equivalent
 when they have the same normal form $\{0, 1, s_2, \dots, s_\delta\}$.
 By the definition of PDS's, we take a chordal ring
 structure of the PDN with $n = 7$ nodes based on the
 perfect difference set $\{0, 1, \text{and } 3\}$.

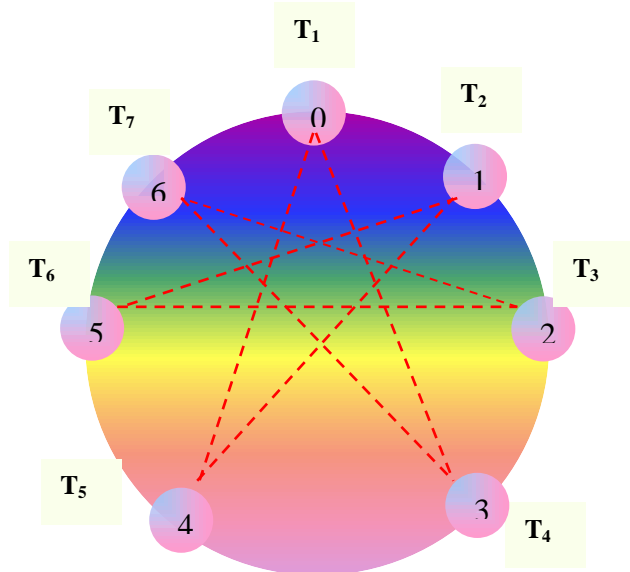


Figure: 2.1 Chordal Representations

Here, the value of δ is 2 and $n = \delta^2 + \delta + 1$.

Where we assume that all the points of chordal is
 similarly represent the processors. They are
 interconnected with each other to communicate data
 with ones to another. This representation is similar as a

see figure: 2.2,

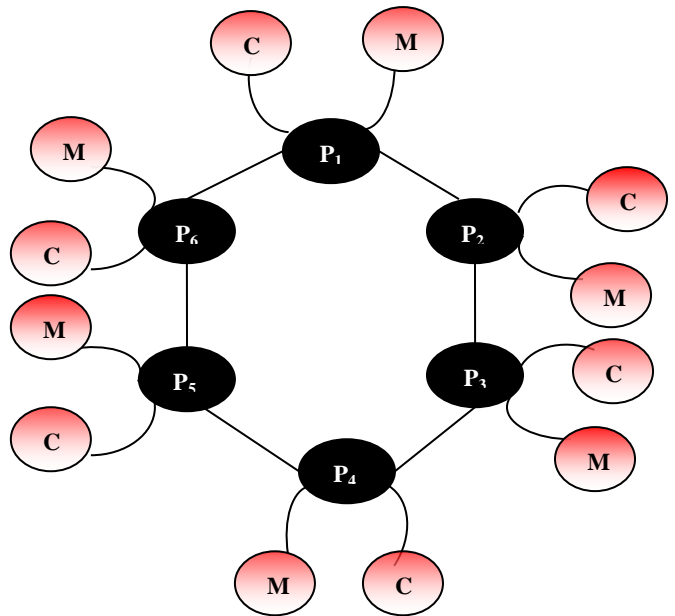


Figure: 2.2

That means the chordal representation is represent the
 connection of nodes or processors, they are placed in
 anywhere in the surrounding of the world. It shows
 either the global connection of internet, in which user
 machine are connected with another machine which is
 placed on different countries.

Lemma 1: In PDS 2^n differences.

Proof: Let us explain in another sense,

- $\Rightarrow T_0 = 0 = (0 - 0)$
- $\Rightarrow T_1 = 1 = (1 - 0)$
- $\Rightarrow T_2 = 2 = (3 - 1)$
- $\Rightarrow T_5 = 3 = (3 - 0)$
- $\Rightarrow T_4 = 4 = (0 - 3)$
- $\Rightarrow T_5 = 5 = (1 - 3)$
- $\Rightarrow T_6 = 6 = (0 - 1)$

Where, T_1 is the mirror image of T_6 , T_2 is the mirror
 image of T_5 , and,

T_3 is the mirror image of T_4 .

Then,

By, the reason of definition the perfect difference
 network is the property of remainder theorem;

$$\Rightarrow N = R + D * Q \text{ from the equation (2),}$$

$$\Rightarrow s_i - s_j = \delta^2 + \text{mod } \delta^2 + \delta + 1$$

$$\Rightarrow N = R + D * Q$$

$$\Rightarrow N = (R_1 - R_2) + D * Q \quad (5)$$

In equation (5), assume the value of $Q = 1$ and put it in

equation (5).

$$\begin{aligned} \Rightarrow R_2 &= 7 - 3 & \Rightarrow 4 \\ \Rightarrow R_2 &= 7 - 4 & \Rightarrow 3 \\ \Rightarrow R_2 &= 7 - 5 & \Rightarrow 2 \\ \Rightarrow R_2 &= 7 - 6 & \Rightarrow 1 \\ \Rightarrow R_2 &= 7 - 7 & \Rightarrow 0 \end{aligned}$$

Then we get the results,

$$\Rightarrow N = (R_1 - R_2) + D \quad (6)$$

$$\Rightarrow R_1 - R_2 = N - D$$

$$\Rightarrow R_2 = R_1 - (N - D)$$

$$\Rightarrow R_2 = R_1 - N + D \quad (7)$$

$$N - D + R_2 \quad (8)$$

Put, $R_2 = 0$, in equation (8) and, $R_1 = 0$, in equation (7)

Hence, we get from equation (8):

$$\Rightarrow R_1 = N - D \quad (9)$$

And, from equation (7):

$$\Rightarrow R_2 = -N + D \quad (10)$$

Again, we put the value of $R_2 = 1$ in equation (8) and $R_1 = 1$ in equation (7)

Hence, the result is:

$$\Rightarrow R_2 = N - D + 1 \quad \{\text{from equ. 8}\}$$

$$\Rightarrow R_1 = 1 - N + D \quad \{\text{from equ. 7}\}$$

If $N = \{0, 1, 2, 3, 4, 5, 6\}$

Then, we have put all these value in equ. (8),

And, also assume the value of $R_2 = 0$ for all cases

$$\Rightarrow N = 0 \Rightarrow R_1 = D$$

$$\Rightarrow N = 1 \Rightarrow R_1 = (1 - D)$$

$$\Rightarrow N = 2 \Rightarrow R_1 = (2 - D)$$

$$\Rightarrow N = 3 \Rightarrow R_1 = (3 - D)$$

$$\Rightarrow N = 4 \Rightarrow R_1 = (4 - D)$$

$$\Rightarrow N = 5 \Rightarrow R_1 = (5 - D)$$

$$\Rightarrow N = 6 \Rightarrow R_1 = (6 - D)$$

Again, in a chordal ring structure as shown in figure: 2.1 all nodes are 7 then, the value of D is also 7.

Put, if $D = 7$ in equation (8) then,

$$\Rightarrow R_1 = 0 - 7 = -7 \Rightarrow 0$$

$$\Rightarrow R_1 = 1 - 7 = -6 \Rightarrow 1$$

$$\Rightarrow R_1 = 2 - 7 = -5 \Rightarrow 2$$

$$\Rightarrow R_1 = 3 - 7 = -4 \Rightarrow 3$$

$$\Rightarrow R_1 = 4 - 7 = -3 \Rightarrow 4$$

$$\Rightarrow R_1 = 5 - 7 = -2 \Rightarrow 5$$

$$\Rightarrow R_1 = 6 - 7 = -1 \Rightarrow 6$$

But, for all cases $R_1 - R_2 = -1$ is not working.

If $R_2 = D - N$ when, $R_1 = 0$ for all cases by the equation (8)

Then,

$$\Rightarrow R_2 = 7 - 0 \Rightarrow 7$$

$$\Rightarrow R_2 = 7 - 1 \Rightarrow 6$$

$$\Rightarrow R_2 = 7 - 2 \Rightarrow 5$$

Hence, we have the perfect difference set in 7 nodes chordal ring is $\{0, 1, 3\}$

$$\Rightarrow s_i - s_j = (\delta^2 + \delta) \pmod{(\delta^2 + \delta + 1)}$$

$$\Rightarrow 0 - 1 = n \pmod{7} \Rightarrow n = (0 - 1) + 7 = 6$$

$$\Rightarrow 0 - 3 = n \pmod{7} \Rightarrow n = (0 - 3) + 7 = 5$$

$$\Rightarrow 1 - 3 = n \pmod{7} \Rightarrow n = (0 - 3) + 7 = 4$$

$$\Rightarrow 1 - 0 = n \pmod{7} \Rightarrow n = (1 - 0) + 7 = 8 \% 7 = 1$$

Where, 1 is a reminder by reminder theorem.

$$\Rightarrow 3 - 0 = n \pmod{7} \Rightarrow n = (3 - 0) + 7 = 10 \% 7 = 3$$

Where, 3 is a reminder by reminder theorem.

$$\Rightarrow 3 - 1 = n \pmod{7} \Rightarrow n = (3 - 1) + 7 = 9 \% 7 = 2$$

Where, 2 is a reminder by reminder theorem.

Hence we have 2^n difference in 7 nodes chordal ring the PDS.

For example: $2^n = 2^3 \Rightarrow 8$ assume $n = 3$ where is the no of members in PDS

Lemma 2: The ${}^n P_2$ mirror image in a PDN.

Proof: $\{\emptyset\}, \{0\}, \{0, 1\}, \{0, 3\}, \{1, 1\}, \{0, 3\}, \{3, 3\}$

$$3_{c_2} = \frac{\angle 3}{\angle 3 \angle 3 - 2} = \frac{\angle 2}{\angle 3 \angle 3} = 3$$

(0, 1) (0, 3) (1, 3)

$$3_{P_2} = \frac{\angle 3}{\angle 3 - 2} = \frac{3 \times 2 \times 1}{1} = 6$$

$$\{0, 0\}, \{0, 1\}, \{0, 3\}, \{1, 1\}, \{1, 3\}, \{3, 3\}$$

$$\{0-0\}, \{0-1\}, \{0-3\}, \{1-1\}, \{1-3\}, \{3-3\}$$

$$\{1-0\}, \{3-0\}, \{3-1\}$$

2.2 Asynchronous Communication in Interconnection Network

We know that, the normal PDS $\{0, 1, S_2, \dots, S_\delta\}$ of order n , by this we can construct a direct interconnection network with a node n . where, $n = \delta^2 + \delta + 1$.

Definition 2.5: The PDN based on the normal-form of PDS $\{0, 1, S_2, \dots, S_\delta\}$ and it have n nodes; they are numbered 0 to $n - 1$. The node is directed connected via nodes $i \pm 1$ and $i \pm S_j \pmod{n}$ for $2 \leq j \leq \delta$.

For Every normal PDS contains 1 as a member. Therefore, PDN's based on normal form PDS's are special types of chordal rings. In chordal ring technology, the links connecting with i and $i+1$ connecting ring links, while these that connect with nodes i and $i+S_j$ are non-connecting \square , $2 \leq j \leq$ skip links or chords. The links are connected with i node and $i+S_j$ nodes. In which node i , is a formal-skip node and node $i+S_j$ is backward skip nodes. By this reason we can also says, the ring link for i is forward link and $i+1$ is backward ring.

Lemma 3: The message passing over a PDN is asynchronously.

Proof:-

For asynchronous communication again we take seven nodes chordal ring shown in figure: 2.1,

$$\begin{aligned} \Rightarrow T_0 &= T_1 + T_3 + T_4 + T_6 = T_7 \\ \Rightarrow T_1 &= T_0 + T_2 + T_4 + T_5 = T_8 \\ \Rightarrow T_2 &= T_1 + T_3 + T_5 + T_6 = T_9 \\ \Rightarrow T_3 &= T_2 + T_4 + T_0 + T_6 = T_{10} \\ \Rightarrow T_4 &= T_1 + T_0 + T_3 + T_5 = T_{11} \\ \Rightarrow T_5 &= T_4 + T_6 + T_2 + T_1 = T_{12} \\ \Rightarrow T_6 &= T_2 + T_3 + T_0 + T_5 = T_{13} \end{aligned}$$

With different clock in message will be passed in different channel, these are shown in follows figure: 2.3. In every node connected with the other node that means in interconnection network every machine has store own address and the recipient machine port address by this all machine are transforming data between each other. But, in this distributed data processing machine architecture all machine communicated message in asynchronously. Hence, it is prove that in all interconnection networks passed message through that channel is asynchronous at a part of given interval.

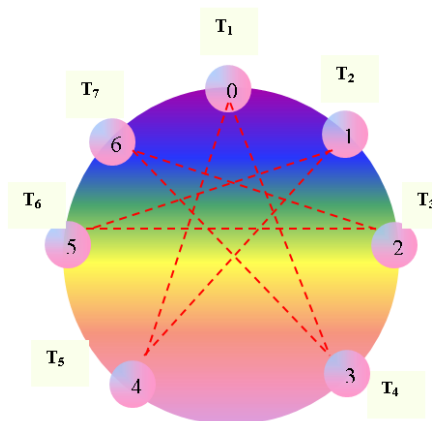


Figure: 2.3

Again,

$$\begin{aligned} \Rightarrow T_7 & \Rightarrow T_1 + T_3 + T_4 + T_6 \\ \Rightarrow T_1 & + (T_0 + T_2) + (T_0 + T_5) + T_6 \\ \Rightarrow 2T_0 & + T_1 + T_2 + T_5 + T_6 \end{aligned}$$

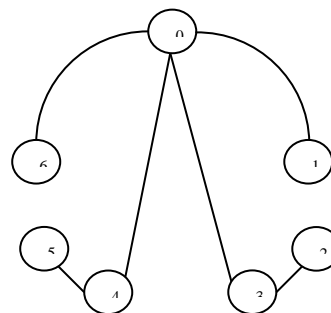


Figure: 2.3 DAG representation of interconnection network. Where T_i is connected to the T_n .

Apply the above architecture for all nodes hen we get the result of all nodes.

Hence, the convergency and divergency of algorithms suggest the creation on of vector fields.

$$\begin{aligned} \Rightarrow T_7 & \Rightarrow 0 \text{ mod } 7 \\ \Rightarrow T_8 & \Rightarrow T_0 + T_2 + T_4 + T_5 \\ \Rightarrow T_8 & \Rightarrow 1 \text{ mod } 7 \\ \Rightarrow T_9 & \Rightarrow T_1 + T_3 + T_5 + T_6 \\ \Rightarrow T_9 & \Rightarrow 2 \text{ mod } 7 \\ \Rightarrow T_{10} & \Rightarrow T_0 + T_2 + T_4 + T_6 \\ \Rightarrow T_{10} & \Rightarrow 3 \text{ mod } 7 \\ \Rightarrow T_{11} & \Rightarrow T_0 + T_1 + T_3 + T_5 \\ \Rightarrow T_{11} & \Rightarrow 4 \text{ mod } 7 \\ \Rightarrow T_{12} & \Rightarrow T_1 + T_2 + T_4 + T_6 \\ \Rightarrow T_{12} & \Rightarrow 5 \text{ mod } 7 \\ \Rightarrow T_{13} & \Rightarrow T_0 + T_2 + T_3 + T_5 \\ \Rightarrow T_{13} & \Rightarrow 6 \text{ mod } 7 \\ \Rightarrow T_{14} & \Rightarrow 7 \text{ mod } 7 \end{aligned}$$

With, different clocks the message will be passed in following network of PDN. The message will be passed to as master processor in the following manner.

$$\begin{aligned} \Rightarrow T_0 &= T_7 \Rightarrow 0 \text{ mod } 7 \\ \Rightarrow T_1 &= T_8 \Rightarrow 1 \text{ mod } 7 \\ \Rightarrow T_2 &= T_9 \Rightarrow 2 \text{ mod } 7 \\ \Rightarrow T_3 &= T_{10} \Rightarrow 3 \text{ mod } 7 \\ \Rightarrow T_4 &= T_{11} \Rightarrow 4 \text{ mod } 7 \\ \Rightarrow T_5 &= T_{12} \Rightarrow 5 \text{ mod } 7 \\ \Rightarrow T_6 &= T_{13} \Rightarrow 6 \text{ mod } 7 \end{aligned}$$

i.e., the above processor can be explained in matrix multiplication by using message-passing interconnection. It is known as interconnection communication in asynchronous system in perfect difference networks.

For multicore PDN we assume that according to the

above figure: 5.3

$$\begin{aligned} \Rightarrow T_0 + T_1 &= T_0 + T_6 \\ \Rightarrow T_0 + T_3 + T_2 &= T_0 + T_4 + T_5 \\ \Rightarrow T_7 &\Rightarrow 0 \pmod{7} \\ \Rightarrow T_7 &= (T_0 + T_1) + (T_0 + T_6) + (T_0 + T_3 + T_2) + (T_0 + T_3 + T_2) \\ \Rightarrow T_7 &= T_0 \pmod{7} \end{aligned}$$

i.e., the communication latency is $T_0 + T_6 = T_0 + T_1 = T_0 + T_4 = T_0 + T_3 = T_4 + T_5 = T_3 + T_2$

Hence, the nodes T_0 , T_1 , T_3 and T_4 are in direct communication with the main node which is T_0 . And, also the node T_5 and T_2 are indirect connected with T_0 . Apart from this all the above declare nodes are interconnected and passed message in asynchronously. But there is no communication between $(T_6 \& T_5)$, $(T_1 \& T_2)$, and $(T_4 \& T_3)$ is according to the figure: 5.3.

According to the above interconnection network we refer several issues as follows:

- Total communication time of a complete graph is always greater than the total communication time of an interconnection network.
- Total number of circuits in a complete graph is always greater than the total no of circuits of an interconnection network.
- Minimum communication time in a complete graph is always greater than the minimum communication time of an interconnection network.
- Minimum communication time in an interconnection network of $\delta = 2$ is equal to 6 edges, which lies between all the seven nodes.

Again we can say according to our research, in an interconnection network:

- More circuits more communication.
- More circuit more robustness.
- More circuit more expansive.

III. RESULTS AND DISCUSSION

3.1 Strassen Matrix Multiplication in MPI

Here, we had given strassen's algorithm for matrix multiplication in its original notation [1]. First divided the input matrices A; B and the output matrix C into 4 sub matrices:

$$A = \begin{bmatrix} A_{11} & A_{12} \\ A_{21} & A_{22} \end{bmatrix}, \quad B = \begin{bmatrix} B_{11} & B_{12} \\ B_{21} & B_{22} \end{bmatrix} \text{ and } C = \begin{bmatrix} C_{11} & C_{12} \\ C_{21} & C_{22} \end{bmatrix}.$$

Then, for one step of the algorithm, compute the following quantities:

$$\begin{aligned} I &= (A_{11} + A_{12}) * (B_{11} + B_{12}) \\ II &= (A_{21} + A_{22}) * B_{11} \\ III &= A_{11} * (B_{12} - B_{22}) \\ IV &= A_{22} * (B_{21} - B_{11}) \\ V &= (A_{11} + A_{12}) * B_{22} \\ VI &= (A_{21} - A_{11}) * (B_{11} + B_{12}) \\ VII &= (A_{12} - A_{22}) * (B_{21} + B_{22}) \end{aligned}$$

And the output is:

$$\begin{aligned} C_{11} &= I + IV - V + VII \\ C_{12} &= II + IV \\ C_{21} &= III + V \\ C_{22} &= I + III - II + VI \end{aligned}$$

That means the algorithm is recursive since it can be used for each of the 7 smaller matrix multiplications. The recursion for the computational cost of the algorithm is $F(n) = 7F(n/2) + 18n^2$, yielding a solution of

$$F(n) = 6n^{\lg 7} - 5n^2$$

For n a power of two and using a base case of $n = 1$.

3.2 Limit of Synchronization In Interconnection Network

- 1) **Multicore System:** It is a single computing component with two or more independent actual processing units, these units are also known as "cores". They are executing programming instructions and codes. The instructions are either arithmetic operation or other general instructions. But the multiple cores can run multiple instructions at the same execution time, increasing overall speed for programs amenable to synchronous system. In a multi-core processor implemented multiprocessing in a single physical package. Processors were originally developed with only one core. In the mid-1980s Rockwell International manufactured versions of the 6502 with two 6502 cores on one chip as the R65C00, R65C21, and R65C29 [2], sharing the chip's pins on alternate clock phases. Other multi-core processors were developed in the early 2000s by Intel, AMD and others. The

main factor of multicore system is to perform highly at lower energy. For example: Mobile devices.

- 2) **Parallel And Distributed Data Processing System:** Both systems can be defined as a collection of processing elements that communicate data's and process then to achieve a certain goals. In present environment, parallelism of machine using at all levels of technologies. Within each CPU's by executing multiple instructions from the same thread of control, simultaneously, thus make parallel systems. Simultaneously, advances in networking technology have created an explosion of distributed applications, making distributed computing an inherent fabric in our day-to-day lives. A system in which all components located at network and communicate data's and information through the communication medium with the help of communication media and coordinates their actions only by passing message ones to another, but remember that all machine are placed in different places.
- 3) **Cloud Computing:** Cloud computing metaphor: For a user, the network elements representing the provider-rendered services are invisible, as if obscured by a cloud [3]. Cloud computing is a model for enabling convenient, on-demand access to a shared pool of configurable computing resources [4]. Cloud computing and storage solutions provide users and enterprises with various capabilities to store and process their data in third-party data centers.
- 4) **Internet:** The internet is a network of networks which connects computers all over the world. The term "internet" has been coined by the combination of two words namely "interconnectivity" and "networks". Thus, the definition of internet we can also say that, it is interconnectivity of networks. It is the vast pool of resources that offers different opportunities to different people. We gave several concepts about internet as:
- It is an ocean of information waiting to be dived into.
 - It is the place where we can show our

company's presence all over the world.

- It offers employment opportunities all over the world.
- It is a source of entertainment to young and old in all over the world.

Computers connected to the internet, communicates by using IP (internet protocol), that slices the information into packets and routes them to their destination. Along with IP, most computers on the internet communicate with TCP and the combination is known as TCP/IP. Each computer on internet is called a host or host computer. The computers on internet are connected by cables, phone lines and satellite connections.

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A Study on Monitoring of Visitors in Dynamic Network

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ABSTRACT

Wireless Network is very broad area, which include set of nodes those communicate through radio waves. Dynamics and Portability are important aspect of Wireless Network. In this paper we present a monitoring system for a dynamic network, in which a set of domain nodes shares the responsibility for producing and storing monitoring information about a set of visitors. This information is stored persistently when the set of domain nodes grows and shrinks. Such a system can be used to store traffic or other logs for auditing, or can be used as a subroutine for many applications to allow significant increases in functionality and reliability. The features of the system include authenticating visitors, monitoring their traffic through the domain, and storing this information in a persistent, efficient, and searchable manner. From a theoretical outlook our system performs fighting fit, but it would certainly be interesting to see how it would perform in real life.

Keywords: Survivable Monitoring, Network Intrusion Detection, Emergency Communication

I. INTRODUCTION

In dynamic network, network configuration being rearranged at every time when subscriber moves into different base station. Dynamic overlay networks have recently attracted a lot of attention due to the enormous interest in peer-to-peer systems and wireless ad-hoc networks.

We present a monitoring system which collects and stores information about visiting participants in a network. The information is made available upon request and can be subsequently analyzed and used for any purpose by an administrator. Methods for authentication ensure that visitor nodes are identified before being allowed to communicate; message encryption within the network ensures that no node can impersonate a domain node or send messages through the domain nodes except through the proper monitoring process.

Depending on how the information collected by the system and it is being used, there are several applications such as persistent audit logs, network intrusion detection, and emergency systems.

1.1 Problem description

We assume that there is two different kinds of nodes, visitors and domain nodes, and that the visitors are untrusted and the domain nodes are trusted. The task of the domain nodes is to monitor all activities of the visitors which involve the network. They also store a distributed database containing recorded monitoring information for all visitors. There are three components to this monitoring process:

- Traffic of the visitors has to be cached.
- The intercepted traffic must be processed to produce relevant monitoring information.
- This information must be stored permanently. We focus primarily on the last of these, studying a distributed database and algorithms for the storage of this information. The requirements of such a database are as follows:

Authentication: The system must be able to identify visitors accurately to ensure that stored information can be correctly matched to a visitor.

Search ability: The database must be searchable, in the sense that an administrator must be able to acquire all

information about a particular visitor wishing to connect to the network.

Persistence: The database must be persistent, in the sense that no entries in the database can be lost by network disruptions.

Efficiency: The algorithms for maintaining and using the database should run with minimal communication and computational overhead.

II. METHODS AND MATERIAL

A. Related Work

Emergency communication systems are becoming increasingly popular but, none of the existing and proposed systems operates over a dynamic network and provides an open access policy that allows visitors to communicate; see [20] for a survey of existing emergency systems. Intrusion detection for distributed systems is a very active research area and several systems have been proposed that can be classified based on the approach employed by the detector.

For instance, DIDS [17] and NSTAT [9] are systems based on the centralized analysis approach where audit data is collected on individual nodes and then reported to a centralized location where the intrusion detection analysis is performed. In GrIDS [18] and EMERALD [7], systems based on the hierarchical analysis approach, audit data is collected and analyzed by each node and the results of the analysis is reported according to some hierarchical structure.

We study the load balancing and recovery mechanisms built on top of the overlay network SPON [14], which was designed for reliable broadcasting in dynamic networks. Extensive research has been recently carried out on the design of overlay networks that support arrivals and departures of nodes. Recent systems projects on such networks include Freenet [4], Ohaha [11], Archival Intermemory [3], and the Globe system [1].

Theoretically well-founded peer-to-peer networks have also been presented, such as Pastry [15], Tapestry [10], Chord [19] along with SPON. With the exception of SPON, the topologies of these networks are based on DNS-like, hyper cubic, or random constructions, which are either not useful or far too complex. Recently, a new

backup system based on peer-to-peer overlay networks has been proposed in [5], similar to an approach previously suggested in other works, including, for example, [2, 6, 7, 13, 16]; the scope of these systems is to backup entire file systems. The storage component of the system studied here is designed solely to store monitoring information, allows us to fulfill our requirements while achieving provable efficiency, which more expensive systems cannot.

B. System Overview and Its Components

The monitoring information could be exchanged, but this would generate significant communication overhead. The monitoring information could be left at the domain node that collected it, and collected only when needed; this saves unnecessary message passing, but can cause load imbalances and can exceed the capacity of domain nodes. Layers of Secure Monitoring protocol are presented herewith.

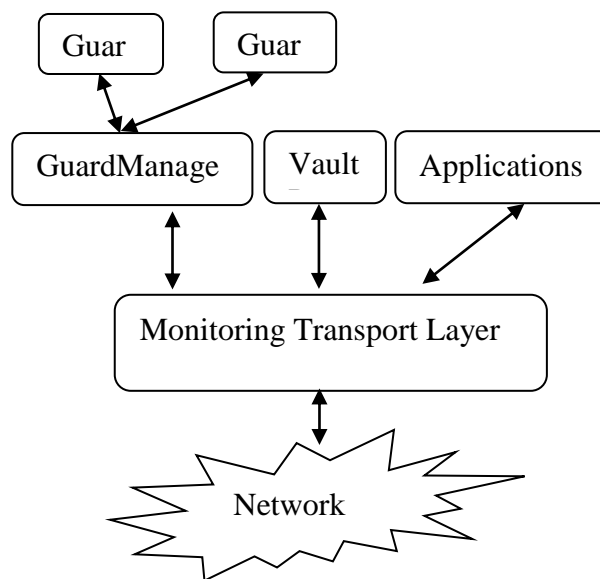


Figure 1. Layers of Secure Monitoring protocol

1. Visitors:

The visitor is responsible for authenticating its messages by signing them, so that a domain node receiving them can properly match the traffic to the node. Any unsigned messages from a visitor are ignored.

sign(): authenticate itself in its message.

2. Domain Node

The monitoring transport layer receives all messages arriving from the network. It passes messages which are not valid domain messages to the guard process, and routes valid domain messages to the guard and vault processes and to any applications in use according to their destination. It also signs all messages from the node, from any process, to mark them as valid domain messages.

Sign(): sign all outgoing messages as valid domain messages

Route(): route incoming messages to appropriate processes

The guard process verifies the identity of a visitor and clears it with the supervisor when it first connects. On the first and subsequent connections, the guard forwards the visitor's messages into the network, and also produces monitoring information about the visitor's messages. We use a single guard manager in the domain node which spawns independent guard processes for each visitor connecting through it.

Interface of guard manager

New(): Spawn a new guard process to handle a new visitor

Delete(): delete a guard process.

Interfaces of guard

Check(): query supervisor regarding a visitor

Monitor(): produce monitoring information

Forward(): send a visitor's message

Page(): request a node to send monitoring information

Upload(): send monitoring information to a vault.

The vault process is responsible for the storage of monitoring information assigned to it.

Interfaces of Vault

Join(): join a heap

Leave(): leave a heap

Page(): request a node to monitoring information to

Move(): move data to another vault

Heapify(): rearrange with neighbours in heap

Search(): search locally stored information for a specific node

Write(): write monitoring information

locally

3 Supervisor

The supervisor is a single domain node known by all other domain nodes, and is also a process running on that node which performs the supervisor functions.

Interfaces of supervisor

Insert(): add a vault to the backup heap

Remove(): remove a vault from its heap

Check(): see if a visitor is in the blacklist

Update-list(): update a blacklist when told

Get-lightest(): return the top vault in the active heap.

Switch-heap(): active the backup heap

4 Administrator

The exact functioning of the administrator is beyond the scope of this paper. In general, the administrator initiates data collection through broadcasts through the domain, in order to retrieve all monitoring information about a set of visitors. If broadcasting is not a primitive in the domain, a strategy such as [29] can be used to perform reliable broadcasting using a unicast primitive.

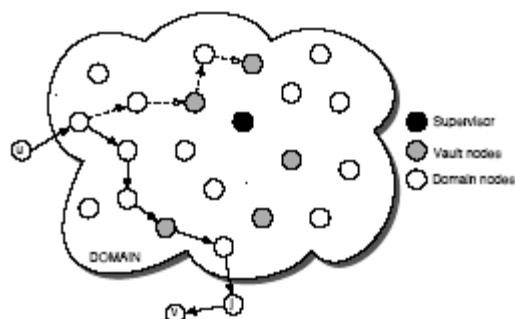


Figure 2: The flow of message from a visitor through the network to another visitor. The Solid path is message path and dotted path is the path of some monitoring information

Flow path of messages

Messages can be freely exchanged between domain nodes. A message from a visitor node is stopped at the first domain node it reaches (which may change over time as the visitor and domain nodes move around), and the node determines whether or not to let the visitor send to the network by contacting the network supervisor. The domain node monitors the traffic of the visitor after

it is cleared by the supervisor. Monitoring information is distributed through the domain by being sent piecemeal through the network to vaults, and can be accessed and used by an administrator, for example to update the network's acceptance policies for visitors. A sample overview of the flow of a message is given in Figure 2.

III. RESULTS AND DISCUSSION

A. Algorithm

1 Cryptographic Algorithm

Effective monitoring is only possible if untrusted nodes cannot create multiple or false identities, and if the complete traffic to and from an untrusted node is monitored, filtered, and stored. Central requirements for a monitoring system are:

1. Untrusted nodes must be uniquely identifiable.

This can be achieved via a wide range of standard authentication techniques, from password-based systems to digital certificates that bind node identifiers to public keys. (This is similar to the unique network identifier in intrusion detection systems [33, 18].)

2. Domain nodes should be able to communicate securely.

Domain nodes should be able to communicate so that outsiders cannot read, modify or inject messages. This can be achieved via standard techniques although techniques based on public-key cryptography should be kept at minimum whenever domain nodes are mobile, since mobile nodes often rely on battery power which can be consumed rapidly by CPU-intensive operations. Depending on network conditions there are a number of standard solutions to these requirements, including public-key cryptography, shared keys, and group key communication protocols. we discuss a set of solutions to these issues, designed for a single application. This section by no means represents the only way to implement the general system.

2 Data Management Algorithms

2.1 Guards, pages of logs, and temporary page storage

As the guard monitors the visitor, it stores this information in a temporary fixed size page of storage space; when this page is filled, the guard requests a destination from the supervisor through `page()`, receives a network address, and calls `upload()` to send the page to the address to be stored in that node's vault process. The guard's temporary page can then be erased and reused. Collecting the data into pages improves the efficiency of the supervisor, since each store operation includes a certain overhead cost independent of the amount of data being stored. But if a page is too large, or if all data is stored at the guard, then the load can become unbalanced.

2.2 Vaults and SPON-based heaps

For permanent storage of pages, vaults are organized into structures based on the SPON network developed in [14] and discussed in section 4. The SPON topology is a rooted tree structure consisting of multiple trees of varying depths similar to a binomial heap; it tolerates single node insertions and removals through replacement in constant time per operation under the assumption that the roots of all trees are stored in an array at a supervisor node.

On top of this topology a heap is maintained, where heaping is performed according to the maximum space available at a node, such that each node has at least as much free space for storage as its children. This is done through the `heapify()` calls of each node, which need to occur only when a node joins or leaves (when its replacement is inserted) or when a node is given additional load. An inserted node queries its new parent and children (as applicable).

If it has more free space than its parent, they exchange places by exchanging adjacent node information and informing their neighbors as well; this requires $O(1)$ rounds and messages. Then the node continues to move itself up the tree querying its new parent and exchanging until a terminal location is found; each round requires $O(1)$ messages and rounds of communication, and the supervisor does not need to be involved in any of the operations. If an inserted node or a node given additional load has less free space than its children, it exchanges places with the child of most free load, and continues to

query its new children and exchange until it is in place. In this way the root of the rightmost tree is always the node with the most room.

2.3 Types of vaults and heaps

There are three types of vaults: old, spare, and active. There are also two separate heaps maintained in the system, the active heap and the backup heap. Active vaults are connected to the active heap, and spare vaults are connected to the backup heap; The root node of the active heap is sent by the supervisor to the next guard node to request storage for a page.

B. HEAP Structure

We study a tree-based network called SPON which manages group updates and supports efficient broadcasting. SPON uses a supervisor peer to maintain the network during node arrivals and departures and routes broadcasts using direct connections between nodes. SPON is capable of performing reliable broadcasting in unreliable networks.

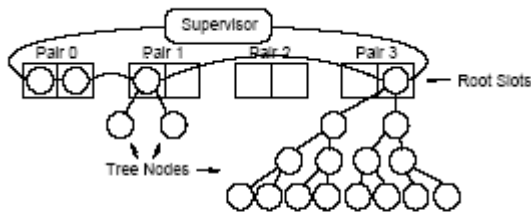


Figure 3: A sample network

Any root node in a slot of pair i is the root of a complete binary tree of nodes of depth i . At most one slot pair is fully occupied, and below this pair there is no occupied slot. Furthermore, every root node maintains a link to the closest root node to the right and to the left of the array of root slots, and the leftmost and rightmost root nodes maintain a link to the supervisor as shown in Figure 3.

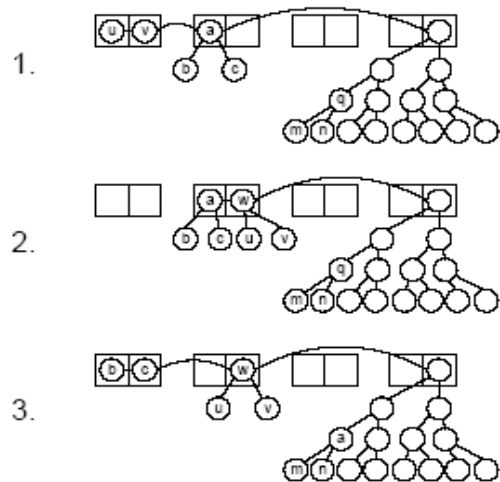
Thus, every root node in the SPON structure has a degree of at most 4. Tree nodes maintain links to a parent and to a left and right child (when appropriate) in the tree, and thus have degree at most 3

1 Join and leave

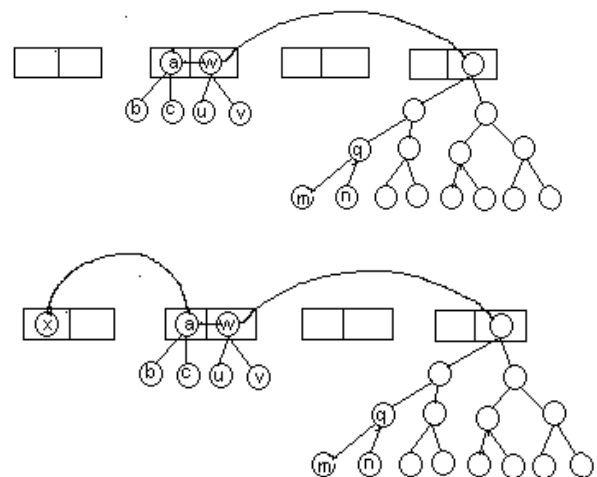
A join request can be sent to any node in the system by a new node wishing to join the network. This request is then forwarded to the supervisor, who then processes the

request through a function called $\text{Integrate}(v)$ to insert a new node v into the data structure. When some node w leaves the system, it performs a function called $\text{Replace}(w, N[w])$ so the supervisor can replace it with a new node reconnected to $N[w]$.

The operation $\text{UpdateRootLinks}()$ in these functions makes sure that at the end the links between the root nodes satisfy Invariant 4.1. For a possible outcome, see Fig. 4. Next we show that the algorithms Integrate and Replace indeed preserve Invariant 4.1.



1. A sample network containing 20 nodes.
2. Node w joins; the supervisor assigns u and v to be its children.
3. Node q leaves; the supervisor selects a as its replacement and sends a 's children b and c to the open slots in level 0.



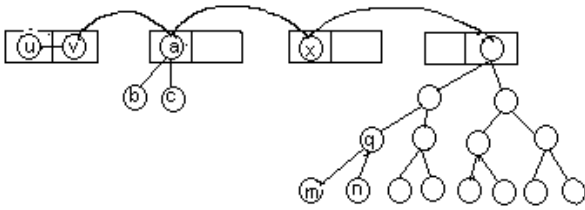


Figure 5:

1. A sample network containing 21 Nodes
2. Node x joins the supervisor place it in open slot pair 0
3. Node w leaves; the supervisor remove w from its slot and place w's children in pair 0. the existing root node shifted to pair 2.

C. Analysis

1. Control messages

We analyze the cost of control messages through the following comparison to the cost of data movements.

Lemma 6.1.1: Except for messages to process nodes joining and leaving heaps, control message cost is at most a constant multiple of data movement cost. **Proof.** Other than nodes joining and leaving heaps, control messages are triggered by two types of events: visitor communication and page movement.

The initial communication of a visitor to a guard causes the guard to check with the supervisor to see if the node is okay; this requires constant work. An optimal algorithm still must send the message from the visitor to its destination. Hence, for the visitor communication the algorithm only creates a constant overhead and is therefore constant competitive. Page movement control messages are identical regardless of whether a page is moved from a guard to a vault or from one vault to another: the source process must request a destination node from the supervisor, which responds, and after moving the data, the destination node may need to heapify itself.

This total process requires up to $O(\log n)$ messages. But a page of data is moved in this process, and since we assumed above that a page of data is by at least a logarithmic factor larger than a control message, the cost of sending control messages in this case is within a

constant factor of sending pages of data, which completes the proof of the lemma.

Notice that node join and graceful leave operations can be processed with $O(1)$ control messages in SPON. Hence, we can ignore the cost of control messages in our competitive analysis.

2. Data movements

Recall that OPT denotes any algorithm with an optimal cost for every sequence of operations. When data is written to the active heap in our algorithm, the optimal algorithm OPT may instead write the data to a different node in the active heap or to a node in the backup heap. Let us consider a sub optimal extension of OPT, SUB, which always writes the data first to a node in the active heap; this is always possible since the active heap is by definition not full, since if it fills it stops being active. If OPT would have assigned that data to a node currently in the backup heap, then SUB moves the data to that node when its first node fails.

From these rules it follows that the cost of SUB is at most twice the cost of OPT under any circumstances, because it moves any set of data at most twice as often as OPT.

Lemma 2.1: The amount of data in the vaults in the backup and active heaps in the algorithm is at most the amount in the same vaults in SUB.

Proof. This holds because in the algorithm all nodes not in the backup and active heaps are full (in the sense of having less than a page free), and consequently must be holding at least as much information as SUB and OPT can hold in these nodes.

Lemma 2.3: Data movements caused by departures of vaults not in the active heap is constant competitive to SUB.

Proof. At time t , let A be the set of vaults in the active heap, B the vaults in the backup heap, S the set of all old vaults (not in either heap), and V the entire set of vaults, so that $V = A \cup B \cup S$. Of the load stored in $A \cup B$ in both algorithms, some will have been first placed in $A \cup B$ and some will have been moved in when a vault in S departed. Because SUB places data first in the currently active set, the amount of load in $A \cup B$ placed in $A \cup B$ to begin with is the amount of load placed in A to begin

with, which is the same in both algorithms since both first place all load in A. According to Lemma 5.2, SUB must have at least as much load in $A \cup B$ as our algorithm. Therefore SUB must have moved at least as much data into the active heap from vaults not in the active heap as in the algorithm.

IV. CONCLUSION

We deliberated an efficient monitoring system for dynamic networks. The system produces and stores monitoring information in a persistent manner about visiting nodes in the network. The information is searchable and available to system administrators. Here a novel data reallocation mechanism that ensures that no monitoring information is lost even if several nodes depart ungracefully. The storage process is $O(\log n)$ -competitive in the number of network messages with respect to an optimal offline algorithm and this is as good as any online algorithm can be. Hence, from a theoretical perspective the monitoring system performs well. The monitoring system can be used as a building block for the collection of persistent audit logs, network intrusion detection, and in emergency systems.

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New Methods for Text Steganography

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ABSTRACT

In this work first we use systems to limit access as firewall; firewall is a network security system that monitors and controls the incoming and outgoing network traffic. Then we coding information if a non-valid person could access information do not use them. In this paper presents 4 new approaches of text steganography's these procedures can applied by using letters placed other letters.

Keywords: Steganography, Text Steganography, Protection, Information

I. INTRODUCTION

Steganography is the art of science of hiding information inside information without out drawing any suspicion to others.

It came from two Greek words “steganos” meaning to cover and “graphtos” meaning to write. The most common steganography is to hide a file inside another file. The reversal act of steganography is called “steganalysis” which means to extract information.

Steganography can be divided into different branches include sound, image, etc. In this paper we explain text steganography and present some new approach for text steganography. The following graph shows the hierarchy of producing meaning out of information.

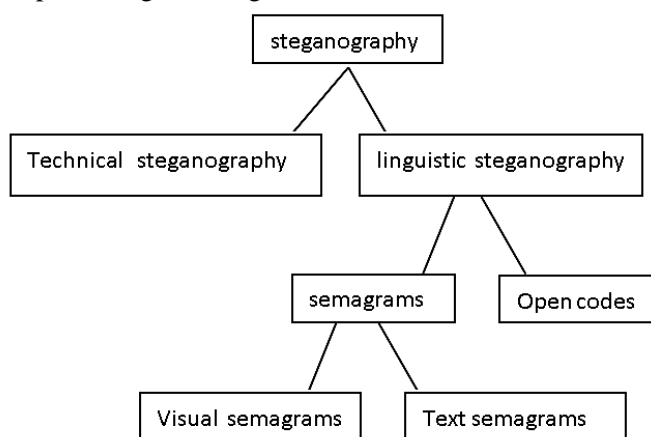


Figure 1: shows a common taxonomy of steganography techniques

Technical steganography uses scientific methods to hide a message. Linguistic steganography hides the message in the carrier in some nonobvious ways and is further categorized as semagrams or open codes. Semagrams hide information by the use of symbols or signs. A visual semagram uses innocent-looking or everyday physical objects to convey a message; a text semagram hides a message by modifying the appearance of the carrier text, such as subtle changes in font size or type, adding extra spaces, or different flourishes in letters or handwritten text. Open codes hide a message in a legitimate carrier message in ways that are not obvious to an unsuspecting observer.

II. METHODS AND MATERIAL

2. Suggested Methods

In this section we describe 4 new methods to steganography with example for each method.

2.1. Sequential Method

In this method we can select number of words which sequential of letters in alphabet is correct as secret words.

Example:

Secret word = buygo sequential in alphabet 15423

Please send money to buy a bag and go

Psaleene sdno meoty ybu.....

2.2. First Letter Method

In this method we can select n words for generate secret word that first letter of them are same the first word of text.

Example:

This is a book, I like that, I bought two books

The first letter of above text is "t" therefore all words that start with character "t" generate secret word.

It is better that the same letter "t" be delete.

Secret word=that two by delete the first letter we have hatwo.

2.3. Step by Step Method

In this method we consider the number of characters of the first word of text as k_1 .

Then we calculate $n=k_1*2$

Then we forward in text n words, and then we consider this word and the number of characters of this word as k_2 .

Then we calculate $m=k_2*2$

Then forward in text from n'th word length m,Example:

She was busy and couldnot work good, she say that my mother help to me.

Length of she = 3

$3*2=6$ 6'th word = good

Length of good=4

$4*2=8$ 8'th word from 6'th word = me

We repeat this procedure to end of text or limit number of words.

2.4. Combine method

In this method we select secret word by any above methods then we use from power and mod to 26 (26

is the number of all english characters) and ascii code to calculate situation .

Consider secret words are "she good me"

She start with "s" ascicode of "s" is 83

$(83)^2=6889$ middle digits are 88 $88 \bmod 26 = 10$,

$88 \div 26 = 3$

Therefore we consider 10'th character in alphabet situate with "s"

But in destination we need to result of div in this example 3 to calculate ascicode, therefore we hold result of divide in array and send to destination

III. CONCLUSION

As we know nowadays we need to share information in the network and internet therefore if we do not protect from them they do not be safe to protect information it is required to use some methods as encoding information. This article suggested 4new method of text steganography, Text oriented methods and using nowadays and increasing information makes it important to network. The suggested methods have no specific limitation but it depends on the individuals to make limitation as they like.

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Business in Era of Ambient Intelligent Markets

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ABSTRACT

Ubiquitous computing eliminates the bottlenecks of conventional business in such a way that users get a thrilling experience as well as their purpose is also served. The main underlying principle in ambient intelligence is that computing, communication ability is stored in smart devices which can be objects, locations, people. Conducting online business with smart devices increases savings in overall cost for all stakeholders involved. Though reliability is a challenge research work in this direction has already been initiated by the major bodies working in this area.

Keywords: Ambient, EDI, Smart, VMI, Ubiquitous

I. INTRODUCTION

In present business era, smart services adopt themselves according to market scenarios. As market scenarios are dynamic, so the design of the devices offering smart services should be flexible. This element of flexibility in the design of smart devices has inherent challenges in themselves which sometimes reduce the quality of service for the device. Nevertheless the advantages weigh over these minor challenges while deploying and using the smart devices. A emerging trend was set in military grounds by the Department of Defence (DoD), USA by making use of RFID tags at container level to supply the inventory products to minimize the lead time when demand was made. This was put to use in business markets slowly by the market giants like WalMart in US, Tesco in UK. By early 2000's when it was put into practice certain degree of suspicion in conducting effective business was obvious but after few years the impact was noticeable and now it has become an essential factor in creating a brand image for a company in the market. Every organization weighs down its options to use smart devices in the market to make its supply chain even more robust. Return on Investment is analyzed prior to using ubiquitous devices. In an ambient intelligent market possibility of delivering services are at dimensions which technology can achieve with minimum cost. The basic factor which must be considered while introduction of ubiquitous devices in conducting business are the physical environment, time, device, network characteristics, semantic knowledge of

the context. The benefits of the networked business models are multiple but the main objective remains the same, at the end it must be a win-win situation for all parties. Supply chain ubiquitous computing applications are well in place but when it comes to development of ubiquitous consumer applications, design principles are weak as requirements are ill defined. The main difficulty is that the consumer shopping trends are diverse and making a unification framework towards this kind of trend is challenging. But still work is in progress to counter this issue and in future it will be definitely be solved.

II. BASIC MODEL USED

Using smart services in supply chain management cycle, process can be managed efficiently. Even outstanding services can be channeled to other organizations with minimum cost of transfer. Three layers are mainly designed. The first one is the design channel, where the prototypes are involved with smart principles. Then exists the manufacturing channel where smart devices are used as tools for making the product. Finally the channel of sales exercises flow of smart services through product deployment, product sales. All the three channels are maintained in smart environment. In addition to the process-shown above, users' feedback can be playing a vital role in R&D of an organizational which caters to a smart-market. The basic principle in constructing a smart environment is the intelligence is controlled by end users not by the network. So, to

control whole network, the user should be able to deploy applications in very other users' device then only central-authority is established.

III. BUSINESS SETTING IN AMBIENT INTELLIGENT MARKETS

A. Inherent Business Settings:

1. Open-Innovation in developing a product: A product should be designed on smart principles which is highly innovative and contains features which are absent in existing products.
2. Resources for development can be gathered even from competitors: Competitors should be taken into consideration for valuable support and also in few instances order may be placed to gather resource from them. It increases a healthy business rapport with other firms in same business area.
3. Integration of open-standards with company's standards: Open standards can be used by all but a company standard may be limited in use ,so we produce a smart environment the integration of company's standards with open standards is essential.

B. Current Supply Chain Management Standards:

1. Barcodes: This standard-developed from 1940's though laser scanning of the codes in 1960's.It's efficient for product-identification. Currently, we have barcodes which have evolved over Internet across various sectors like healthcare, defence etc.
2. Ubiquitous Services: Ubiquitous devices to provide service channels like mobiles which support standards like 3G, GPRS with which customers can order at whatever location they are and whatever may be the time. The service should be 100% available. Supporting technologies like GPS, biometrics, RFID, cameras, microphones should be the sensors with which smart services can be generated.

C. Business Value of Ubiquitous Computing Technologies:

The main problem faced by companies is information related like product availability, recalls, recycling, and inventory in accuracy etc. The solution is collection of information in initial sales stages & tracking sales records. But integration of the concerned with company's inventory management system become's expensive. Thus, many firms are developed strategies to collect data, process it with low-quality .Statistical data collection method have so far kept the companies in good-state. By using sensors, actuators companies can

leverage their savings in cost. Timeliness is crucial in data collection & with help of smart devices, data collection & with help of smart devices, data collection becomes easy.

IV. TRACKING CUSTOMERS WITH PRICE DISCRIMINATORS

With help of ubiquitous computing we can develop a set of relationships for parameters that determine the optimality of the price conditioning solution. The only hindrance is the parameter of loss of privacy. If this factor gains weight customers will shy away from online transactions. But with customers behavior changing with time, most transactions are made hassle free with respect to privacy concerns. So, this factor should not be a major concern while deploying a smart device or smart technology .The merchants can offer discounts in prices for the goods purchased by applying simple techniques of one click shopping, targeted references to goods etc. The merchants can track customers who are repeated visitors and offer them a flat price discount too.

A store equipped with smart devices may have following tracking technology:

1. Manually registering personal information on wireless card for payment.
2. Automated registration of data with support from digital signature between store's sensors and customers devices.

The current research should be developing pricing model keeping in view the effectiveness of the tracking technology.

Design priorities of ubiquitous retailers:

1. Enhancing consumer value.
2. Elimination of costs that do not add consumer value.
3. Maximise value in supply chain thereby minimizing the inefficiency in supply chain.

Current Adversaries in Retail Sector:

Inspite of planned deployment of information systems in logistics, long lead times are frequent. Thus, return rates of business decreases causing the whole supply chain inefficient .Basic reason are information sharing between trading partners in effective, hence accuracy of scheduling of the replenishment process decreases. To overcome this issues ubiquitous retailers are following the vendor managed inventory (VMI) approach .Here, the vendor commands the specificity of delivery channel. Electronic Data Interchange(EDI) is used as a protocol for exchange of business data .In VMI ,there is frequent exchange of information between the inventory levels, so no issues of delayed inventory exists .The

manufacturer and retailer interact with each other with EDI standard and retailer. In turn the retailer and wholesaler interact with each other with same guidelines and finally the wholesaler interacts with parties who are interested in buying the smart services.

V. LEGAL CHALLENGES TO UBIQUITOUS BUSINESS:

1. **Intellectual Property Rights:** Copyright issues affects usage of organizational assets significantly, so proper legislation should be in place. This ensures that product manufacturing companies do not get into the nerves of services companies. In wireless world, this conflict arises too often there by diluting new projects for ubiquitous commerce.
2. **Privacy:** Consumers object if without their consent information about their location, behavior, habits, transactions, finance is communicated to parties in concern. Confidentiality in usage of smart devices should be made indispensable part of ubiquitous business models.
3. **Contracts:** There must be certain agreed level of transparency in design principles of ubiquitous business offers like acceptance, rejection, negotiation between the intermediate software agents. Technology neutral legislation should be enforced on practitioners of ubiquitous business organizations. Accordingly, before initiation of a service using a smart device, the consumer must agree on certain terms and conditions for a effective service delivery. Most of the laws were made for pre-ubiquitous business era, so as to achieve the real meaning of ubiquitous business in modern world.

VI. FUTURE DIRECTIONS

With due regards to the practitioners expertise in managing the risks associated with ubiquitous business ,an effective framework for cost/benefit analysis should be evolved so that the real measure of smart business can be known. Already researchers have done experiments in this regard to measure the effect of using smart technologies with multiple dimensions of data. For example the type of object granularity which is attached to a smart device also affects the overall performance of the smart environment. Adding sensors to data devices makes data collection and management easy .It helps in concluding the effectiveness of the smart business design. Moreover point of creation and point of action decision makes huge impact on service quality. The future challenge is to establish a clear boundary for both of this so that information flow between these two areas occurs with minimum technological involvement.

VII. CONCLUSION

This paper presents a novel approach for conducting business in ambient intelligent market. The purpose of this paper is to highlight the business model with its inherent advantage while conducting e-commerce. Additionally we have presented the design principles of a smart business market along with business settings of such a market. Ubiquitous retailers dependencies on standards like Electronic Data Interchange in the Vendor Managed Inventory is also discussed. We have mentioned the legal issues while carrying out business in ambient intelligent market. Finally we want to conclude that in an ambient intelligent business market, ubiquitous devices bridge the gap between information sources which in turn leverage the return on investment for an organization.

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A Survey on User Behaviour Prediction Using Web Server Log

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ABSTRACT

Web prediction is a classification problem in which we attempt to predict the next set of request that a user may make based on the knowledge of the previously visited pages. User behaviour prediction deals with collecting the web server logs, preprocess the data and analyze the pattern. The main goal of this process is to extract the useful pattern from raw data collection. Preprocessing contains cleaning the data, user identification and session identification which saves 80% of processing data. Web server log contains much useful information like server ip, time, date, error code, browser etc. there are various prediction models like n-gram session identification, association rule mining, markov model and support vector machine are available. Here comparison is done on the basis of accuracy, processing time and scalability.

Keywords: Preprocessing, Web Server Log, Association Rule Mining, Markov Model

I. INTRODUCTION

As one of the three categories of web mining, web log mining [1] is aimed at how to extract useful knowledge model such as association rules, sequential patterns and clustering analysis from web data, whose results can be applied to optimize the website structure, webpage prefetching, adaptive website and many other aspects [2]. There are mainly three steps in web log mining: data preprocessing, pattern recognition and pattern analysis, among which data.

Preprocessing is the critical and primary task [3]. The data preprocessing includes data cleaning, user identification, session identification and path completion, etc., whose results will directly affect the efficiency and accuracy of web log mining [2].

In order to attract new customers and retain current customers, web sites' administrators want to know their customers' profits. But web servers record and accumulate data about user interactions whenever requests for resources are received. The mass amounts of log data make it impossible to find useful information directly. What can help administrators get useful information from these log files? It is web log file

analysis. Web log file analysis began with the purpose to offer a way to Web site administrators to ensure adequate bandwidth and server capacity to their organization. [1] Web prediction is a technique in which we attempt to predict the next set of Web pages that a user may visit based on the knowledge of the previously visited pages. When a prediction model for a certain Web site is available, the search engine can utilize it to cache the next set of pages that the users might visit.

II. LOG FILE PREPROSESING

The Procedure of data preprocessing : 1) Data cleaning 2) user identification 3) Session identification

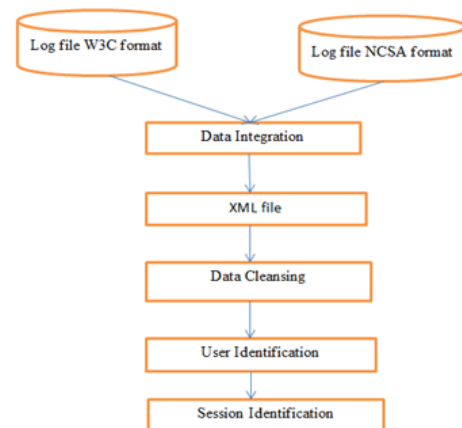


Figure 1: Log file Pre-processing

1) Data Cleaning [4]

Data cleaning means deleting needless data, which can't reflect the characters of user's accessing behaviour. It covers with some aspects as follows 1) Irrespective attribute: The attributes paid attention to include users IP address, URL pages requested, and accessing time and so. And other attributes should be got rid of.2) Content of pages as picture, video and audio resources and the logical units as script CSS files.3) the actions that not request for pages and fail requested pages. The actions that not request for pages failed requested pages. The former can be judged by the code of POST or GET and the later can be judged by the state code.

2) User Identification [4]

Traditional user identification is carried out according these rules: 1) Different IP address refer to different users.2) The same IP with different operating system or different browser should be consider as different user.3) While the IP, operating system and browsers are all the same, new user can be determined whether the requesting page can be reached by accessed pages before according to the topology of the site.

3) Session Identification [4]

Web log mining covers a long time periods, therefore users may access the site more than once. Session identification is in order to divide the access records into several accessing sequences, in which the pages are requested at the same time. Traditional session identification algorithm is based on a uniform and fixed timeout. While the interval between two sequential requests exceeds the timeout, new session is determined.

III. LITERATURE SURVEY

There are various models available for prediction of user behaviour from web server logs. each model has their own merits and demerits. To prepare an efficient prediction model which can handle the large amount of data effective the proper analysis of each one should be done.

1. N-Gram for Session Representation [5-6]

In user behaviour prediction the well known representation of session is n-gram. N-gram depicts

sequences of page clicks by a population of users surfing a Web site. Each component of the N-gram takes specific page ID value that identifies a Web page. For example, the N-gram <A10, A16, A4, A2> describes the fact that the user has visited pages in the following order: page 10, page 16, page 4 and finally page 2. Many models further process these N-gram sessions by applying a sliding window to make training examples have the same length. As an example, consider a log file L consisting of the following request paths:

A,B,C,D
A,B,C,F
A,B,C,F
B,C,D,G
B,C,D,G
B,C,D,F

If we were to construct a 3-gram model, we have two 3-grams to build our prediction model on. These are

A,B,C;
B,C,D

Our application of the algorithm returns the following hash table H3():

N-Gram Prediction

A,B,C	F
B,C,D	G

However, if we were to build a 2-gram model, then we have the following 2-grams to contend with:

A,B;
B,C;
C,D

Based on the log data, we can build the following 2-gram prediction model H2():

N-Gram Prediction

A,B	C
B,C	D
C,D	G

Zhong Su*, Qiang Yang* and Hongjiang Zhang [6] proposed n-gram(+), which is more accurate than previous n-gram.

As an example, assume that we have built up 3-gram and 2-gram models as H3 and H2. Suppose that we observe that the current clicking sequence consists of

only one click “DBC”. In this case, the prediction algorithm checks H3 first to see if an index “DBC” exists. It finds out that the index does not exist. Therefore, it checks the 2-gram model H2 for the index “BC”, which exists, thus the predicted next click is “D”, according to H2.

2. Association Rule Mining [5]

ARM is a data mining technique that has been applied successfully to discover related transactions. In ARM, relationships among item sets are discovered based on their co occurrence in the transactions. Specifically, ARM focuses on associations among frequent item sets. For example, in a supermarket store, ARM helps uncover items purchased together which can be utilized for shelving and ordering processes. In the following, we briefly present how we apply ARM in WPP. In WPP, prediction is conducted according to the association rules that satisfy certain support and confidence as follows.

For each rule, $R = X \rightarrow Y$, of the implication, X is the user session and Y denotes the target destination page. Prediction is resolved as follows:

$$\text{Prediction}(X \rightarrow Y) = \arg \max \sup \frac{(X \cup Y), X \cap Y}{\text{Supp}(X)}$$

Here the cardinality of Y can be greater than one, i.e., prediction can resolve to more than one page. Moreover, setting the minimum support plays an important role in deciding a prediction. In order to mitigate the problem of no support for $X \cup Y$, we can compute prediction $(X \rightarrow Y)$, where X is the item set of the original session after trimming the first page in the session.

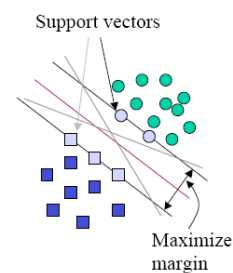
3. Markov Model [5]:-

The basic concept of Markov model is to predict the next action depending on the result of previous actions. In Web prediction, the next action corresponds to predicting the next page to be visited. The previous actions correspond to the previous pages that have already been visited. In Web prediction, the K th-order Markov model is the probability that a user will visit the k th page provided that she has visited the ordered $k - 1$ pages. For example, in the second-order Markov model, prediction of the next Web page is computed based only on the two Web pages previously visited. It can be easily

shown that building the k th order of Markov model is linear with the size of the training set. The key idea is to use an efficient data structure such as hash tables to build and keep track of each pattern along its probability. Note that a specific order of Markov model cannot predict for a session that was not observed in the training set since such session will have zero probability.

4. Support Vector Machine

Kiran M, Amresh Kumar, Saikat Mukkherjee, and Ravi Prakash has proposed SVM which performs classification by constructing an N-dimensional hyperplane that optimally separates the data into two categories. In the reference of SVM literature, a predictor variable is called an attribute, and a transformed attribute that is used to define the hyperplane is called a feature. The task of choosing the most suitable representation is known as feature selection. A set of features that describes one case (i.e., a row of predictor values) is called a vector. So the goal of SVM modeling is to find the optimal hyperplane that separates clusters of vector in such a way that cases with one category of the target variable are on one side of the plane and cases with the other category are on the other side of the plane. The vectors near the hyperplane are the support vectors. An SVM analysis finds the line (or, in general, hyperplane) that is oriented so that the margin between the support vectors is maximized.



SVMs maximize the margin around the separating hyperplane.

- The decision function is fully specified by a (usually very small) subset of training samples, the support vectors.
- This becomes a Quadratic programming problem that is easy to solve by standard methods.

Comparison

Sr No	Prediction Model	Advantages	Disadvantages
1	N-Gram	When $n > 3$, a precision gain on the order of 10% or more	As increase in sequence length, there is an increase in precision and decrease in applicability.
2	ASSOCIATION RULE MINING	ARM do not generate several models for each separate N -gram like K th markov model.	ARM endures efficiency and scalability problems by generating item sets and it require exponential time with the number of item sets.
3	MARKOV MODEL	Efficiency and performance, prediction time.	A specific order of Markov model can't predict for a session that was not observed in the training set since such session will have zero probability.
4	SUPPORT VECTOR MACHINE	Accuracy in predicting seen and unseen data compare to Markov model. Robust classification and proven effectiveness	It's suffered from scalability problem in both memory requirement and computation time when the input dataset is too large.

IV. CONCLUSION

In this paper, we have reviewed many prediction model like n-gram session identification, markov model, association rule mining and support vector machine. Each model has its own advantages and disadvantages. For the future work, we will try to modify any of the above model and apply it on hadoop framework for parallel processing to reduce the training time and will compare the results with commercial software such as Google analytics etc.

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IHS based Pan Sharpening with Geo-Image Processing

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ABSTRACT

The image processing methodologies that have been actively studied and developed now play a very significant role in the flourishing Genomic Image Processing research. Spatial data are captured by some remote sensing satellites. These satellites actually capture many bands of images. Now, these captured images are put under different types of processing in order to get the useful image for further usage. The main advantage of doing processing is when a client needs to purchase these images; a provider cannot give the data as it is taken. It has to be converted in the required format for client usage. Moreover, images once captured it may be possible that it cannot be captured again in future, so there will more need to process such data for future usage and work. Using IHS (Intensity-Hue Saturation) based Pan Sharpening we can enhance these images. Pan-sharpening is to fuse a low spatial resolution multispectral image with a higher resolution panchromatic image to obtain an image with high spectral and spatial resolution.

Keywords: Geo-Image Processing, Pan-Sharpener, Grayscale image, CMY, IHS, HSL, HSV, Image Fusion, JAI

I. INTRODUCTION

Geo-Image Processing

Spatial data or Geo Image known as geospatial data or geographic information it is the data or information that identifies the geographic location of features and boundaries on Earth, such as natural or constructed features, oceans, and more. Spatial data is usually stored as coordinates and topology, and is data that can be mapped. Spatial data is often accessed, manipulated or analyzed through Geographic Information Systems.

Spatial data are captured by some remote sensing satellites. These satellites actually capture many bands of images. Now, these captured images are put under different types of processing in order to get the useful image for further usage. This phenomenon is called as Geo – Image Processing.

While doing these satellite imaging generally two types of images are captured on which processing is done:

In this category of images various types of spectral bands generated by satellites are combined to generate

false or true-color images. If the images so created true than no processing required but if the image so created are false image pictures, then processing is must. These images are combination of two or more bands. These images are generally of lower resolution. In this panchromatic images are generate i.e. they are actually Grayscale images. They are made of one band only. These images consist of one band only. These are higher resolution images.

The main advantage of doing processing is when a client needs to purchase these images; a provider cannot give the data as it is taken. It has to be converted in the required format for client usage. Moreover, images once captured it may be possible that it cannot be captured again in future, so there will more need to process such data for future usage and work.

1.1 Types of Geo-Image Processing

There are several categories in which Geo Image Processing can be done. Some of these categories are:

1. Geometric correction

Conversion of data to ground coordinates by removal of distortions from sensor geometry.

2. Image matching

The act of matching defined anatomical structures from one image to another typically during the image review phase to verify patient positioning.

3. Image calibration

The images are calibrated to eliminate as much as possible the unwanted effects produced by a CCD camera and light pollution.

4. Contrast enhancements

Improving the contrast to get a more clear view of data.

5. Hardcopy and digital output in client specific formats

Converting the image in the format as asked by the client.

II. METHODS AND MATERIAL

2. Pan Sharpening

Pan sharpening is an image fusion technique that enhances the spatial resolution of a composite image by combining lower-resolution color images with a higher-resolution panchromatic image.

2.1 Image Types

There are various types of images formats present:

1. RGB Format:



Figure 1: RGB format

These are image comprises of 3 color bands as shown in fig 1:

- Red band
- Green band
- Blue band

The combination of these 3 bands forms various other colors. The color format is also called as additive color format

2. Panchromatic Image

These images comprises of only one band. Grey Scale pictures are generally called as panchromatic Image

3. Other Formats

- CMY format – Cyan – Magenta – Yellow format.
- IHS format – Intensity – Hue – Saturation format
- HSL format – Hue – Saturation – Lightness format
- HSV format – Hue – Saturation – Value format and many more.

2.2 Image Fusion

In computer vision, Multisensor Image fusion is the process of combining relevant information from two or more images into a single image. The resulting image will be more informative than any of the input images.

In remote sensing applications, the increasing availability of space borne sensors gives a motivation for different image fusion algorithms. Several situations in image processing require high spatial and high spectral resolution in a single image. Most of the available equipment is not capable of providing such data convincingly. The image fusion techniques allow the integration of different information sources. The fused image can have complementary spatial and spectral resolution characteristics. However, the standard image fusion techniques can distort the spectral information of the multispectral data while merging.

Multisensor data fusion has become a discipline to which more and more general formal solutions to a number of application cases are demanded. Several situations in image processing simultaneously require high spatial and high spectral information in a single image. This is important in remote sensing. However, the instruments are not capable of providing such information either by design or because of observational constraints. One possible solution for this is data fusion.

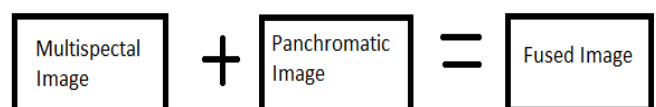


Figure 2: Image Fusion

As shown in the fig 2 multispectral image (low resolution image) are combined with panchromatic image (high resolution) to get a fused image with more better results and more of information.

The merging of these images is “**Pan Sharpening**“ also called as “**Panchromatic Sharpening**”. There are many algorithms proposed to show these merging.

2.3 Types of Pan Sharpening

2.3.1. High Resolution Imagery

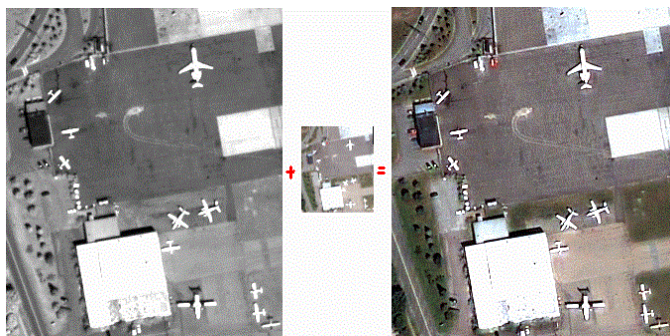


Figure 3: High Resolution Imagery

Left	High-resolution panchromatic images (spatial resolution 0.6 m)
Middle	Low-resolution natural color images made of blue band (band 1), green band (band 2), and red band (band 3) (spatial resolution 2.4 m)
Right	Pan-sharpened, high-resolution color composites (spatial resolution 0.6 m)

Pan Sharpening with False Colour Images

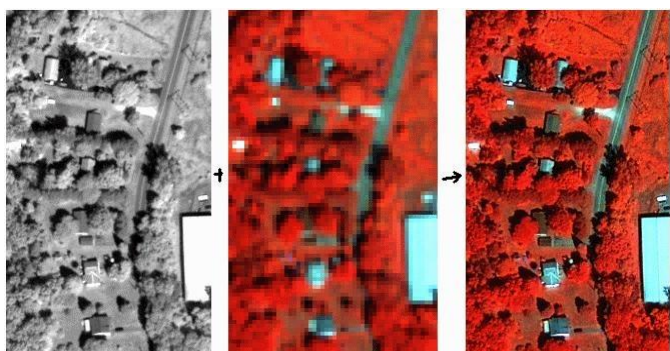


Figure 4: Pan Sharpening with False Colour Images

Left	High-resolution panchromatic band (spatial resolution 0.6 m)
Middle	Low-resolution false colour composite made of QuickBird's blue band (band 1), green band (band 2), and near-infrared band (band 4) (spatial resolution 2.4 m)
Right	Pan-sharpened, high-resolution false colour composite (spatial resolution 0.6 m)

3. IHS Based Pan Sharpening – Algorithm

3.1 Select the image bands that will be used to create a RGB image

Step 1: There are two inputs in this step. They are

- Three image of different bands
- Panchromatic image

Input is done by getting the image from the path.

Step 2: The bands are merged to form a RGB image

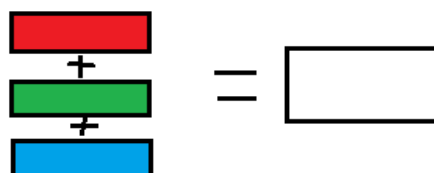


Figure 5: Red green and blue band are merge to form RGB image which is of white color

As shown an example Red Green and blue band are merged to form white color image of 3 bands

How the merging takes place as explained??

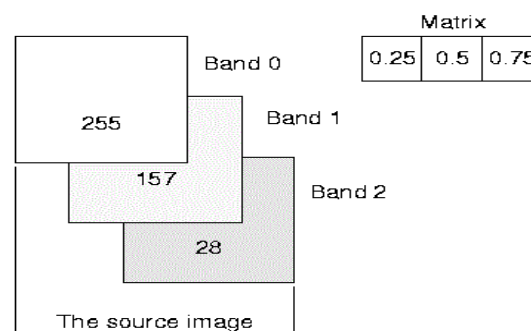


Figure 6: Sample Band Merge

Here as shown in the figure 6, three images are taken of band 0, band 1 and band 2. One pixel value of each image are taken.

Here for band 0, pixel value is 255

Band 1, pixel value is 157

Band 2, pixel value is 28

A matrix is also taken which is formed by (# of source band + 1) / (# of destination band)

Now, finally destination pixel is calculated as:

$$\text{Dst} = (255 * 0.25) + (157 * 0.5) + (28 * 0.75)$$

So the destination pixel is the combination of 3 bands so 3 band image is produced.

This is done by “bandmerge” operator of JAI.

3.2 Rescale the RGB Image Equal to Panchromatic Image

In this step RGB images resized so that it gets equal to panchromatic image size. Here resizing scaling factors are calculated for X and Y axis both. It is done by
 $ScaleX = 1f * width(rgbimage) / width(panimage)$
 $ScaleY = 1f * height(rgbimage) / height(panimage)$

Now these ScaleX and ScaleY passed as parameter and then scaling is done. The scaling is done by
 $x'(dstwidth \text{ of RGB image}) = x(srcwidth) * scaleX$
 $y'(dstheight \text{ of RGB image}) = y(srcheight) * scaleY$

This is done by “scale” operator of JAI.

3.3 Convert the RGB image to IHS based color model.

After rescaling next step is to convert RGB image into HIS model. IHS model is Intensity Hue Saturation based model.

JAI (Java Library) has already provided IHS class for IHSColorModel and conversion of RGB image is done by following equations:

$$I = (R+G+B)/3$$

$$S = 1 - \min(R, G, B)/I$$

$$H = G > B ? h : 2 * \pi - h,$$

where

$$h = \cos^{-1} \{ [(R-G) + (R-B)] / [2 \sqrt{(R-G)^2 + (R-G)(G-B)}] \}$$

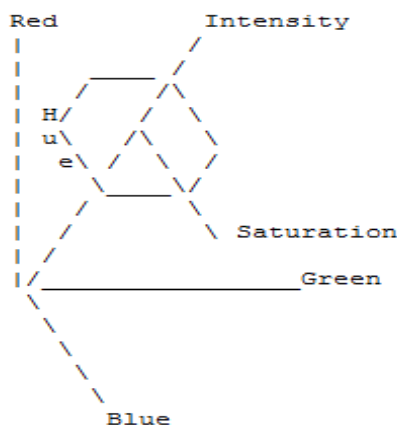


Figure 7: Relation between all 6 components

Here as shown in figure 7 Red band forms Y axis, Blue band forms Z axis and Green band forms X axis. Intensity is defined by axis perpendicular to all 3 axis above. Hue is an angle on a circle that is centred and perpendicular to the intensity axis and Saturation is defined by the radius of the circle defined by hue.

3.4 Split the IHS Image Into its Three Components

Now once the image is converted to IHS model the next task is split it into all its three bands. They are :

- Intensity band(band 0)
- Hue band(band 1)
- Saturation(band 2)

This done by “bandselect” operator of JAI. JAI has also defined

a bandIndices parameter which gives band index to each bands. So the destination pixel values will be:

$$dst[x][y][b] = src[x][y][bandIndices[b]];$$

3.5 Substitute I band in the image by the panchromatic image.

Now once all the three bands are separated Intensity band (band 0) is replaced with the one band panchromatic image. Now main advantage of doing so is that panchromatic image is correct resolution image so by replacing Intensity band with this band, the correct resolution image is obtained or formed.

Replacing Hue or Saturation band will not correct picture because they are related to color.

3.6 Merge the three bands to a single IHS image.

Once the Intensity band is corrected, the 3 bands which will be combined again are panimage band hue band saturation band Here again “bandmerge” operator is used to merge the 3 bands.

3.7 Convert the IHS to the RGB color model

Now one new IHS image is formed reverse conversion of IHS model to RGB model will take place.

The conversion of HIS to RGB is as shown below:

When H is in $[2\pi/3, 4\pi/3]$, R should be the smallest. Then,

$$R = (1-S)I \text{ and}$$

$$G = (c1 + c2)/2$$

$$B = (c1 - c2)/2$$

where $c1 = 3I - R$ and $c2 = \sqrt{3}(R - I)\tan(H)$

When H is in $[4\pi/3, 2\pi]$,

$$G = (1-S)I \text{ and}$$

$$B = (c1 + c2)/2$$

$$R = (c1 - c2)/2$$

$$\text{where } c1 = 3I-G \text{ and } c2 = \sqrt{3}(G-I)\text{tg}(H-2\text{PI}/3)$$

When H is in $[0, 2\text{PI}/3]$,

$$B = (1-S)I \text{ and}$$

$$R = (c1 + c2)/2$$

$$G = (c1 - c2)/2$$

$$\text{where } c1 = 3I-B \text{ and } c2 = \sqrt{3}(B-I)\text{tg}(H-4\text{PI}/3)$$

Hence finally at the end of 7 step the intensity of the model is corrected and the image resolution will be increased.

III. RESULTS AND DISCUSSION

An Experimental Program on Java Advance Imaging

An imaging operation within JAI is summarized in the following four steps:

1. Obtain the source image or images. Images may be obtained in one of three ways
 - a. Load from an image file such as GIF, TIFF, or JPEG
 - b. Fetch the image from another data source, such as a remote server
 - c. Generate the image internally
2. Define the imaging graph. This is a two part process:
 - a. Define the image operators
 - b. Define the parent/child relationship between sources and sinks
3. Evaluate the graph using one of three execution models:
 - a. Rendered execution model
 - b. Renderable execution model
 - c. Remote execution model
4. Process the result. There are four possible destinations:
 - a. Save the image in a file
 - b. Display the image on the screen
 - c. Print the image on a printer or other output device
 - d. Send the image to another API, such as Swing

Output Image 1

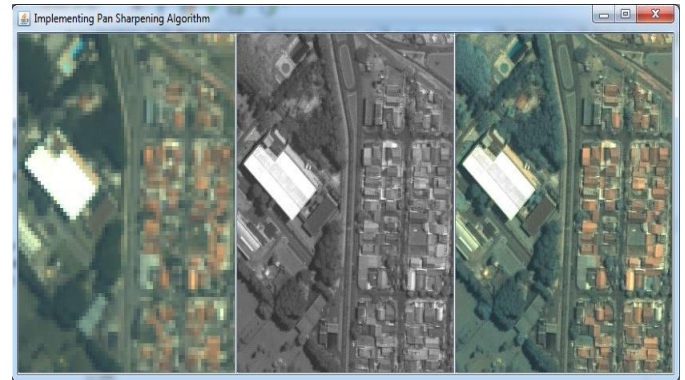


Figure 8: Implementation of Pan Sharpening Algorithm

Here as shown in the figure:

Panel 1 of Grid is RGB input low resolution image

Panel 2 of Grid is the panchromatic high resolution Image

Panel 3 of Grid is the Pan Sharpened High Resolution Image

Output Image 2

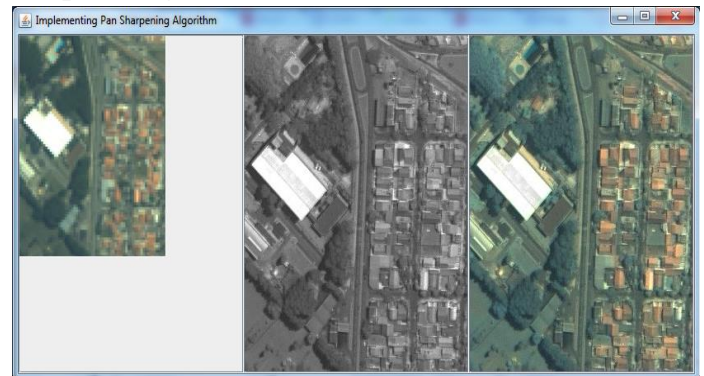


Figure 9: Implementation of Pan Sharpening Algorithm

Here as shown in the figure:

Panel 1 of Grid is RGB input low resolution image

Panel 2 of Grid is the panchromatic high resolution Image

Panel 3 of Grid is the Pan Sharpened High Resolution Image

IV. CONCLUSION

The IHS pan-sharpening method gives good spatial quality and is a commonly used algorithm for its speed and simplicity. To improve its spectral quality we proposed IHS Based Pan Sharpening algorithm. Pan-sharpening is to fuse a low spatial resolution multispectral image with a higher resolution panchromatic image to obtain an image with high spectral and spatial resolution. Most remote sensing satellites have several spectral bands which can be used to generate false or true-color images, and a panchromatic image of higher resolution.

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Optimizing Performance of CI Engine fueled with Undi Oil Biodiesel

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ABSTRACT

An increasing demand of fossil fuels has being a critical problem for us. The natural resources of fossil fuel are dwindling day by day. Biodiesel that may called natural fuel may be a good source or substitute for fossil fuel in future. An experiment is conducted to obtain the operating and emission characteristics of Undi Oil Biodiesel on Diesel Engine run on various Blends of biodiesel, Load Conditions and Injection Pressure. From the comparison of results, it is inferred that the engine performance is improved with significant reduction in emissions for the chosen oils without any engine modification. The effective injection pressure can be fixed based on the experimental results obtained in the engine since the findings of the present research work infer that the biodiesel obtained from Undi oil is a promising alternative fuel for direct-injection four-stroke VCR diesel engine.

Keywords: Biodiesel, Undi oil, Transesterification, Various Injection Pressure, Biodiesel Blends, Engine Loads Performance & Emission Characteristics.

I. INTRODUCTION

In recent years, oil prices have been rising rapidly again and there is a major concern for the long term availability of fossil fuels. This and the growing concern for our environment have created a much larger market for renewable resources. Vegetable oils are one of the important sources of renewable energy, and can be transesterified to biodiesel, which is an alternative fuel for diesel engines.

The difference between bio-diesel and petroleum diesel lies in the name itself. Petroleum diesel is 100% petroleum based and considered as a fossil fuel. On the other hand bio-diesel is created from live feedstock such as vegetable oil, peanut oil, coconut oil, even algae oil. Bio-diesel can be used as a direct fuel considered B100, or in its unrefined form of vegetable oil. Many of these vegetable oils are similar in properties to those of petroleum diesel, the main difference is that vegetable oils and bio-diesels have a lower oxidative stability state, a higher viscosity coefficient, and a higher volatility

point. These properties make bio-diesel blends a suitable candidate for an immediate alternative energy fuel.

Biodiesel is a non-toxic, biodegradable, and renewable diesel fuel and can be used neat or blends with petroleum diesel fuels. Biodiesel has many advantages compared to diesel fuels. It has higher cetane number than diesel fuel, and contains no aromatics, almost no sulfur and 10-12% oxygen by weight. Biodiesel-fueled engines produce less CO, HC and particulate emissions than petroleum diesel-fueled engines. Biodiesel improves the lubricity, which results in longer engine component life.

Bio-diesel production is a very modern and technological area for researchers due to the relevance that it is winning everyday because of the increase in the petroleum prices and the environmental advantages biodiesel offers over diesel. Accordingly, many researchers around the world have dealt with these issues and in many cases devised unique solutions.

1.1 Problem Statement

There is a problem statement as, to optimize the Injection Timing by analyzing engine performance and exhaust emission for blend C25 at compression 16.5 : 1 and injection pressure 220bar.

1.2 Objectives

There are two main objectives in this research,

- To investigate the performance and emission characteristic of a diesel engine operating with Undi Oil biodiesel blend U25 under varying conditions of injection timing and Engine Load.
- To optimizing the performance of CI engine.

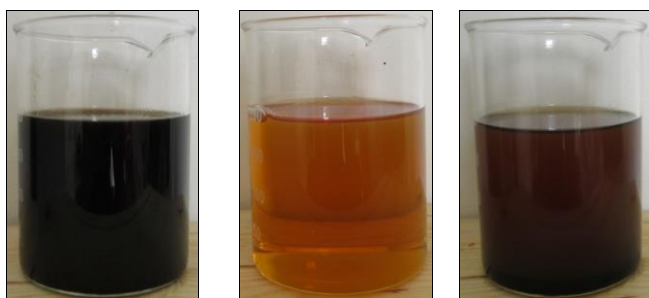
II. METHODS AND MATERIAL

The production of biodiesel from Undi Oil checked for suitability as alternative fuel for diesel use in CI engine was done in author's previous work, title "Honne Oil Biodiesel – Alternative Fuel for CI Engine" published in IJSRSET/ Volume 1/ Issue 2/ March April 2015 [433-435].

TABLE I
PHYSICO-CHEMICAL PROPERTIES

Parameter	Test Standard	Diesel	UOME	Undi Oil
Density at 15°C (gm/cc)	IS 1448 (P16) 2007	0.835	0.8653	0.9363
Kinematic Viscosity at 40°C (cst)	IS 1448 (P25) 2007	3.5	1.744	51.58
Calorific Value (MJ/Kg)	IS 1448 (P6) 2007	43.00	35.37	40.27
Flash Point (°C)	IS 1448 (P69) 2013	44	8.5	220

Material used is a biodiesel blend U25, where the datum line data is obtained by using neat Diesel U00.



Row Undi Oil Diesel (U00) U25 (25%UOME + 75%Diesel)
Figure 1 : Fuel Samples Used

2.1 Optimizing CR and Blend

The objective of the first work is to study through experiments, the performance and emission characteristics of Undi Oil (UOME) blends in direct injection (DI) VCR diesel engine at various blend, engine load and compression ratio, to find the most suitable compression ratio and blend type at all load condition.

TABLE II
METHODOLOGY OPTIMIZING CR & BLEND

Blend Type	Blend	IOP in bars	Injection Timing in degree bTDC	C R	Load in KW
U00	100% Diesel	210	27	14.5 : 1	0.75
U25	25% UOME +75% Diesel			15.5 : 1	1.50
U50	50% UOME +50% Diesel			16.5 : 1	2.25
U75	75% UOME + 25 Diesel			17.5 : 1	3.0

From author's previous work titled "Performance Test of CI Engine fueled with Undi Oil Biodiesel under Variation in Blend Proportion, Compression Ratio & Engine Load" published in IJSETR, Volume 3, Issue 8, August 2014, [2197-2205], it was concluded that the best suited blend was U25 and the Compression Ratio was the 16.5 irrespective of all load conditions.

2.2 Optimizing IOP and Blend

The objective of the second work was to study, the performance and emission characteristics of Undi Oil (UOME) blends in CI engine at various blend, engine load and injection pressure ratio, to find the most suitable injection pressure and blend type at all load condition.

TABLE III
METHODOLOGY OPTIMIZING IOP & BLEND

Blend Type	Blend	IOP in bars	Injection Timing in degree bTDC	C R	Load in KW
U00	100% Diesel	190	27	16.5 : 1	0.75
U25	25% UOME +75% Diesel	200			1.50
U50	50% UOME +50% Diesel	210			2.25
U75	75% UOME + 25 Diesel	220			3.0

From author's previous work titled "Performance Test of CI Engine fueled with Undi Oil Biodiesel under Variation in Injection Pressure, Blend Proportion & Engine Load" published in JECET, June-August 2015, Sec. C, Volume 4, No.3, [427-436], it was concluded that the best suited blend was U25 and the Injection Operating Pressure was the 200bars at all load conditions.

2.3 Optimizing Injection Timing

The present work is to optimize the injection timing, through the study of engine performance and exhaust emission under the variation of injection timing and load conditions.

TABLE IV
METHODOLOGY OPTIMIZING INJECTION TIMING

Blend Type	Blend	IOP in bars	Injection Timing in degree bTDC	C R	Load in KW
U00	100% Diesel	200	25	16.5 : 1	0.75
			27		1.50
29	2.25				
31	3.0				
U25	25% UOME +75% Diesel				

III. RESULTS AND DISCUSSION

3.1 Experimental Engine Setup

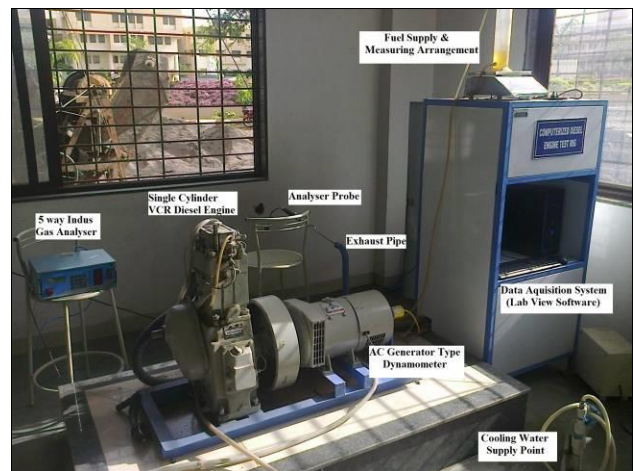


Figure 2 :Experimental Engine Setup

3.2 Engine Specifications

TABLE V
EXPERIMENTAL ENGINE SPECIFICATIONS

Sr. No.	Description	Specification
1	Make	Rocket Engineering Model VRC-1
2	Type of Engine	Vertical Single Cylinder Water Cooled
3	Bore	80 mm
4	Stroke	110 mm
5	Swept Volume	553 mm ³
6	RPM	1500
7	Brake Hours Power	5 HP
8	Compression Ratio	15.5 : 1 to 18.5 : 1
9	Fuel	High Speed Diesel
10	Coefficient of Discharge	0.65
11	Water Flow Transmitter	0 to 10 lit./min.
12	Air Flow Transmitter	0 to 250 wc
13	Piezo Sensor	0 to 5000 psi with low noise cable
14	Software	LabView

3.3 Experimental Methodology

Experiment is carried out with the diesel fuel and biodiesel blend U25 (25% UOME + 75% Diesel) where engine performance data with diesel is considered as the reference for experimentation.

The total experimental work is carried out by varying injection timing from 27 °bTDC to 31 °bTDC in the increment of 2 deg. and engine load from 0.75 KW to 3

KW in the increment of 0.75 KW, where as IOP 200 bar, Compression Ratio 16.5 are kept constant.

4. Results

4.1 Variation of Exhaust Gas Temperature

The result indicates that the variation in exhaust gas temperature (EGT) for diesel is highest at 27 °bTDC and that of blend U25 at 29 °bTDC, irrespective of load conditions. This shows that combustion of respective fuel reaches the maximum temperature at that injection timing.

From the graphs it is found that for biodiesel blends U25 the injection timing best suited is 29 °bTDC .

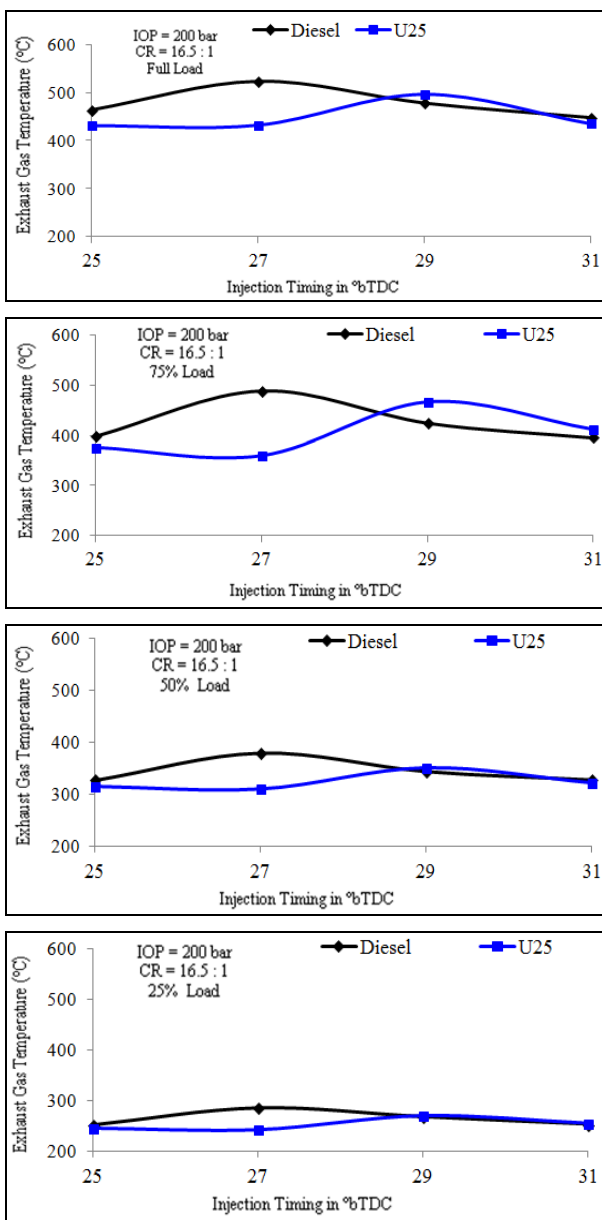


Figure 3: Variation of Exhaust Gas Temperature

4.1.2 Variation of Brake Thermal Efficiency

Brake thermal efficiency as compared to diesel over the entire range of injection timing is lower for blend U25 as compared to diesel, for all load conditions, which is as per expected as the lower heating value of biodiesel leads to decrease in brake thermal efficiency.

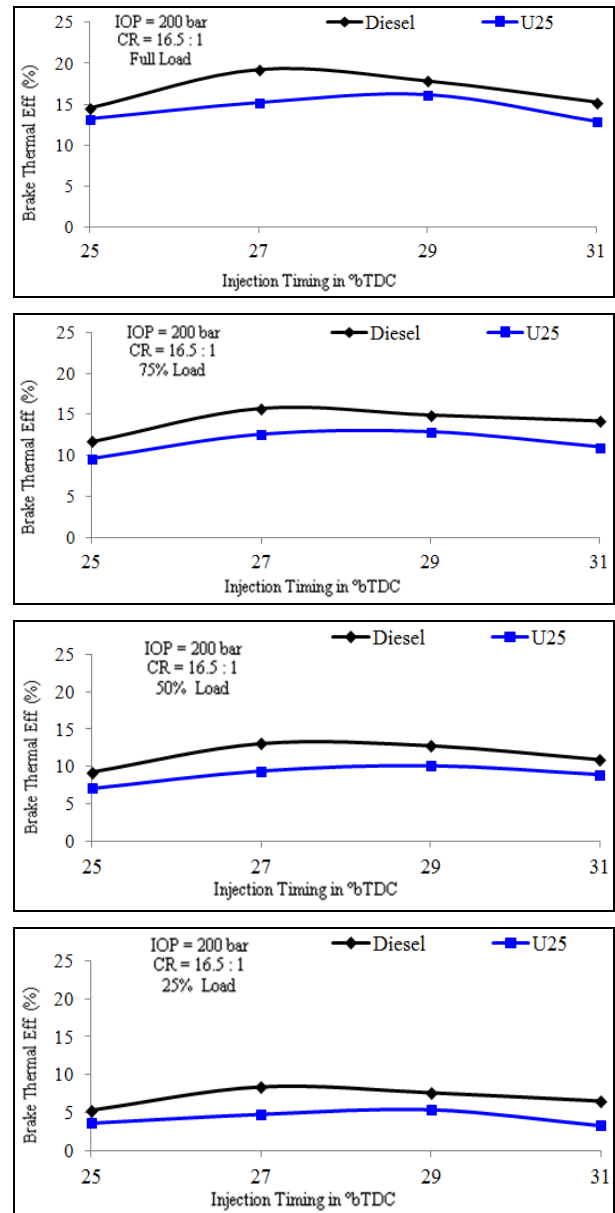


Figure 4 Variation of Brake Thermal Efficiency

4.1.3 Variation of Brake Specific Fuel Consumption

The figure shows that, BSFC for biodiesel blend U25 is higher than that of diesel. This is due to lower heating value of biodiesel, lower the power generation for the same fuel consumption rate as compared to diesel.

From the graph, the lowest BSFC for diesel is observed at For the full load condition, the highest BSFC obtained at 27 °bTDC, where as for blend U25 at 29 °bTDC. Which is as expected from the graphs of EGT and Brake thermal efficiency.

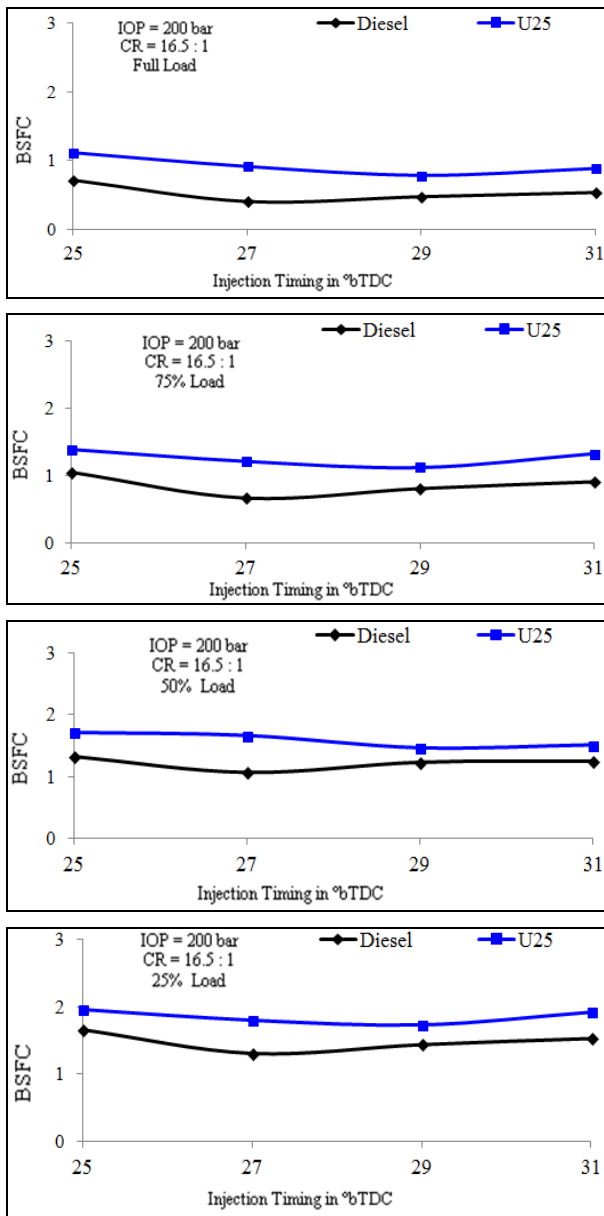


Figure 5: Variation of BSFC

4.1.5 Variation of Carbon Dioxide (CO₂)

Carbon Dioxide emission is higher for diesel as compared to blend U25, but among all injection timing for U25 the highest CO₂ emission is at 29 °bTDC, which indicates that the complete combustion is higher compared to other injection timing.

This validates the highest brake thermal efficiency and EGT for blend U25. For diesel highest CO₂ emission is observed at 27 °bTDC.

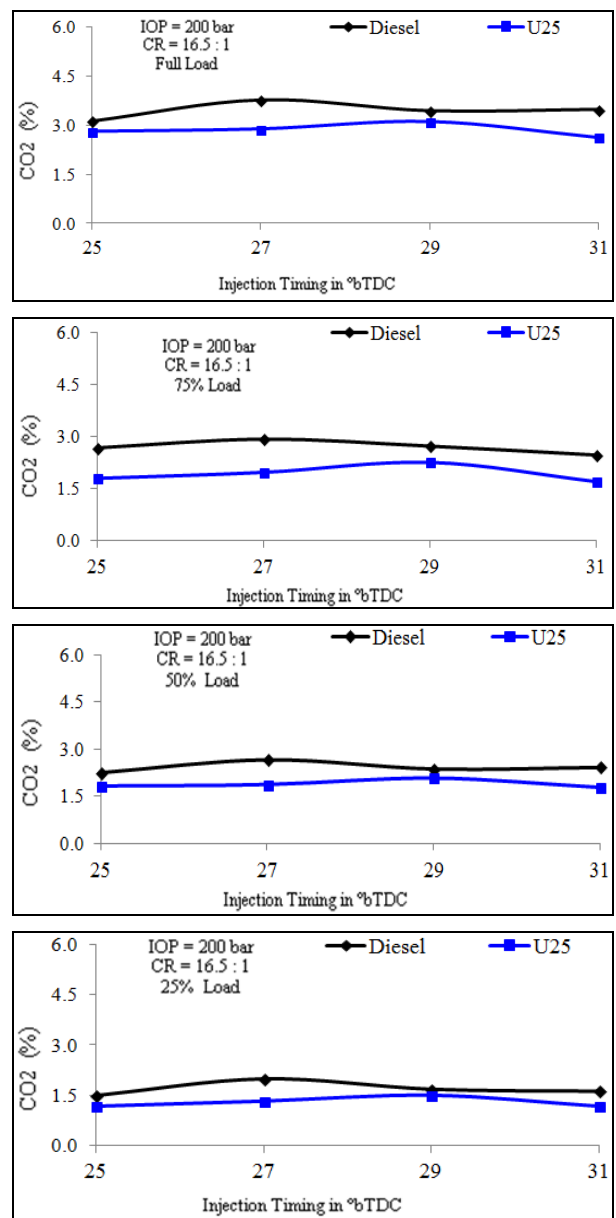


Figure 6: Variation of Carbon Dioxides

4.1.4 Variation of Carbon Monoxide (CO)

Carbon Moxide emission is lower for blend U25 as compared to diesel, irrespective of load and injection timing. Among all injection timing for U25 the Lowest CO emission is at 29 °bTDC, which is due to % of complete combustion and thus CO₂ formation is higher at this injection timing.

For diesel lowest CO emission is observed at 27 °bTDC.

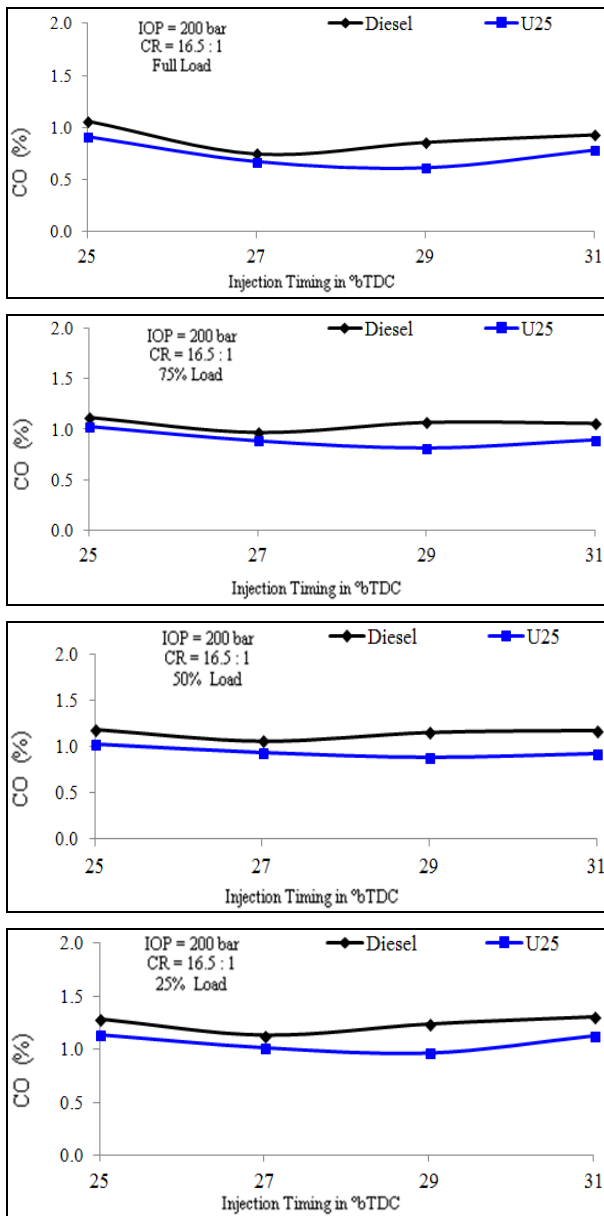


Figure 7: Variation of Carbon Monoxides

4.1.4 Variation of Hydrocarbon (HC)

Carbon Monoxide and Hydrocarbon always shows the similar trend in exhaust emission. Graphs shows hydrocarbon emission is lower for blend U25 as compared to diesel at all engine load condition and injection timing. For blend U25 the lowest HC emission is observed at 29 °bTDC, which is as expected. For diesel lowest HC emission is observed at 27 °bTDC.

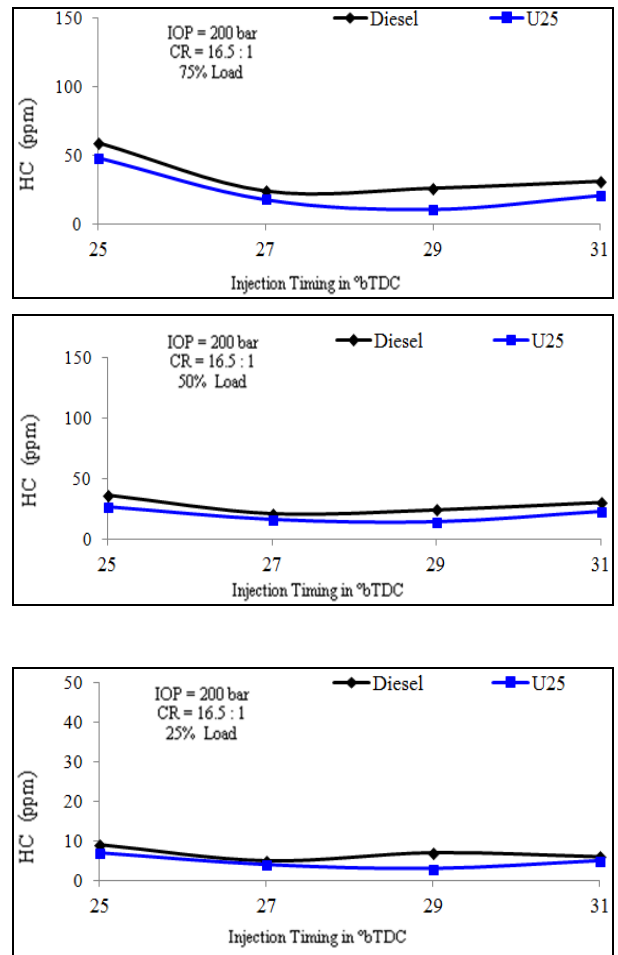
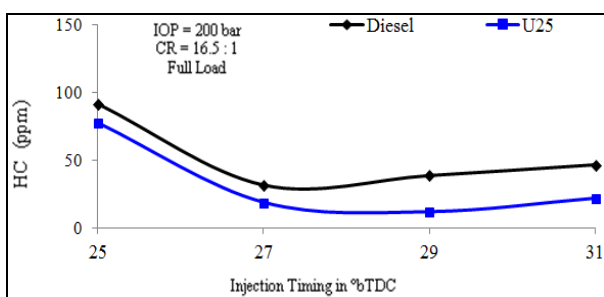
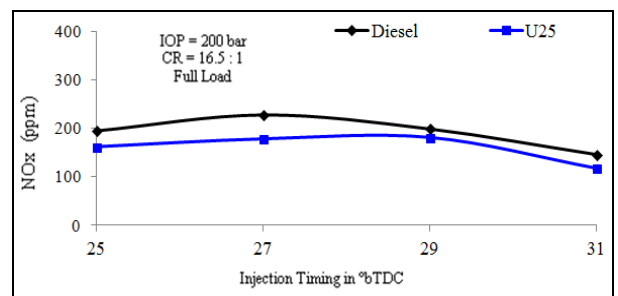


Figure 8 Variation of Hydro Carbons

4.1.4 Variation of Oxides of Nitrogen (NOx)

Oxides of Nitrogen form at the higher combustion temperature (about 1000°C and more) and as expected NOx emission is higher for diesel as compared to blend U25 due to higher heating value result in higher combustion temperature.

For blend U25 NOx emission is higher at 29 °bTDC as compared to other injection timing as at this timing blend U25 shows highest combustion temperature. Among all the lowest value is observed at 31 °bTDC. For diesel highest NOx emission is observed at 27 °bTDC.



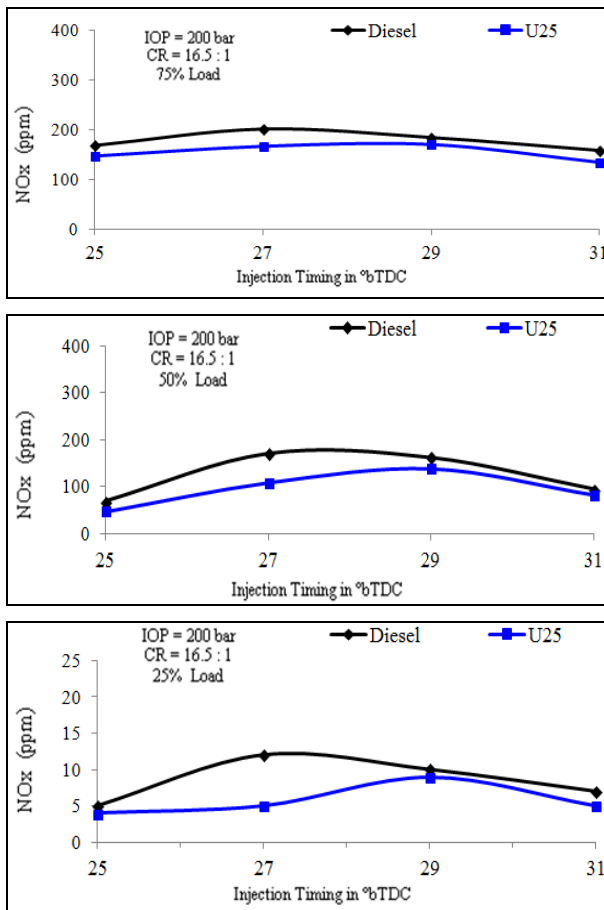


Figure 9 Variation of Oxides of Nitrogen

IV. CNCLUSIONS

Use of a undi oil biodiesel is considered as a new possible source of alternative fuel for diesel engine. No difficulty was facing at the time of starting the engine and the engine ran smoothly over the range of engine speed. Based on the experimental work, the following conclusions are drawn.

- Best suited Undi Oil Biodiesel Blend is U25, which can be used in CI engines without any modifications.
- The best suited compression ratio to use blend U25 is 16.5 : 1.
- The best suited injection pressure to use blend U25 is 200 bars.
- The optimum value of injection timing to used blend U25 is 29 °bTDC.

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VI. BIOGRAPHIES



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Nilima Baliram Gadge, PG student, Mechanical (Heat Power), JSPM's Rajarshi Shahu College of Engineering, Tathawade, Pune University, Pune, India. Born on dated 17th Jul. 1980. She has completed her graduation in Production Engineering, from BDCOE, Wardha, in the year 2006, secured first class (74.23%), Nagpur University. Also she has completed Diploma in Mechanical Engineering, from ASTS, Pimpri, Wardha, in the year 2001, securing first class (62.23), MSBTE, Mumbai Board. Currently working as a Lecturer in Nutan Maharashtra Vidya Polytechnic, Talegaon Dabhade, Pune, (India).

Optimizing Performance of CI Engine fueled with Undi Oil Biodiesel

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ABSTRACT

An increasing demand of fossil fuels has being a critical problem for us. The natural resources of fossil fuel are dwindling day by day. Biodiesel that may called natural fuel may be a good source or substitute for fossil fuel in future. An experiment is conducted to obtain the operating and emission characteristics of Undi Oil Biodiesel on Diesel Engine run on various Blends of biodiesel, Load Conditions and Injection Pressure. From the comparison of results, it is inferred that the engine performance is improved with significant reduction in emissions for the chosen oils without any engine modification. The effective injection pressure can be fixed based on the experimental results obtained in the engine since the findings of the present research work infer that the biodiesel obtained from Undi oil is a promising alternative fuel for direct-injection four-stroke VCR diesel engine.

Keywords: Biodiesel, Undi oil, Transesterification, Various Injection Pressure, Biodiesel Blends, Engine Loads Performance & Emission Characteristics.

I. INTRODUCTION

In recent years, oil prices have been rising rapidly again and there is a major concern for the long term availability of fossil fuels. This and the growing concern for our environment have created a much larger market for renewable resources. Vegetable oils are one of the important sources of renewable energy, and can be transesterified to biodiesel, which is an alternative fuel for diesel engines.

The difference between bio-diesel and petroleum diesel lies in the name itself. Petroleum diesel is 100% petroleum based and considered as a fossil fuel. On the other hand bio-diesel is created from live feedstock such as vegetable oil, peanut oil, coconut oil, even algae oil. Bio-diesel can be used as a direct fuel considered B100, or in its unrefined form of vegetable oil. Many of these vegetable oils are similar in properties to those of petroleum diesel, the main difference is that vegetable oils and bio-diesels have a lower oxidative stability state, a higher viscosity coefficient, and a higher volatility

point. These properties make bio-diesel blends a suitable candidate for an immediate alternative energy fuel.

Biodiesel is a non-toxic, biodegradable, and renewable diesel fuel and can be used neat or blends with petroleum diesel fuels. Biodiesel has many advantages compared to diesel fuels. It has higher cetane number than diesel fuel, and contains no aromatics, almost no sulfur and 10-12% oxygen by weight. Biodiesel-fueled engines produce less CO, HC and particulate emissions than petroleum diesel-fueled engines. Biodiesel improves the lubricity, which results in longer engine component life.

Bio-diesel production is a very modern and technological area for researchers due to the relevance that it is winning everyday because of the increase in the petroleum prices and the environmental advantages biodiesel offers over diesel. Accordingly, many researchers around the world have dealt with these issues and in many cases devised unique solutions.

1.1 Problem Statement

There is a problem statement as, to optimize the Injection Timing by analyzing engine performance and exhaust emission for blend C25 at compression 16.5 : 1 and injection pressure 220bar.

1.2 Objectives

There are two main objectives in this research,

- To investigate the performance and emission characteristic of a diesel engine operating with Undi Oil biodiesel blend U25 under varying conditions of injection timing and Engine Load.
- To optimizing the performance of CI engine.

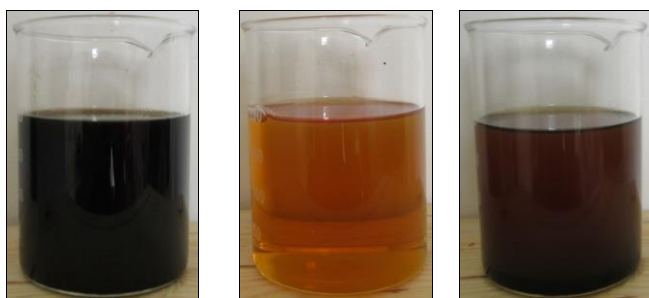
II. METHODS AND MATERIAL

The production of biodiesel from Undi Oil checked for suitability as alternative fuel for diesel use in CI engine was done in author's previous work, title "Honne Oil Biodiesel – Alternative Fuel for CI Engine" published in IJSRSET/ Volume 1/ Issue 2/ March April 2015 [433-435].

TABLE I
PHYSICO-CHEMICAL PROPERTIES

Parameter	Test Standard	Diesel	UOME	Undi Oil
Density at 15°C (gm/cc)	IS 1448 (P16) 2007	0.835	0.8653	0.9363
Kinematic Viscosity at 40°C (cst)	IS 1448 (P25) 2007	3.5	1.744	51.58
Calorific Value (MJ/Kg)	IS 1448 (P6) 2007	43.00	35.37	40.27
Flash Point (°C)	IS 1448 (P69) 2013	44	8.5	220

Material used is a biodiesel blend U25, where the datum line data is obtained by using neat Diesel U00.



Row Undi Oil Diesel (U00) U25 (25%UOME + 75%Diesel)
Figure 1 : Fuel Samples Used

2.1 Optimizing CR and Blend

The objective of the first work is to study through experiments, the performance and emission characteristics of Undi Oil (UOME) blends in direct injection (DI) VCR diesel engine at various blend, engine load and compression ratio, to find the most suitable compression ratio and blend type at all load condition.

TABLE II
METHODOLOGY OPTIMIZING CR & BLEND

Blend Type	Blend	IOP in bars	Injection Timing in degree bTDC	C R	Load in KW
U00	100% Diesel	210	27	14.5 : 1	0.75
U25	25% UOME +75% Diesel			15.5 : 1	1.50
U50	50% UOME +50% Diesel			16.5 : 1	2.25
U75	75% UOME + 25 Diesel			17.5 : 1	3.0

From author's previous work titled "Performance Test of CI Engine fueled with Undi Oil Biodiesel under Variation in Blend Proportion, Compression Ratio & Engine Load" published in IJSETR, Volume 3, Issue 8, August 2014, [2197-2205], it was concluded that the best suited blend was U25 and the Compression Ratio was the 16.5 irrespective of all load conditions.

2.2 Optimizing IOP and Blend

The objective of the second work was to study, the performance and emission characteristics of Undi Oil (UOME) blends in CI engine at various blend, engine load and injection pressure ratio, to find the most suitable injection pressure and blend type at all load condition.

TABLE III
METHODOLOGY OPTIMIZING IOP & BLEND

Blend Type	Blend	IOP in bars	Injection Timing in degree bTDC	C R	Load in KW
U00	100% Diesel	190	27	16.5 : 1	0.75
U25	25% UOME +75% Diesel	200			1.50
U50	50% UOME +50% Diesel	210			2.25
U75	75% UOME + 25 Diesel	220			3.0

From author's previous work titled "Performance Test of CI Engine fueled with Undi Oil Biodiesel under Variation in Injection Pressure, Blend Proportion & Engine Load" published in JECET, June-August 2015, Sec. C, Volume 4, No.3, [427-436], it was concluded that the best suited blend was U25 and the Injection Operating Pressure was the 200bars at all load conditions.

2.3 Optimizing Injection Timing

The present work is to optimize the injection timing, through the study of engine performance and exhaust emission under the variation of injection timing and load conditions.

TABLE IV
METHODOLOGY OPTIMIZING INJECTION TIMING

Blend Type	Blend	IOP in bars	Injection Timing in degree bTDC	C R	Load in KW
U00	100% Diesel	200	25	16.5 : 1	0.75
			27		1.50
29	2.25				
31	3.0				
U25	25% UOME +75% Diesel				

III. RESULTS AND DISCUSSION

3.1 Experimental Engine Setup

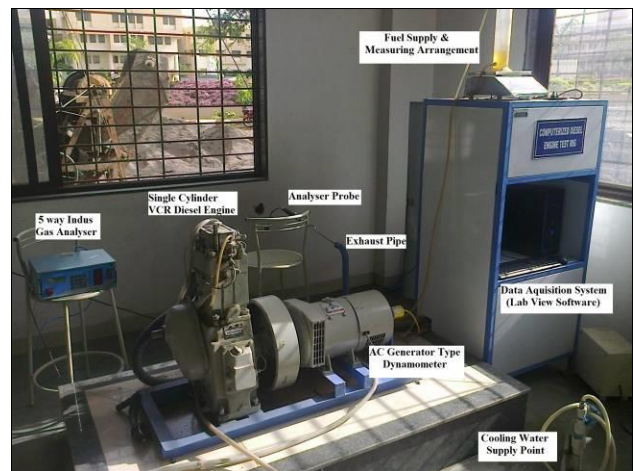


Figure 2 :Experimental Engine Setup

3.2 Engine Specifications

TABLE V
EXPERIMENTAL ENGINE SPECIFICATIONS

Sr. No.	Description	Specification
1	Make	Rocket Engineering Model VRC-1
2	Type of Engine	Vertical Single Cylinder Water Cooled
3	Bore	80 mm
4	Stroke	110 mm
5	Swept Volume	553 mm ³
6	RPM	1500
7	Brake Hours Power	5 HP
8	Compression Ratio	15.5 : 1 to 18.5 : 1
9	Fuel	High Speed Diesel
10	Coefficient of Discharge	0.65
11	Water Flow Transmitter	0 to 10 lit./min.
12	Air Flow Transmitter	0 to 250 wc
13	Piezo Sensor	0 to 5000 psi with low noise cable
14	Software	LabView

3.3 Experimental Methodology

Experiment is carried out with the diesel fuel and biodiesel blend U25 (25% UOME + 75% Diesel) where engine performance data with diesel is considered as the reference for experimentation.

The total experimental work is carried out by varying injection timing from 27 °bTDC to 31 °bTDC in the increment of 2 deg. and engine load from 0.75 KW to 3

KW in the increment of 0.75 KW, where as IOP 200 bar, Compression Ratio 16.5 are kept constant.

4. Results

4.1 Variation of Exhaust Gas Temperature

The result indicates that the variation in exhaust gas temperature (EGT) for diesel is highest at 27 °bTDC and that of blend U25 at 29 °bTDC, irrespective of load conditions. This shows that combustion of respective fuel reaches the maximum temperature at that injection timing.

From the graphs it is found that for biodiesel blends U25 the injection timing best suited is 29 °bTDC .

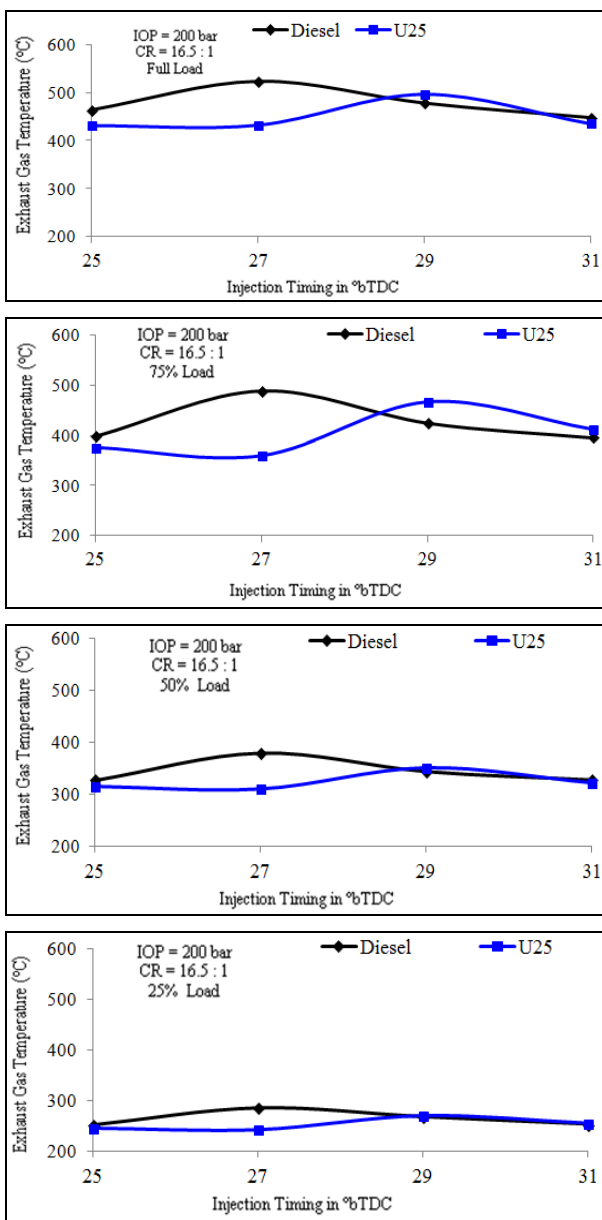


Figure 3: Variation of Exhaust Gas Temperature

4.1.2 Variation of Brake Thermal Efficiency

Brake thermal efficiency as compared to diesel over the entire range of injection timing is lower for blend U25 as compared to diesel, for all load conditions, which is as per expected as the lower heating value of biodiesel leads to decrease in brake thermal efficiency.

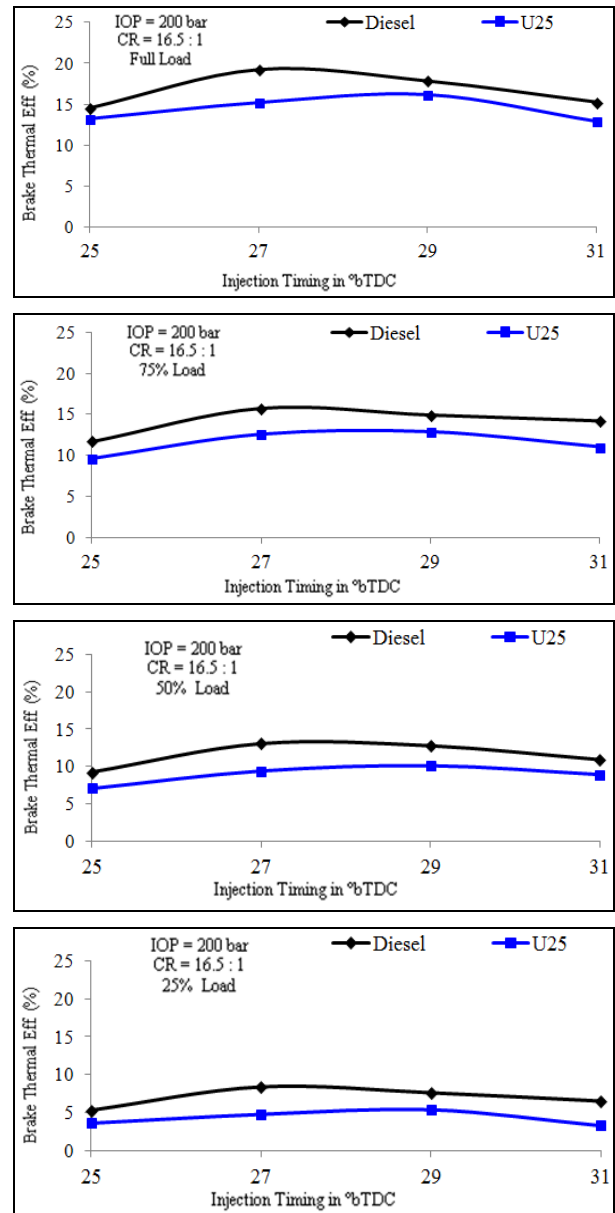


Figure 4 Variation of Brake Thermal Efficiency

4.1.3 Variation of Brake Specific Fuel Consumption

The figure shows that, BSFC for biodiesel blend U25 is higher than that of diesel. This is due to lower heating value of biodiesel, lower the power generation for the same fuel consumption rate as compared to diesel.

From the graph, the lowest BSFC for diesel is observed at For the full load condition, the highest BSFC obtained at 27 °bTDC, where as for blend U25 at 29 °bTDC. Which is as expected from the graphs of EGT and Brake thermal efficiency.

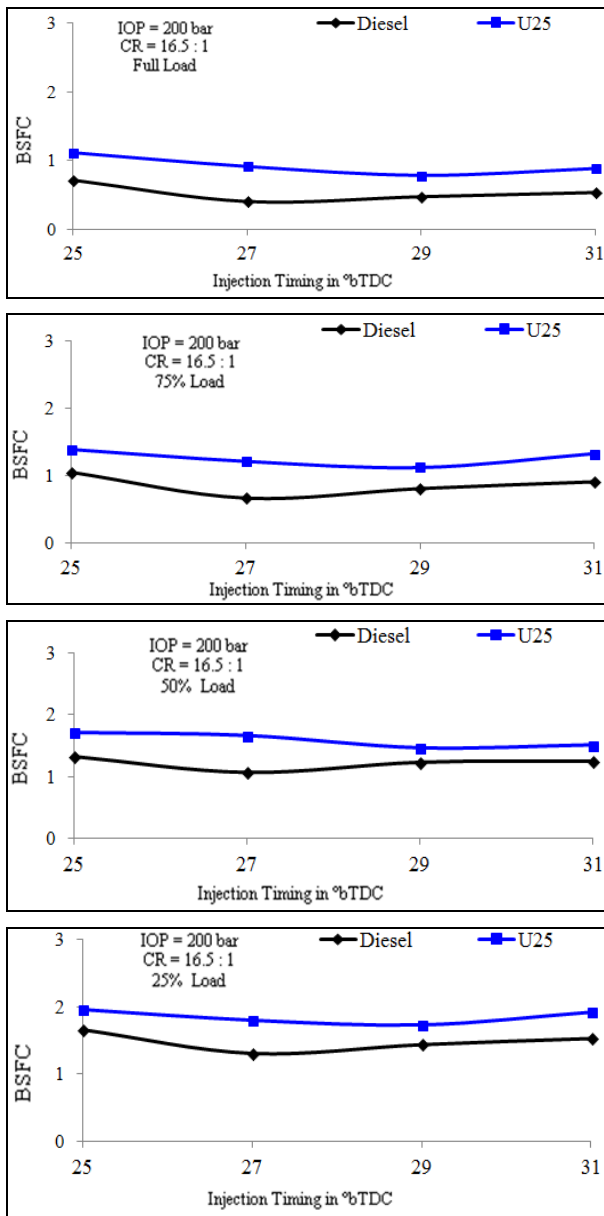


Figure 5: Variation of BSFC

4.1.5 Variation of Carbon Dioxide (CO₂)

Carbon Dioxide emission is higher for diesel as compared to blend U25, but among all injection timing for U25 the highest CO₂ emission is at 29 °bTDC, which indicates that the complete combustion is higher compared to other injection timing.

This validates the highest brake thermal efficiency and EGT for blend U25. For diesel highest CO₂ emission is observed at 27 °bTDC.

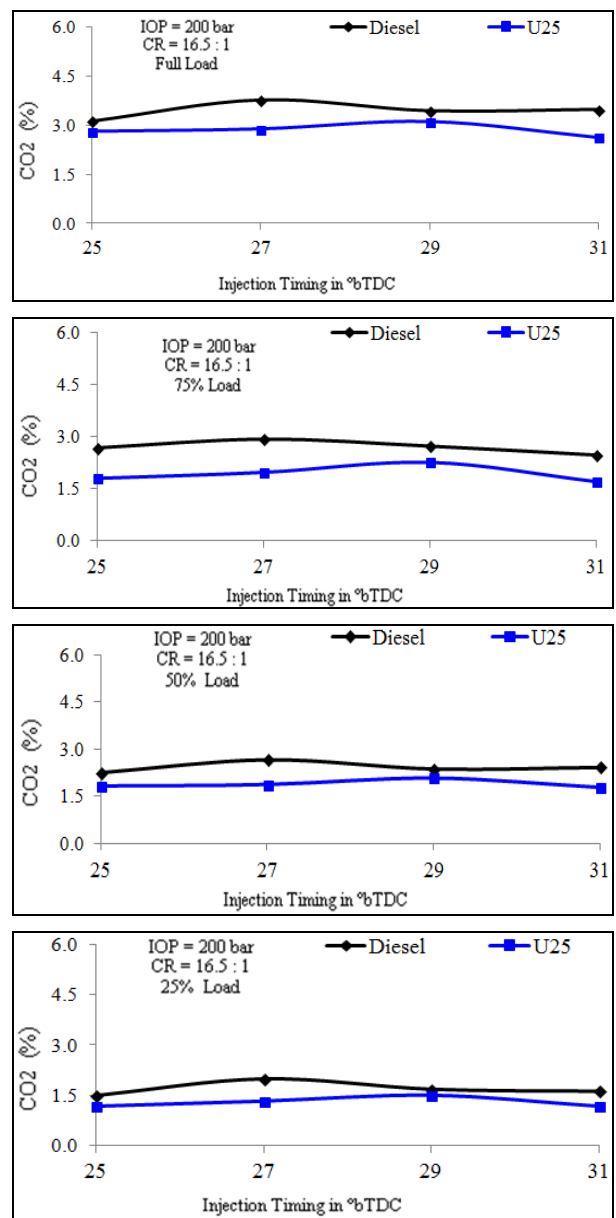


Figure 6: Variation of Carbon Dioxides

4.1.4 Variation of Carbon Monoxide (CO)

Carbon Moxide emission is lower for blend U25 as compared to diesel, irrespective of load and injection timing. Among all injection timing for U25 the Lowest CO emission is at 29 °bTDC, which is due to % of complete combustion and thus CO₂ formation is higher at this injection timing.

For diesel lowest CO emission is observed at 27 °bTDC.

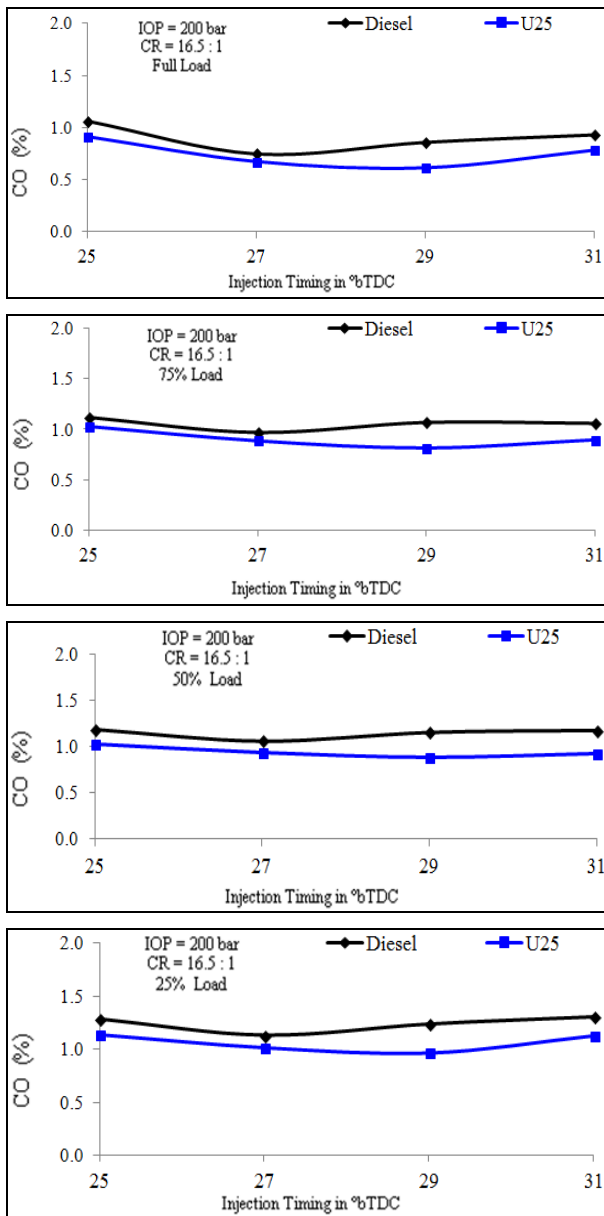


Figure 7: Variation of Carbon Monoxides

4.1.4 Variation of Hydrocarbon (HC)

Carbon Monoxide and Hydrocarbon always shows the similar trend in exhaust emission. Graphs shows hydrocarbon emission is lower for blend U25 as compared to diesel at all engine load condition and injection timing. For blend U25 the lowest HC emission is observed at 29 °bTDC, which is as expected. For diesel lowest HC emission is observed at 27 °bTDC.

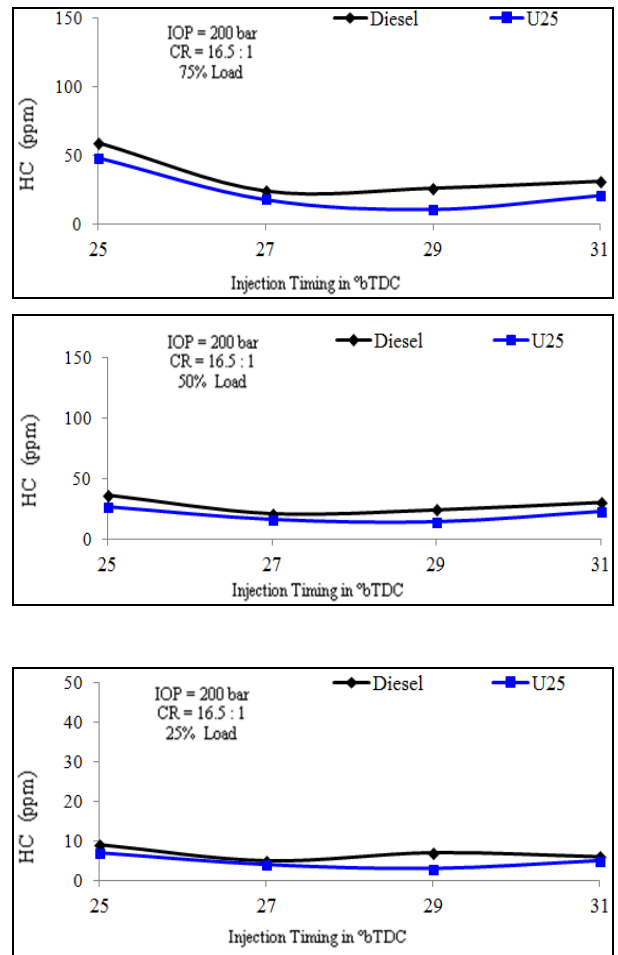
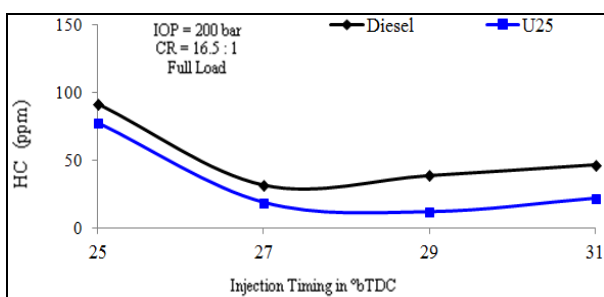
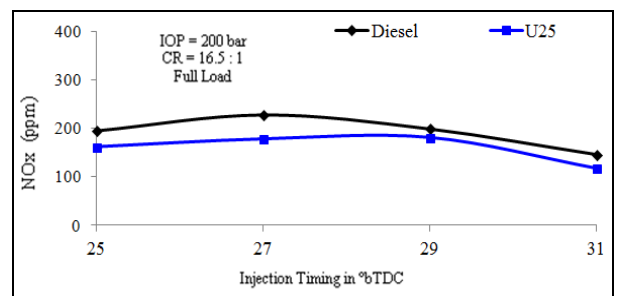


Figure 8 Variation of Hydro Carbons

4.1.4 Variation of Oxides of Nitrogen (NOx)

Oxides of Nitrogen form at the higher combustion temperature (about 1000°C and more) and as expected NOx emission is higher for diesel as compared to blend U25 due to higher heating value result in higher combustion temperature.

For blend U25 NOx emission is higher at 29 °bTDC as compared to other injection timing as at this timing blend U25 shows highest combustion temperature. Among all the lowest value is observed at 31 °bTDC. For diesel highest NOx emission is observed at 27 °bTDC.



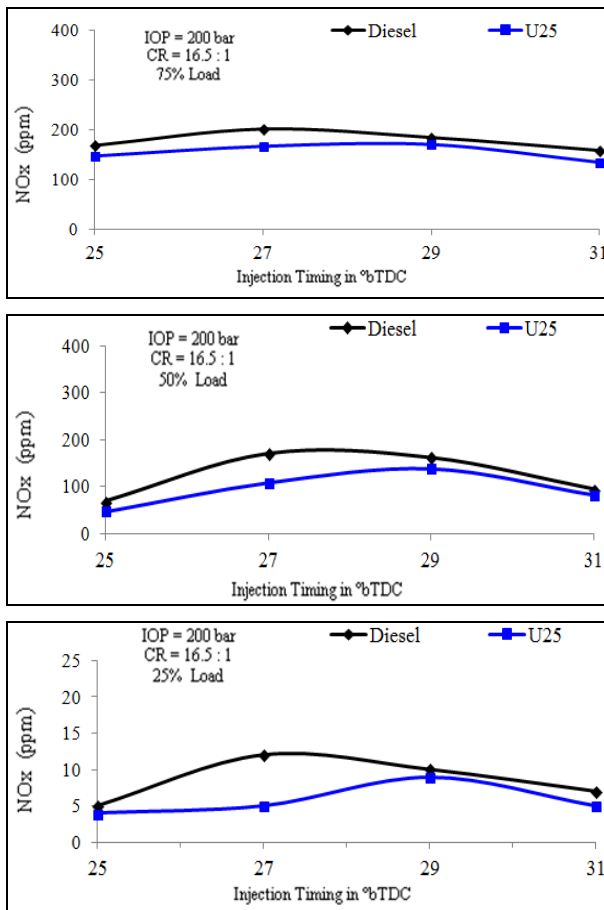


Figure 9 Variation of Oxides of Nitrogen

IV. CNCLUSIONS

Use of a undi oil biodiesel is considered as a new possible source of alternative fuel for diesel engine. No difficulty was facing at the time of starting the engine and the engine ran smoothly over the range of engine speed. Based on the experimental work, the following conclusions are drawn.

- Best suited Undi Oil Biodiesel Blend is U25, which can be used in CI engines without any modifications.
- The best suited compression ratio to use blend U25 is 16.5 : 1.
- The best suited injection pressure to use blend U25 is 200 bars.
- The optimum value of injection timing to used blend U25 is 29 °bTDC.

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Breast Cancer Frequency Rate Shift toward Younger Age in IRAQ

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ABSTRACT

Breast cancer in Arab countries present at earlier age than in Western countries and early diagnosis may contribute to better treatment outcome.

Aim: To determine the frequency rate in different age groups.

Patients and methods: A total of 148 breast cancer cases included in the study. The analysis of variables performed with stratification of 10 years age interval.

Results: Age distribution of breast cancer indicated that 20.3% of cases were with age of ≤ 20 years and 14.9% were with age of 16-18 years. In addition more than half of cases [52.7%] were with age of less than 30 years. Furthermore, 79.7% of breast cancer cases were in women ≤ 40 years of age. Only 5.4% of cases were with age of > 45 years. Odd ratio confirmed a significant association between age and breast cancer development in our study cohort. The highest frequency was in women with age of 21-30 years, followed by those with age of 31-40 years. Age of women with breast cancer significantly influences the CEA and ER mean serum values whether the analysis performed on group or individual stratification. In addition, P53 mean serum level in women with breast cancer was significantly different when the analysis performed on individual stratification, however, non-significant differences was achieved between age group. The same pattern was demonstrated for CA 27-29 and PR.

Conclusion: Age at diagnosis was with two decades earlier than that in Western countries.

Keywords: Breast cancer, Pollution, Frequency, CA 15-3, CA 27-29, PR, ER, P53, CEA.

I. INTRODUCTION

Breast cancer is the most common cancer among women in Arab countries [1]. Breast cancer accounts for approximately 1/3 of the registered female cancers [2]. In a recent study Alwan reported a trend for breast carcinoma to affect younger age group [3]. The incidence of breast cancer in Iraqi women increased in the last two decades and forms one of the major threats to female health [4]. The age standardized incidence rate of breast cancer in Iraq was 31.1/100000, while it was 18.4 for Iran, 22.4 for Saudi Arabia, 23.0 for Syria, 28.3 for Turkey, 47.0 for Jordan, and 47.7 for Kuwait [5]. Al-Hashimi and Wang conducted incidence trends from 2000 to 2009 and included 23,792 cases reported that breast cancer in Iraqi women increased from 26.6 per

100000 in 2000 to 31.5 /100000 in 2009 [6]. Iraqi National Programs for early detection of breast cancer were developed in order to decrease morbidity and mortality of breast cancer [7]. Age at which breast cancer diagnosed is with important implications since cancer in younger age group is more aggressive [8, 9].

This study was conducted to determine the frequency rate of breast cancer in different age groups.

II. METHODS AND MATERIAL

Study population

Women with breast cancer were recruited from those attending Breast Cancer Clinic and private clinic in Erbil

Governorate from January 2014 to end of July 2015. Their age range from 16 to 86 years. A total of 148 were included and verbal informed consent taken from each woman participated in the study before enrolment. The research protocol was approved by the ethical committee of Tikrit University College of Science [TUCOS]. The data gathered using predesigned questionnaire and information's collected by direct interview of each participant.

Statistical Analysis

The results presented as mean \pm SD and frequency. For mean comparison of the means between groups, student t test and ANOVA were used. Chi square test was used to compare frequency difference between groups. Logistic regression line analysis was used to determine odd ration, while Recessive Operative Curve [ROC] was used to determine area under curve [AUC]. P value of <0.05 was considered as significant.

III. RESULTS AND DISCUSSION

Age distribution of breast cancer indicated that 20.3% of cases were with age of ≤ 20 years and 14.9% were with age of 16-18 years. In addition more than half of cases [52.7%] were with age of less than 30 years. Furthermore, 79.7% of breast cancer cases were in women ≤ 40 years of age. Only 5.4% of cases were with age of > 45 years, Table 1. Odd ratio confirmed a significant [OR=0.94, 95% CI=0.91-0.96; P=0.000] association between age and breast cancer development in our study cohort.

When analysis performed on individual stratification age incidences of breast cancer were significantly different [P <0.01], Table 1, the same pattern of significance was observed when cases stratified on 10 years age group interval, Table 2.

The highest frequency [48/148; 32.4%] was in women with age of 21-30 years, followed by those with age of 31-40 years [40/148; 27.0%]. The women with age of 16-20 years were with frequency rate of 20.3% [30/148 cases], while those with age of 41-50 years were with rate of 18.9% [28/148 cases]. Only 2 cases were with age of more than 50 years [1.4%], Table 2.

The mean serum level of CA 15-3 was not with significant difference in relation to age, whether the analysis performed on age group [F=0.61, P.0.05] stratification, Table 3, or individual [F=1.263, P >0.05] stratification, Table 4.

The CEA mean serum values in women with breast cancer were significantly different when the analysis performed on group [F=3.667, P=0.007], Table 4, or individual [F=2.324; P=0.001] stratification, Table 5.

The mean serum levels of CA 27-29 were not significantly [F=0.89, P >0.05] between the age groups, Table 4, however, there were significant differences [F=2.295; P=0.001] between individual values, Table 6. On individual stratification serum P53 values were significantly different [F=2.413; P=0.001], Table 4, while the mean serum values were not significantly different between age groups [F=0.878, P >0.05], Table 7.

ER mean serum levels significantly different between age groups [F=5.147; P=0.001], Table 8, and between individuals [F=2.413; P=0.001], Table 4. PR serum levels were significantly [F=4.038; P=0.000] different between individual cases in relation to their age, Table4. However, the mean serum values were not significantly [F=1.181; P >0.05] different between age groups, Table 9.

Table 1. Frequency Distribution of Breast Cancer Cases in Relation to Age

Age in	Year	Frequency	Valid Percent	Cumulative %
	16	2	1.4	1.4
	17	2	1.4	2.7
	18	18	12.2	14.9
	19	6	4.1	18.9
	20	2	1.4	20.3
	21	8	5.4	25.7
	22	4	2.7	28.4
	23	10	6.8	35.1
	24	6	4.1	39.2
	25	2	1.4	40.5
	26	4	2.7	43.2
	27	2	1.4	44.6
	28	10	6.8	51.4
	29	2	1.4	52.7
	31	2	1.4	54.1
	32	4	2.7	56.8
	34	8	5.4	62.2
	35	14	9.5	71.6

	36	4	2.7	74.3
	37	4	2.7	77.0
	38	2	1.4	78.4
	40	2	1.4	79.7
	41	8	5.4	85.1
	44	4	2.7	87.8
	45	10	6.8	94.6
	46	2	1.4	95.9
	48	4	2.7	98.6
	86	2	1.4	100.0
	Total	148	100.0	

Table 2. Frequency Distribution of Breast Cancer Cases in Relation to Age Group

Age group Year	Frequency	Percent
16 – 20	30	20.3
21 – 30	48	32.4
31 – 40	40	27.0
41 – 50	28	18.9
≥ 51	02	1.4
Total	148	100.0

P <0.01

Table 3. Age Influence on CA 15-3 Mean Serum Value in Women with Breast Carcinoma

Age group Year	Mean	Standard Deviation
16 – 20	46.70	18.05
21 – 30	44.67	15.63
31 – 40	48.20	25.89
41 – 50	41.04	16.47
≥ 51	45.00	15.00
Total	45.35	19.40

F=0.61; P>0.05

Table 4. Age Influence on Biomarkers in Women with Breast Cancer

Biomarker	F value	P value
CA 15-3	1.263	>0.05
CEA	2.324	0.001
CA 27-29	2.295	0.001
P 53	2.413	0.001
ER	2.413	0.001
PR	4.038	0.000

Table 5. Age Influence on CEA Mean Serum Value in Women with Breast Carcinoma

Age group Year	Mean	Standard Deviation
16 – 20	5.41	2.22
21 – 30	5.04	2.74
31 – 40	5.15	2.67
41 – 50	7.28	4.31
≥ 51	1.90	0.95
Total	5.53	3.09

F= 3.667; P=0.007

Table 6. Age Influence on CA 27-29 Mean Serum Value in Women with Breast Carcinoma

Age group Year	Mean	Standard Deviation
16 – 20	48.41	30.37
21 – 30	62.13	49.78
31 – 40	48.77	36.50
41 – 50	60.79	48.50
≥ 51	45.00	15.00
Total	55.26	42.46

F=0.888 ;P>0.05

Table 7. Age Influence on P 53 Mean Serum Value in Women with Breast Carcinoma

Age group Year	Mean	Standard Deviation
16 – 20	1396.5	1325.3
21 – 30	1418.7	1412.4
31 – 40	1564.2	1122.2
41 – 50	1111.1	1115.9
≥ 51	3500.0	565.68
Total	1380.9	1259.0

F=0.878; P>0.05

Table 8. Age Influence on ER Mean Serum Value in Women with Breast Carcinoma

Age group Year	Mean	Standard Deviation
16 – 20	28.96	25.82
21 – 30	33.05	34.68
31 – 40	20.36	27.51
41 – 50	29.17	29.50
≥ 51	115.00	7.07
Total	29.16	31.67

F=5.147; P=0.001

Table 9. Age Influence on PR Mean Serum Value in Women with Breast Carcinoma

Age group Year	Mean	Standard Deviation
16 – 20	4.44	0.36
21 – 30	3.54	0.31
31 – 40	14.22	4.79
41 – 50	5.58	0.47
≥ 51	14.00	1.67
Total	7.14	2.53

F=1.181; P>0.05

Discussion

The present study shows that the highest frequency of breast cancer was in women with age of 21-30 years, followed by those with age of 31-40 years. This trend of frequency rate in relation to age was inconsistent to that reported for Arab Countries and globally [3,6,8,10,11] as previous studies indicated that the highest incidence and frequency was in the women with age of 40 to 49 years. Cox et al [12] in a nested case control study conducted in Norway and included 399 women with breast cancer found that frequency rate of BC was in age of 65-69, then 60 to 64 years and 50 to 54 years. Hosseini et al [13] studied the Iranian national data from cancer registry for 6265 female breast cancer found that age specific incidence rate of breast cancer decreases after menopause. Our present study finding indicated that breast cancer reduced after menopause, however, the peak incidence in Iranian population was in age group of 50 -59, while our present study cases peak was in age group of 21 to 30 years. In contrast to this study finding the breast cancer in US continue to increase with lower slope after menopause [14].

In a comprehensive literature review of 28 articles on breast cancer in Arab countries reported high frequency of cases was in the age that range of 43-52 years [8]. Alwan [3] carried out a study on 721 breast cancer in women, who visited Main Referral Training Centre for Early Detection of Breast Tumors in the Medical City Teaching Hospital in Baghdad, and found the higher frequency was in the age of 40-49 years and the rate declined with age. In addition, a comparative study on breast cancer in samples from 3 Iraqi Governorate indicated that the high frequency of breast cancer was in age group of 40- 49 years for Hilla and Baghdad and 20-

39 years in Karballa [11], and the trend of frequency reduced with age.

A population based study of breast cancer in Kurdish cohort which includes 514 cases for the period 2008-2010 in Sulaimaniyah, Iraq, found that higher frequency was in the age range of 20-49 years and subsequently reduced with age [15].

A prospective case-control study was conducted in Nanakaly Oncology Hospital in Erbil, Iraq for the period September 2009 to April 2011, which included 300 breast cancer cases and indicated that 42.7% were premenopausal [16].

A study conducted in Basra, Iraq, which included 67 breast cancer cases shows that 55.2% are with age of less than 47 years [17]. However, 28.7% of 130 women with breast cancer were with age group of 40 – 49 and 50-59 years in sample from Baghdad Governorate [18]. In addition, in Saudi Arabia the breast cancer that developed before the age of 40 years accounted for 26.4%, while it was 6.5% in USA [10] and 79.7% in the present study.

In two studies reported for Kirkuk show that breast cancer was most common in age group 41-50 years in that conducted from October 2012 TO December 2013 which included 138 cases [19] and the age group 51-60 years in that conducted from December 2013 to May 2013 which included 100 cases [20]. In addition, other previously reported studies in Iraqi community indicated that age peak frequencies occurred in fifth decade of life [21-27], while in Asian countries the age peak frequency was in 40-50 years and it was 60-70 years in Western countries [28].

The mean age of women with breast cancer who included in the present study was 30.6 ± 11.5 years which is not consistent to previous studies reported for Iraq, other Arab countries and globally. The lower mean age reported in literature was 41.7 years [29] in a study conducted in Baghdad which included 70 cases, while the higher mean age was 52 years which was a national large scale research (23,792 cases)[6]. In addition, in Basrah, one study reported mean age of 47 years which included 216 cases [17], while Majid et al [15] reported a mean age of 47.8 years and 49.5 years in two studied cohort in Northern Iraq for the period 2008-2010.

In Arab countries the weighted average age at diagnosis of breast cancer derived from 26 articles (7455 cases, 1985-2008) was 49.8 years [8]. The mean age at diagnosis of breast cancer was 50.1 years for Jordan [30], 47 to 48.6 years for Saudi Arabia [31-33], 46 years for Libya [34], 43.4 to 49.3 years for Iran [35-37]. However, the mean age at diagnosis of women breast cancer in UK, Canada, Australia, Denmark, Sweden, Norway, 1995-2007, was 62.5 years with a range of 60.6 to 63.9 years [38]. Collectively from the above data, the mean age at diagnosis of breast cancer cases was 41.7 to 52 years for Iraqi population studies, while it was 43 to 52 years in Arab countries, 43.4 to 49.3 years in Iran and 60.6 to 63.9 years in Western countries. Thus the mean age at diagnosis of breast cancer in Arab countries appears to be a decade earlier than in America and Western countries [8, 39]. However, the present study suggest that age at diagnosis appears to be a decade earlier than previous studies findings for Arab countries and two decade earlier than Western countries. This finding needs to be evaluated on a large scale national study to confirm such finding because it was with impact on Iraqi women health and disease control and prevention.

Unfortunately, the women with age of 16-20 years were with frequency rate of 20.3%, while those with age of 41-50 years were with rate of 18.9%. This finding suggests a shift in age breast cancer development and need to start screening at earlier age in Iraqi community. The high frequency rate of breast carcinoma in women with age of 20 years and below was not consistent with that reported for Iraq [3, 11, 15, 17, 18, 19] and Iran [13].

In this study odd ratio confirmed a significant association between age and breast cancer and the age frequency of breast cancer was 20.3% in 15-20 years of age and increased to reach the peak at age of 21-30 years and declined with age. This finding was consistent with that reported for Iraq and Iran but not of USA as the frequency steady increased with age [13]. The significant association between age and breast cancer was demonstrated whether the stratification performed on individual or 10 years age intervals.

In the present study 79.7% of breast cancer cases were in women ≤ 40 years of age and this frequency rate was higher to that reported for Arab and Western countries. In Iraq, a review for the period 2000 -2009 shows that 52.69-58.49% of breast cancer diagnosed before the age

of 50 years [6]. However, in Hilla, Iraq, 71.3% of breast cancer cases were diagnosed at age of less than fifty years [11], in addition, a review for Arab countries found that 65.5% of breast cancer cases were diagnosed before the age of 50 [8]. Furthermore, 55.2% of breast cancer in Basrah city was diagnosed before the age of 47 years [17], while 60.5% was reported for Sulaimaniyah in a study that included Arabic and Kurdish women [15]. Lafta et al [18] found that 47.3% of breast cancer in Baghdad were diagnosed before age of 50, while two studies performed in Baghdad by the same research group reported 42.3% , 2008-2009 [11] and 54.1%, 2004-2008 [3], and two studies in Kirkuk reported a rate of 58% ,2013 [19], and 38.4% [20].

Thus the present study shows higher frequency rate of breast cancer diagnosis before the age of 50, which is higher to those observed in Sudan 74% [40 Elgaili 2010], Libya 71% [34], Yemen 70% [41], Qatar 59.7% [40], Saudi Arabia 50-58.8% [42,43 Sadat], UAE 56.7% [42], Oman (53.2%) and Bahrain (53.9%)[42,Al-Madouj et al 2011],

Kuwait 47.5% [42], Jordan 44.5 – 47.2% [30,44], Lebanon 40% [45] and Iran 67.5% [35]. Our present study finding was much higher than those reported for USA 20.9% [46], France 23.35% [47], England 20% [48], and Australia 23.6% [49]. In addition, El Saghir et al [1] suggest that women with breast cancer were with age around fifty at the time of diagnosis in developing and Arab countries.

The high proportion of younger age at diagnosis in the present study was higher to that reported in studies in developing and Arab countries and much higher to that reported for Western countries. This could be due to that higher proportion of women with age of less than 50 years in Arab and developing countries [6]. In Iraq, the proportion of women with age of less than fifty was 82% while it was 56% in UK [50]. In addition, the population at risk in UK was stable, while it is increasing steeply in Iraq [6]. Environmental pollution including depleted uranium after 1991 and 2003 Gulf war may increase the risk for development of breast cancer [51-56]

Age of women with breast cancer significantly influences the CEA and ER mean serum values whether the analysis performed on group or individual stratification. In addition, P53 mean serum level in

women with breast cancer was significantly different when the analysis performed on individual stratification, however, non-significant differences was achieved between age group. The same pattern was demonstrated for CA 27-29 and PR. Despite the multiple risk factors for development of breast cancer, age per se still being advocated as an independent role player in the prognosis [57]. Thus circulating biomarkers quantitative and qualitative difference relative to age may be of value in monitoring breast cancer in variable age groups. A recent study performed in Kirkuk [20] shows that serum breast cancer biomarkers are with association to patient's age at time of diagnosis and stratification according to 5 years interval is with different trends of association. Circulating estrogen and progesterone receptors are more in older age women with breast cancer compared to younger and this finding was in agreement to that reported by other [20, 58-61] and contrast to the finding of Morrison et al [59].

IV. CONCLUSION

In conclusion, the present study shows a new trend of breast cancer frequency rate distribution as 20.3% of cases were with age of ≤ 20 years and 14.9% were with age of 16-18 years. In addition more than half of cases [52.7%] were with age of less than 30 years. This finding contributes to reduce the breast cancer screening age in Iraqi community.

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Experimental Investigation of Deflection Characteristics of Shaft in Mercerization Machine by Varying Diameters

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ABSTRACT

Mercerization is one of part of wet processing technology; it is the special type of treatment for cotton. Mercerization is done to get some special properties of the textile materials. In this process, the physical properties of the material get change. The purpose of this work is to study the effect of deflection of mercerization machine shaft and determine how shaft stiffness affects in mercerization process. The Simulation and experiment has shown that the residual stress on the shaft deformation accounts for about 7 mm, which cannot be ignored. The control of the potential error from residual stress in the process of shaft deflection measurement is of great significance for improving the shaft deflection accuracy. The design parameters were optimized with the help of ANSYS with the objective of minimizing the internal diameter of shaft. The design optimization also showed significant potential improvement in the performance of shaft. The results of ANSYS are used for determination of deflection characteristics, modeling and analysis of mercerization machine shaft.

Keywords: Mercerization Machine Shaft, Stiffness, Deflection and Bending

I. INTRODUCTION

Mercerizing is one of part of wet processing technology. It is the special type of treatment for cotton. Mercerization is done for getting some special properties of the textile materials. In this process the physical properties of the material change. Increased dye-uptake, dimensional stability, increased moisture regain, increased reactivity etc. If cotton is dipped into a strong alkaline solution such as lithium hydroxide, caustic soda, or potassium hydroxide, the fibers will swell and shrink. If the fibers are placed under tension while in this swollen state and then rinsed with water, the alkali will be removed and a permanent silk-like structure will result. It will be highly desirable to introduce this process in Khadi sector which will lead to considerable saving in the dyeing cost. In Mercerization machine number of shaft (10-15) arranged in parallel position, these shafts are supported by another shaft which is in parallel position at lower side. The arrangements of all shafts are star arrangement. Initially the yarn is loaded

on upper shaft then lower and again on another upper shaft, in this way the shaft rotates continuously for 7 to 8 minute. The hank (yarn) is loaded through the shaft; each hank has a weight around 0.7 to 1.2 kg. These hanks are dipped in caustic soda solution or alkaline sodium hydroxide solution. Due to absorption of caustic soda solution by the yarn, chemical reaction occurs and as results the length of yarn reduces which are turn develops the stress in shaft. The stress developed in the shaft due to following reasons a) Length reduction of the yarn b) The weight of the yarn gradually increased c) Twisting movement of the shaft due to rotation.

During the course of time the bending of the shaft occurs and misalignment of shaft result which in turn has a great adverse effect on the production line, also the misalignment damages the machine and the yarn. Hence it is decided to determine how shaft stiffness affects in mercerization process and find out solution to avoid bending of shaft.

II. METHODS AND MATERIAL

EXPERIMENT AND RESULTS

SAISI 4140 ALLOY STEEL

TABLE NO 01: CHEMICAL COMPOSITION

Element	Content (%)
Iron, Fe	96.785 - 97.77
Chromium, Cr	0.80 - 1.10
Manganese, Mn	0.75 - 1.0
Carbon, C	0.380 - 0.430
Silicon, Si	0.15 - 0.30
Molybdenum, Mo	0.15 - 0.25
Sulfur, S	0.040
Phosphorous, P	0.035

Problem identification in original shaft

Outer diameter of the shaft = OD = 250 mm

Inner diameter of the shaft = ID = 230mm

Length of the shaft = L = 1200 mm

Volume of the shaft = $V_s = \pi/4(OD^2-ID^2) \times L$

= 9046.080 cm³

Mass of the shaft = $M_s = V_s \times \rho$

= 71.011 kg

Weight of the shaft = $W_s = M_s \times g$

= 695.90 N

Weight per unit length = $w_s = W_s/L$

= 0.580 N/mm

$I = \pi/64(OD^4-ID^4)$

= 54.38×10^6 mm⁴

The deflection of shaft

$$y_{max} = \frac{W * L/2(L - L/2)}{24EIL} [L^2 + \frac{L}{2} * (L - L/2)] * 1.4 * 1.8$$

$$y = \frac{1400 * 10^3 * 600 * 600}{24 * 200 * 10^3 * 54.38 * 10^6 + 1200} [1200^2 + 1200/2(1200 - 1200/2)] * 1.4 * 1.8$$

Bending of shaft= $y = 7.29$ mm

Determination of bending stiffness

The bending stiffness is equal to the product of elastic modulus and the area moment of inertia

There for bending stiffness =

$EI = 200 \times 10^3 * 54.38 * 10^6$ $EI = 1.08 * 10^{13}$ N.mm²

Solution

By decreasing internal diameter of shaft from 230mm to 180mm, Stiffness of shaft increases and bending decreases.

By taking internal diameter ID = 220 mm

$$y_{max} = \frac{W * L/2(L - L/2)}{24EIL} [L^2 + \frac{L}{2} * (L - L/2)] * 1.4 * 1.8$$

$y = 5.13$ mm

Stiffness $EI = 1.53 * 10^{13}$ N.mm²

By taking internal diameter ID = 210 mm

$y = 4.08$ mm

Stiffness $EI = 1.92 * 10^{13}$ N.mm²

By taking internal diameter ID = 200 mm

$y = 3.52$ mm

Stiffness $EI = 2.264 * 10^{13}$ N.mm²

By taking internal diameter ID = 190 mm

$y = 3.08$ mm

Stiffness $EI = 2.55 * 10^{13}$ N.mm²

By taking internal diameter ID = 180 mm

$y = 2.80$ mm

Stiffness $EI = 2.80 * 10^{13}$ N.mm²

$EI = 2.80 * 10^{13}$ N.mm²

III. RESULTS AND DISCUSSION

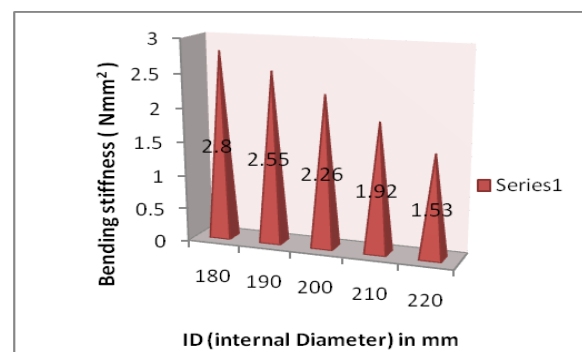


Figure 1: Effect of internal diameter on bending stiffness

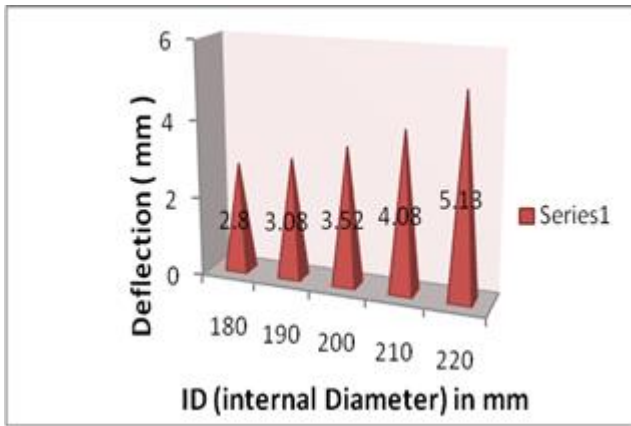
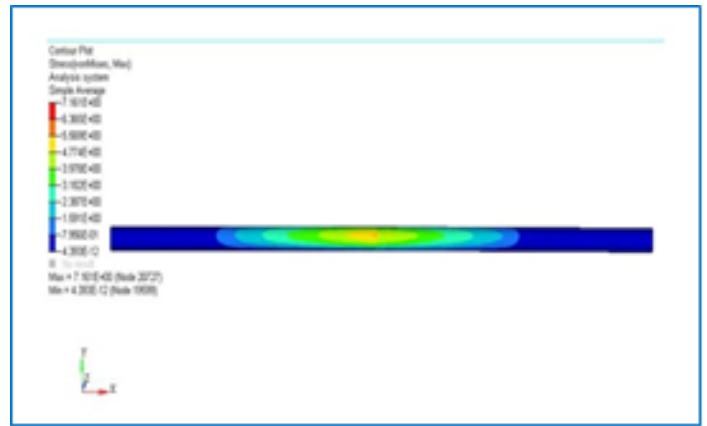


Figure 2 : Effect of internal diameter on deflection



Stress Plot at ID 210

Figures and Tables

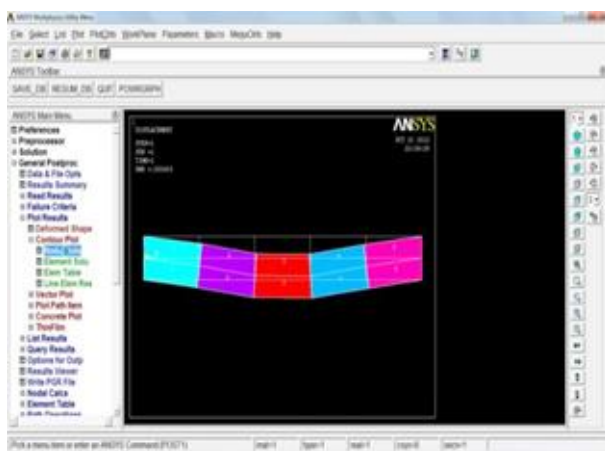
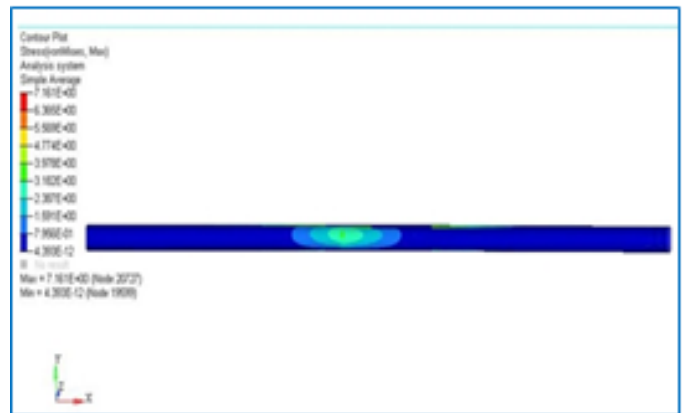
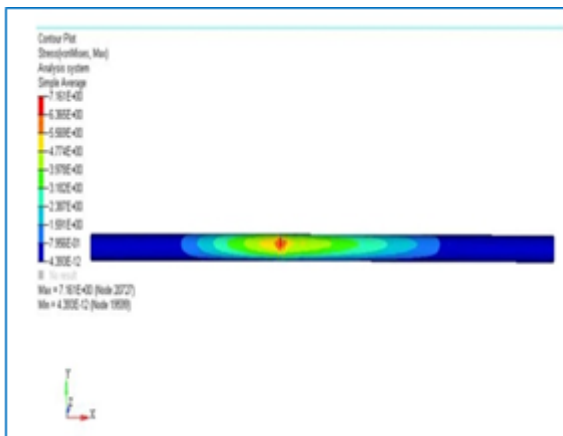


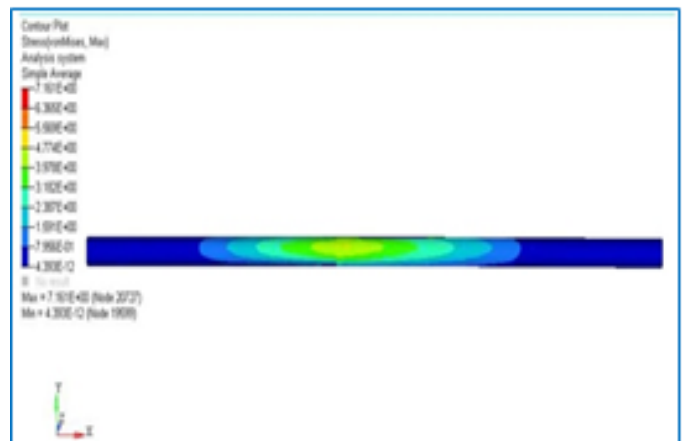
Figure 3 : Simulation results :Shaft bending with ID 230mm



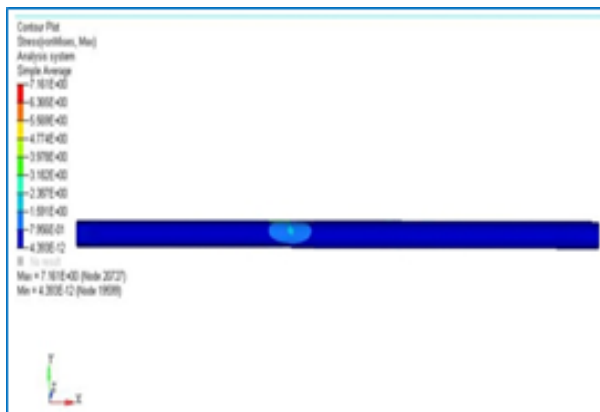
Stress plot at ID 190mm



Stress Plot at ID 220



Stress Plot at ID 200



Stress plot at ID 180mm

Figure 4: effect on bending with change in internal diameter of Shaft in mm

IV. DISCUSSION AND CONCLUSION

As shaft have several types of failure from which bending Failure is huge impact on mercerization process. We are concentrating on bending failure for design of Mercerization machine shaft.

Design and analysis of optimized shaft in machine of mercerization is to minimize the shrinkages in the yarn, increase machining accuracy. The time and capital cost in maintenance can be reduced. The life of machine can be increase, so repair and maintenance charges are minimize. The machine will run smoothly and efficiently so bending of mercerization machine shaft can be avoided.

AISI 4140 steel material is used for the manufacturing of shaft, which has Young's modulus 200 GPa. We require steel having 280 GPa for the material of the steel for achieving the desired result. For the above said purpose the AISI 4140 shaft can be alloyed with Beryllium and mollybdenum, by this we can achieve a Young's modulus of 280-300 GPa. Which can decrease the deflection upto 3 mm. Also we have been change internal diameter of shaft and study the effect of internal diameter on bending stiffness with internal diameter (in mm) 180, 190, 200, 210, 220 and results obtained bending stiffness (Nmm²) 2.80*10¹³, 2.55*10¹³, 2.26*10¹³, 1.92*10¹³, 1.53*10¹³ respectively also we have calculate deflection (mm) at above diameter and results obtained 2.8 mm, 3.08 mm, 3.52 mm, 4.08 mm, 5.13 mm respectively results are shown in fig 1 and 2.

In mercerization process the hanks are held on shaft. At a time numbers of hanks are loaded on shaft and rotated automatically for required time, due to caustic soda treatment, the yarn shrinkages and length is reduced. Due to continuous rotation of shaft the load is developed on shaft and shaft get bend. On the base of above study we can concluded that internal diameter 180 mm is optimized (results are shown in fig 04) for manufacturing of shaft for mercerization machine to avoid the bending of shaft during mercerization process.

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An Authentication by Finger Vein Recognition System

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ABSTRACT

In this project, a real time finger vein system for a security in ATM machine is proposed. In ATM user or bank sector, there is no enough security for users, so provide more security to user finger vein method is used. The finger-vein is a biometric authentication for personal identification in terms of its own security. Everyone has unique finger vein, and it cannot be stolen by anyone because finger vein is inside the body it varies for everyone. Initially, the finger of the users is stored in the database. User finer vein is compared with a database; if it matches the database allow the user to the further process. And generate the OTP password for mobile devices. If it does not match with the database, it display not authentication person and alert by using buzzers.

Keywords : ATM Machine, Finger Vein, OTP Password.

I. INTRODUCTION

The theft occurs in the ATM or other bank sector can be protected by means of authentication. The various techniques such as one time password, fingerprint, mobile phone intimation's used for providing authentication in the entire system. But, it cannot be sufficient to secure the system, so we move on to biometric authentication i.e. finger vein. A unique characteristic of a human being is used to automatically identify an individual or verify an identity. The finger vein of the each user can collect and maintain database for entire the user. This is because other than an authorised user can't be used. The user finger vein is first verified by comparing the input finger vein with finger vein in the database, if it matches it allow the user to proceed otherwise it get comes out.

In finger vein method for segmentation using repeated line tracking and automatic triumph generation. In repeated line tracking it focus only direction, when a low quality image is segmented, the image should not be clear [1]. In existing method, fingerprint method is used it is not more security. Additionally, for ATM centres they also provide automatic temperature control technique for detecting the fire, if the fire will happen in the centres it automatically ON the sprinkles. Using Tilt sensor and DC motor the shutter will automatically ON

[2]. In this fingerprint is used, it is not secured, the fingerprint is stolen easily [3]. ARM CORTEX-M3 is used for fingerprint recognition it has two modes. One is administration mode and it is used to register the new user and gives the mode of authorization and second is user mode for the users [4]. ARM9 processor is used to detect the finger print and it is advanced, and it used lockers, bank locker, ATM centres. It consumes low power [5]. AT89C51 is used to detect the finer vein and its lowest when compared to arm and the memory is very less. It takes only 0.5 seconds to recognise the input [6]. From this paper finer vein is identified for even identical twins, both false acceptance ratio (FAR) and false rejection ratios (FRR) are calculated [7].

In ATM centres, there is no security for users and the user has faced so many problems. To avoid these problems, use finger vein module. A system for identification using a person's unique vein pattern. Vein as a biometric tool that transfer the deoxygenated blood to all parts of the body. Finger vein is exclusive in the body and it is not pinched by anyone. Because everyone has unique finer vein, an attacker may misuse the finer vein, it will alert by buzzer using voice chip. First, the finger vein is stored in a database and then the user may use the ATM centre, the finger vein is compared with database finger vein image. If the image matches it goes for further process and results as authorized one. Then the money transaction takes place. Using this method it will avoid the theft and the user has full security to use the ATM centres.

II. METHODS AND MATERIAL

A. Image Acquisition

In image acquisition the finger vein is taken as an input. But the input image consist of blur and noise, so image clarity can be improved by removing the blur and noise through pre-processing technique.

B. Pre-Processing

Pre-processing is an improved the image data that suppress unwanted distortions or enhanced some image features important for further processing. The pre-processing method consists of image enhancement, image segmentation and feature extraction.

Image Enhancement

Image Enhancement involves the adjustment of digital data for improving the image qualities with the aid of computers. The processing helps in enhancing the clarity, sharpness and details towards extracting information and further analysis. Enhancement distorts the digital value; therefore enhancement is doesn't initiate until the restoration process are completed.

Image Enhancement alters the visual impact that the image has on the interpreter in a fashion that improves the information content

1. Contrast enhancement
2. Intensity, hue, and saturation transformation
3. Density slicing
4. Edge enhancement
5. Making digital varieties
6. Producing synthetic CD images

Image Segmentation

Image segmentation is the division of an image into sub images or categories, which correspond to different objects or parts of objects. Every pixel in an image is due to one of a number of these images.

Segmentation contains:

- Pixels in the same category have similar grey scale of multivariate values and form a connected region,
- Neighbouring pixels which are in different categories have different values.

Feature Extraction

In feature extraction the required information can be extracted from the processed image for their requirement in the application

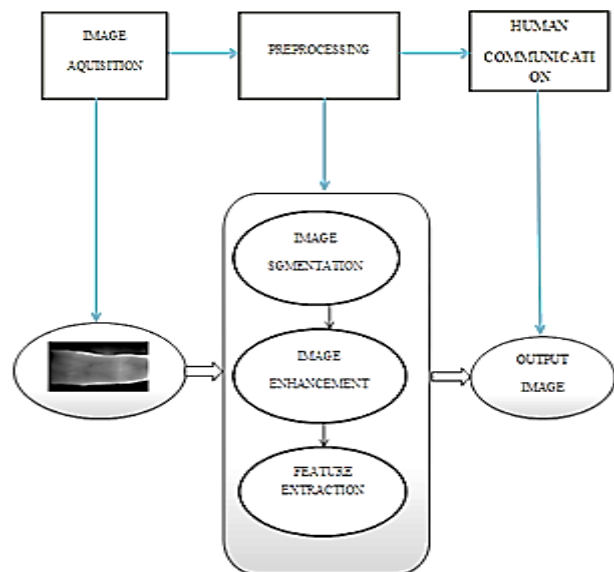


Figure 1: Block Diagram

C. Human Communication Module

The extracted image has been taken from the human communication module.

III. RESULTS AND DISCUSSION

MATLAB platform is used to simulate the finger vein module and the result is compared with database image, if it matches the person is authorized person and if it does not match the person is unauthorized.

A. Image

The authorized person finger vein is stored in database. In user image is consider as person who wants to take the money in the ATM centre. If the two images matches next process will obtained. Otherwise it results as unauthorized person.

B. Haar Transform:

The main purpose of using Haar transform is to perform the transform and its inverse operation simultaneously in the system.

C. Segmentation

Segmentation is used to divide the image into sub image from this the desired image can be obtained.

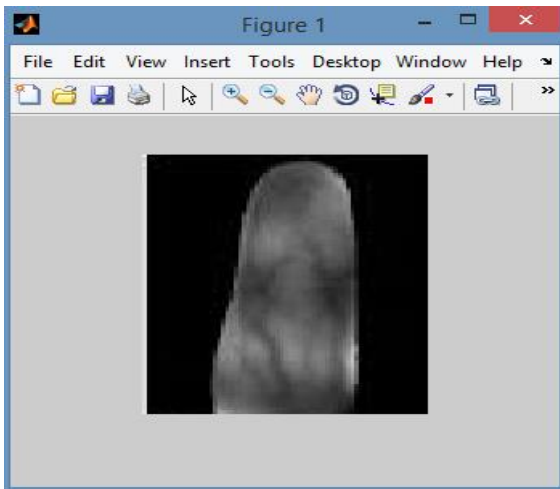


Figure 2: Database Image

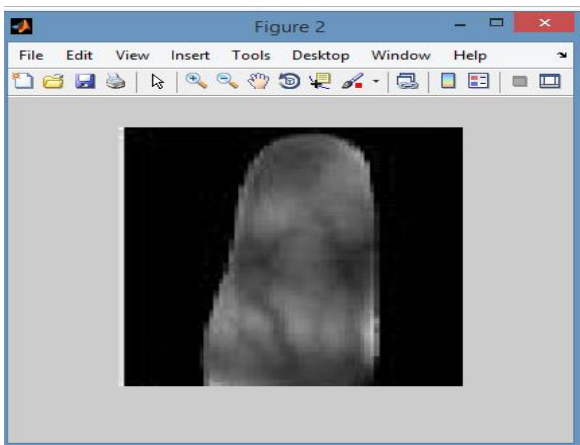


Figure 3: Input Image

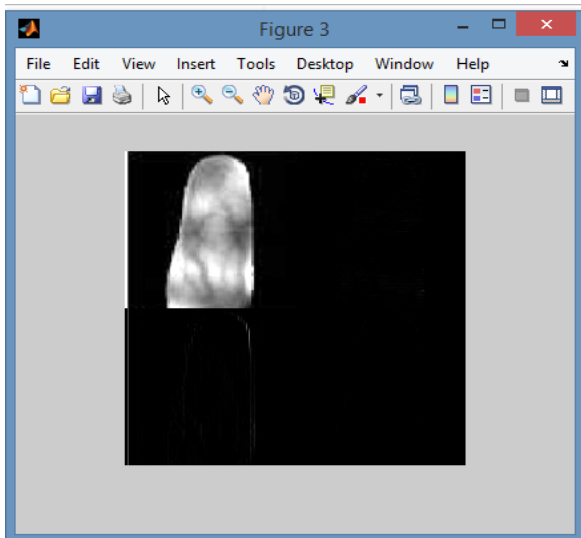


Figure 4: Segmentation Process

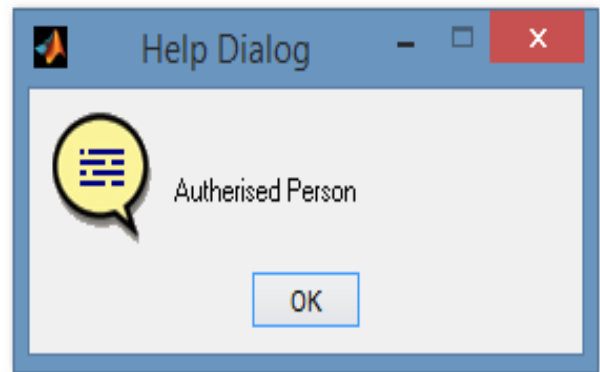


Figure 5: Authentication Process

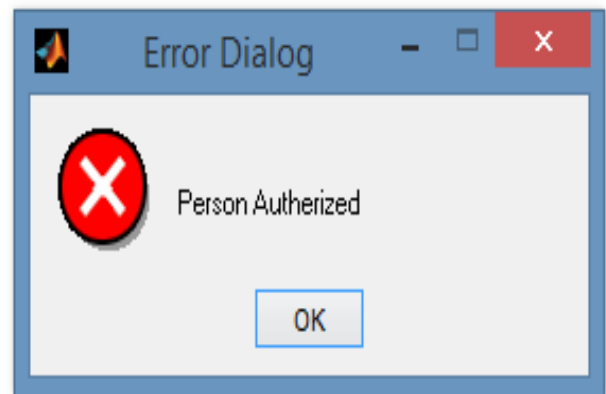


Figure 6: Transaction Allow

IV. CONCLUSION

The drawback of the existing system is overcome by using finger vein based user identification system. This paper provides excellent immunity against unreliable practices and it also very favourable to the users. The results the high performance for high accuracy and despise for wrong matches. The proposed system will efficiently in MATLAB software. The proposed system can be effectively used for authentication in banking, consumer electronics, and airport, space and defence applications

V. FUTURE SCOPE

This project is implemented in hardware using LPC2148 and also gives information to mobile phones using GSM.

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A Detection of Drowsiness using EEGBased Power Spectrum Analysis

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ABSTRACT

Drowsiness and lack of attention leads to accidents. These accidents can be avoided by monitoring the driver attention level and blinking status. So, in our proposed project work we are analysing the mental activities of the brain using EEG signals from the Brain- Computer Interface (BCI) technology. This methodology consists of BCI which is the interface between the human brain and the level analyser unit. EEG electrode converts the muscular action into electrical signals and which is sensed by a brainwave sensor and wireless device i.e., BLUETOOTH which transmits the raw data to the MATLAB for level analyser unit (LAU) which analyse the entire status of the driver.

Keywords: Brainwave Sensor, Level Analyser Unit, MATLAB, Communication module-Bluetooth, BCI.

I. INTRODUCTION

The accident occurs during the night time is mainly due the lack of attention i.e. drowsiness which reduce the vehicles control from the driver. Many techniques have been introduced to detect the driver drowsiness such as physiological measure, blinking detection from face, image capture from camera, etc., But these analyses has some disadvantage. For that sensor. The sensor generates the signal which is based on our muscle contraction. The muscle contraction has separate electrical signal. These signals are sensed by a brainwave sensor with the help of EEG(electroencephalogram) electrode. The level analyser unit received the data through bluetooth it processed the data through MATLAB.

The study of tracking the driver attention through focus of attention (FOA) during the dual-task condition based on neurophysiological data. They analysis the lane-keeping driving task and a mathematical problem solving task[1]. Nonintrusive drowsiness identification method using eye tracking and image processing through computer vision technology by changes occurs in eyelid closure, maximum closure duration, opening and opening velocity. It provides 86% of accuracy in drowsiness detection [2]. The analysis of eye state and head pose for alert the vechicle's driver, they consume

97.2% from adaboost and adaptive thresholding algorithm, and 96% from CDF(cumulative distributed function) [3]. The laboratory oriented biosensor technology is used predict the attention level of drivers in real time system, they used dry mobile wearable EEG system to monitor the brain activity of driver to alert the driver [4]. The drowsiness detection system of the brain and also the visual activity, blink detection are extracted from EOG(electroculographic) channel and brain activity is obtained from EEG(electroencephalographic) channel and it reaches 80.6% accuracy [5]. The automatic detection of low-vigilance states during a real flight based on automatic detection algorithm which compare epoch-by-epoch by pertinence and prognostic, and change in alpha, beta and theta, it can detect microsleep and involuntary sleep and alert the pilot [6]. The brain signal is used to help the disabled person based on the thought of the person who fixed electrodes and it has alert unit to indicate the obstacle detection [7]. Fundamentals of EEG consist of electrodes record electrical activity from the scalp surface after being collected by metal electrodes and conductive media [8]. The study of another type of brainwave sensor is neurosky brainwave sensor for mass market application which has TGAM module (think gear ASIC module) and its output as EEG frequency spectrums, EEG signal quality, raw EEG, and three sensor meter: attention, meditation, eyeblink [9].

The main aim of this project is to reduce the accident due to lack of driver attention. The attention level of the driver can be analysed by brain signal obtained from human brain through brainwave sensor and analysed by level analyser unit.

II. METHODS AND MATERIAL

Design and Implementation

It consist of two main blocks i) transmitter block and ii) receiver block

Transmitter Block

In transmitter block the human brain is taken as an input source. The brain has multiple number of neurons, these neuron action can be expressed in terms of thought and action. Each expression and thought have different electrical signal in the human body. The brain generates biosignal. Biosignals is any signal from a human being that can be estimated and observed. These signals can be obtained with the help of Electroencephalogram. EEG measures the current flows within the neurons of the brain and records the electrical activity along the scalp.

These communications can be done by BCI(brain computer interface)

BCI MODULE:

The major communication module in this project is BCI (Brain computer interface).BCI is the direct communication between the brain and external using thought of the brain (EEG) without using any muscle control. It generally consists of three main element: i) A signal acquisition module (electrode) ii) A signal processing module iii) A control module (microcontroller & driver). It has two types of electrode i.e, invasive (directly connected to brain tissue) and non-invasive (placed on the scalp of the patient). In our work we used non-invasive electrode.

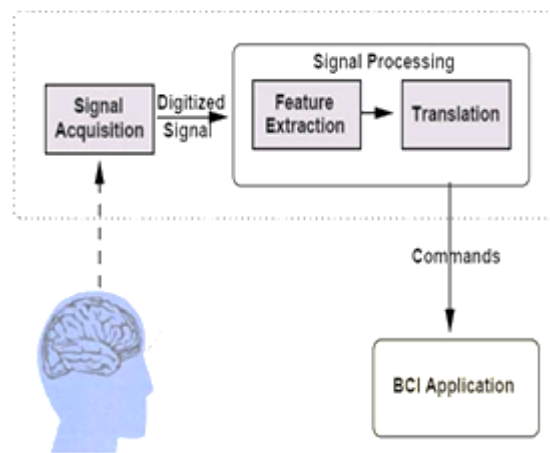


Figure 1: BCI Module

The brainwave has been categorized into four basic groups: Alpha (8-13Hz), Beta (>13 Hz), Theta (4-7Hz), Delta(0.5-4Hz), gamma (>30Hz)waves. Alpha waves are produced when the individual is in a relaxed state and decreasing in amplitude but increasing in frequency. Beta waves are generated when the driver is attentive or alert state, this also has low amplitude. Theta waves are generated when the driver is in sensitive troubles. Delta waves are generated when the individuals are in deep sleep with lesser frequency. Gamma waves are generated at the predominate during the period of times we are thinking.

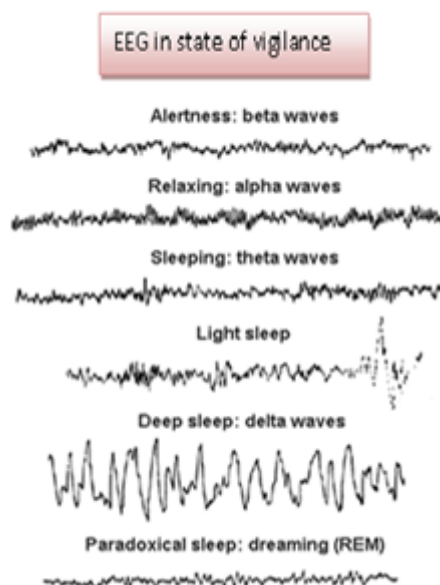


Figure 2: EEG State of Vigilance

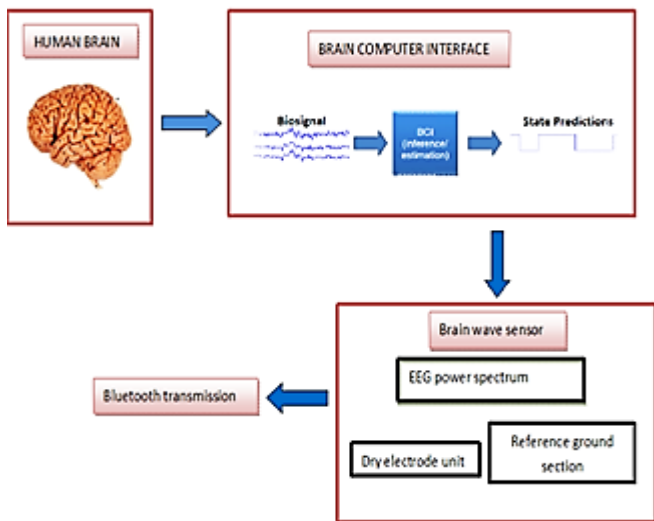


Figure 3 : Transmitter Block

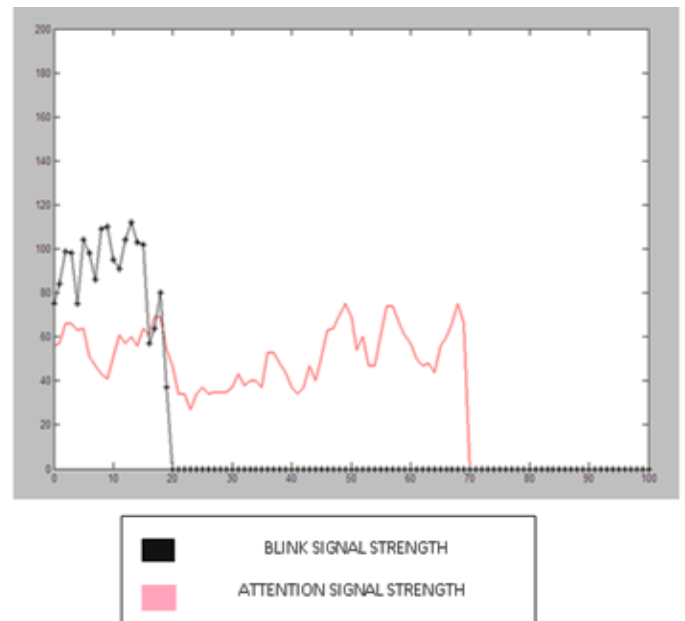


Figure 5: MATLAB Output

RECEIVER BLOCK

The receiver block consists of Bluetooth reception and level analyser unit (LAU). The raw data should be processed and analysed by using MATLAB platform.

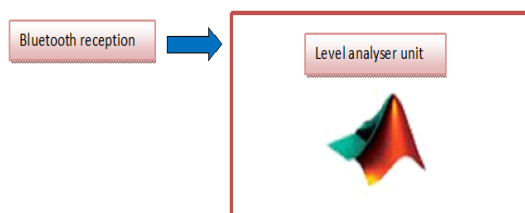


Figure 4 : Receiver Block

III. RESULTS AND DISCUSSION

MATLAB platform is to simulate the brainwave output and generate the output waveform. The coding is written in the program window and run the program, then the output waveform consists of two waves, i.e., one for attention level and another wave for blinking state. The attention level and blinking signal are plotted in the x-axis and time in y-axis. Based on signal strength the status of a driver can be determined. These can help us to avoid the accident through alerting the driver.

IV. CONCLUSION AND FUTURE SCOPE

From this project the attention level and blinking status can be detected, it can detect the driver status based on brain signal and it is mainly useful to avoid accidents or to reduce the accident due to lack of attentiveness. In future these explorations can be used to alert the driver when the driver gets distracted and drowsy during its driving and also to control the speed of the car when they are in an intense level of wakefulness.

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An Experimental Investigation on Strength Properties of Cement Concrete Modified with Ground Granulated Blast Furnace Slag

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ABSTRACT

In the present scenario there is necessity for finding alternate artificial fine aggregates making use of waste materials from the industries. An attempt has been made to use Ground Granulated Blast Furnace Slag (GGBFS) as the basic ingredient in preparing GGBFS modified concrete and in this process along with the mechanical properties Mode-II fracture properties are studied. By varying the percentages of GGBFS as fine aggregate in concrete replacing the conventional fine aggregate in percentages of 0, 20, 40, 60, 80 and 100 by weight, the properties such as compressive strength, split tensile strength, flexural strength, In-plane shear strength etc., are studied and analysis of hardened samples has been done through X-Ray Diffraction technique. This study is expected to through some light on better understanding of the “Strength properties of GGBFS modified concrete.”

Keywords: Compressive Strength, Split Tensile Strength, Flexural Strength, In-Plane Shear Strength , X-Ray Diffraction Test

I. INTRODUCTION

This research work determines the effect of partial substitution of fine aggregates by GGBFS on the mechanical properties of concrete. The inclusion of Slag in concrete not only helps in reducing greenhouse gases but also helps in making use of environmentally friendly material such as GGBFS which is very effective in reducing the expansion. Aggregates have significant influence on mechanical properties of mortars and concrete. Their specific gravity, particle size distribution, shape and surface texture influence markedly the properties of mortars and concrete in the fresh state.

II. METHODS AND MATERIAL

A. Review Of Literature

Experimental Studies were conducted on Concrete Replacing Fine Aggregate with Blast Furnace Slags (BFS) by J. Selwyn Babu and Dr. N. Mahendran (13). In this study the mix was designed as per IS 10262-1982 to

have a characteristic compressive strength of 20 N/mm². Based on the mix design the cement content was identified as 383 kg/m³. The water cement ratio was taken as 0.5. No superplasticiser was used in this study. The results obtained encourage the use of blast furnace slag in concrete as a partial replacement to fine aggregate up to 25%. The maximum compressive strength of 40.69 N/mm² was obtained by replacing 25% of fine aggregate with BFS. Workability was found to be a problem with the fresh concrete, and hence usage of superplasticiser was recommended. The usage of BFS is found to reduce the cost of concrete by 8 to 10%.

Bhaskar Desai, et.al. (39,40) studied the properties like compressive strength, mode-II fracture by using DCN specimen and the fracture toughness values in Mode-II (KIIC) were calculated from the theoretical equations suggested by the earlier researchers and are compared with those obtained from load verses deflection (p- δ) diagrams.

Patnaikuni Chandan Kumar, et.al. (44) studied the X-ray diffraction studies on rice husk ash (RHA) concrete

samples heated at 300°C and 1000°C. These results were compared and observed that at 300°C the inner surface of the specimen shows an extra compound, Copper Iron Lead Telluride $Cu_3FePbTe_4$ along with SiO_2 , $Al_5Fe_2ZnO_4$ which was present on the surface also and it has been presumed that it might be responsible for imparting additional strength upto 7.5% in RHA concrete.

B. Experimental Program

i. Materials Used

The key materials used in this study are cement, sand, crushed stone, GGBFS. The cement used is an ordinary Portland cement of grade 53 with a specific gravity of 3.05. The fine aggregate conforms to grading zone II as per IS 383-1970 is used in the present research. The specific gravity of the fine aggregate is 2.6. The coarse aggregate used is crushed stone with a maximum size of 20mm. GGBFS is collected from Karnataka state kalyan steel factory in koppal, Karnataka near Hospet. The specific gravity of GGBFS is 2.15.

ii. Physical Properties

Various tests have been conducted on fine aggregate in the laboratory as per the procedure given in IS 383 (1970) and presented in table 1.

TABLE 1: The properties of fine aggregate are as follows

Fine Aggregates	Natural Sand (NS)	GGBFS
Specific Gravity	2.6	2.15
Bulk density kg/m ³	1525	1375.6
Water absorption,%	0.6	2.6
Fineness Modulus	4	5.53
% bulking of fine aggregate	17	21

The coarse aggregate used is crushed (angular) aggregate conforming to IS 383: 1970. The maximum size of aggregate considered is 20mm. The test results are tabulated below.

TABLE 2: The properties of Coarse aggregate

Coarse Aggregates	
Specific Gravity	2.72
Water absorption,%	0.3
Fineness Modulus	2.78
Aggregate crushing test,%	12.2
Aggregate impact test ,%	17.801

Cement: Ordinary Portland cement of 53 grades conforming to IS: 12269-1987 has been used. Specific gravity is found to be 3.05.

iii. Mix Proportion

The mix proportions are done for M₂₀ grade of concrete giving w/c ratio of 0.55 by using IS-10262-2009 method of mix design. Total six mixes are made by replacing fine aggregate with GGBFS keeping w/c ratio as constant (control mix) by 0, 20, 40, 60, 80 and 100 % replacements given in table 3.

TABLE 3: Replacement proportions of fine aggregates

Mix No.	GGBFS-%	Natural sand-%
1	0	100
2	20	80
3	40	60
4	60	40
5	80	20
6	100	0

TABLE 4: Mix proportions of control mixes

% GGBFS	Water Lit/m ³	Cement Kg/m ³	F.A Kg/m ³	C.A Kg/m ³
0	197.16	1	1.94	3.16

iv. Casting and Testing of Specimens

Casting and testing of specimens is carried out as per IS relevant codes for compressive strength for cube of size (150mmx150mm)& cylinder of size (150mmx300mm), flexural strength for prism of size(500mm x 100mm x 100mm), modulus of elasticity cylinder of size (150mm x 300mm), split tensile strength for cylinder of size(150mmx300mm) & in-plane shear strength for cube of size (150mmx150mm). Each time 24 specimens are cast out of which 12 specimens with $\frac{a}{w}$

ratios 0.3, 0.4, 0.5, and 0.6, 3 no of plain cubes, 6 cylinders and 3 plain beams. Plate 4.5 shows the arrangement of different notches to suit $\frac{a}{w}$ ratios 0.3, 0.4, 0.5, and 0.6. Totally 144 specimens are cast. For all test specimens, moulds are kept on the vibrating table and the concrete is poured into the moulds in three layers each layer being compacted thoroughly with tamping rod to avoid honey combing. Finally all specimens are vibrated on the table vibrator after filling up the moulds up to the brim. The vibration is effected for 7 seconds and it is maintained constant for all specimens and all other castings. The steel plates forming notches are removed after 3 hours of casting carefully and neatly finished. However the specimens are demoulded after 24 hours of casting and are kept immersed in a clean water tank for curing. Plate 6 shows the specimens in curing pond. After 28 days of curing the specimens are taken out of water and are allowed to dry under shade for few hours.

III. RESULTS AND DISCUSSION

1. Compressive strength of Cube and Cylinder

The results of compressive test of cubes and cylinders are tabulated in table 5 and figure 1&2 shows the variation of compressive strength versus percentage of slag replacing the natural fine aggregate for various mixes considered. Each result presented is the average of three specimen results. From the figure 1 it can be observed that due to the increase in percentage of slag replacement the cube compressive strength gets increased upto 20% replacement i.e 37.71 N/mm² with a 6.4% increase wrt that of control mix without slag i.e 35.4 N/mm² and later for the replacement of GGBFS beyond 20%, the compressive strength results decrease continuously. But even at the 60% replacement of natural fine aggregate, it is observed that the strength is marginally decreased. From the figure 2 it can be observed that due to the increase in percentage of slag replacement the cylinder compressive strength gets increased upto 20% replacement i.e 21.7 N/mm² with 2.3% increase over that of control mix i.e 21.22 N/mm² and later for the continuous replacement of GGBFS beyond 20%, the compressive strength results decrease continuously. But even with 60% replacement of natural

fine aggregate it is observed that the strength is marginally decreased.

2. Split tensile strength:

The split tensile strength is well known indirect test used for determining the tensile strength of concrete. For each mix three cylinders of size 150mm diameter and 300mm in length are cast and tested. Each split tensile strength results is the average of 3 test results. The results are presented in table 6. The variation of split tensile strength versus percentage of replacing fine aggregate with GGBFS is presented in figure 3. From the figure it can be observed that due to the increase in percentage of slag replacement the split tensile strength gets increased upto 20% replacement i.e 3 N/mm² with 6% increase over that of control mix i.e 2.83 N/mm² and later for the continuous replacement of GGBFS beyond 20%, the split tensile strength results decrease continuously. Even with 60% replacement of natural fine aggregate it is observed that the strength is marginally decreased.

3. Flexural Strength

Flexural strength is defined as a material ability to resist deformation under flexural load. Three beams of size 100mm×100mm×500mm are cast for various percentages of GGBFS and testing is done under two point loading in flexural testing machine. The modulus of rupture is calculated. The results are tabulated in table 7. The variation of flexural strength versus percentage of replacement of fine aggregate with GGBFS is presented in figure 4. From the figure it can be observed that due to the increase in percentage of slag replacement, the flexural tensile strength gets increased upto 20% replacement i.e 4.02 N/mm² with 3.8% increase over that of control mix i.e 3.87 N/mm² and later for the continuous replacement of GGBFS beyond 20%, the flexural strength results decrease continuously. But even at 60% replacement of natural fine aggregate it is observed that the strength is marginally decreased.

4. In-plane Shear Strength:

To proceed with this type of experimental program DCN specimens are cast with various percentage replacements of sand by GGBFS. Each time 12 no of DCN specimens are cast. The notch depths provided are 45, 60, 75 and 90mm running throughout

the width of the specimen. Thus the values of a/w ratio are 0.3, 0.4, 0.5, and 0.6 where 'a' is the notch depth and 'w' is the specimen. The load is applied within the notches. The punching test on the DCN cubes is conducted on 3000KN digital compression testing machine, the size of specimen being 150mmx150mmx150mm. The rate of loading applied is 0.5 KN/sec. The IN-PLANE SHEAR STRESS at Ultimate load is presented in table 8. Super-imposed variations of ultimate shear load and ultimate in-plane shear stress with a/w ratios (i.e., 0.3, 0.4, 0.5, 0.6) versus percentage of GGBFS replacing fine aggregate is presented in figure 5&6. From the figure it can be observed that due to the increase in percentage of slag replacement the ultimate shear load and ultimate in-plane shear stress gets increased upto 20% replacement and later for the continuous replacement of GGBFS beyond 20%, the strength results decrease continuously.

But even at 60% replacement of natural fine aggregate it is observed that the strength is marginally decreased.

5. X-Ray diffraction test and analyzed X' Pert High Score software

The sample preparation consists of grinding the dried concrete samples and testing them in XRD machine in mass percentages of 0%, 20%, 40%. From the data generated by X-Ray diffractometer the chemical analysis is determined by using X' Pert High Score software sample results are tabulated in table no 9. The mineral properties of 20% replacement of fine aggregate shown in fig 7. In this experimental test the Polynomial type of "Cubic" is observed. The XRD pattern of GGBFS mainly representing the crystalline Quartz, due to the presence of Quartz the diffraction lines appears more intensely because of sand particles are shown in graph.

ss

TABLE 5: Cube and cylinder compressive strength results

S.No	Designation of the mix	Percentage volume of replacement of fine aggregate		Cube compressive strength (N/mm ²)	Percentage of increase or decrease in cube compressive strength	Cylinder compressive strength (N/mm ²)	Percentage of increase or decrease in cylinder compressive
		Conventional fine Aggregate	GGBFS				
1	G-0	100	0	35.45	0.00	21.22	0.00
2	G-20	80	20	37.71	6.4	21.70	2.3
3	G-40	60	40	34.19	-3.5	20.14	-5.0
4	G-60	40	60	29.15	-18.0	19.44	-8.3
5	G-80	20	80	25.86	-27.0	18.44	-13.0
6	G-100	0	100	23.42	-34.0	17.56	-17.2

TABLE 6: Split tensile strength results

S.No	Name of the mix	Percentage volume of replacement of fine aggregate		Split tensile strength (N/mm ²)	Percentage increase or decrease in Split tensile strength w.r.t G-0
		Conventional fine Aggregate	GGBFS		
1	G-0	100	0	2.83	0.00
2	G-20	80	20	3.00	6.0
3	G-40	60	40	2.66	-6.0

4	G-60	40	60	2.44	-14.0
5	G-80	20	80	2.15	-24.0
6	G-100	0	100	1.92	-32.0

TABLE 7: Flexural strength results

S.No	Name of the mix	Percentage volume of replacement of fine aggregate		Flexural strength (N/mm ²)	Percentage increase or decrease in Flexural strength of concrete w.r.t G-0
		Conventional fine Aggregate	GGBFS		
1	G-0	100	0	3.87	0.00
2	G-20	80	20	4.02	3.8
3	G-40	60	40	3.61	-7.0
4	G-60	40	60	3.30	-15.0
5	G-80	20	80	3.09	-20.0
6	G-100	0	100	2.58	-33.0

TABLE 8: IN-PLANE SHEAR STRESS at Ultimate Load for DCN specimens with a/w ratios = 0.30, 0.40, 0.50, 0.60:

S. No	Name of the mix	Percentage volume of replacement of fine aggregate		a/w=0.3		a/w=0.4		a/w=0.5		a/w=0.6	
		Conventional fine Aggregate	GGBFS	Ultimate load (KN)	In-plane shear stress in N/mm ²	Ultimate load (KN)	In-plane shear stress in N/m ²	Ultimate load (KN)	In-plane shear stress in N/m ²	Ultimate load (KN)	In-plane shear stress in N/m ²
1	G-0	100	0	154.0	4.96	128.3	4.75	105.0	4.66	80.0	4.44
2	G-20	80	20	158.0	5.01	130.0	4.81	106.0	4.71	83.66	4.64
3	G-40	60	40	148.0	4.69	124.0	4.59	100.6	4.47	71.0	3.94
4	G-60	40	60	112.5	3.57	95.0	3.51	93.0	4.13	68.0	3.77
5	G-80	20	80	111.0	3.52	91.0	3.37	75.0	3.33	59.0	3.27
6	G-100	0	100	106.0	3.36	89.0	3.29	73.0	3.24	57.82	3.21

TABLE 9: Using X' Pert High Score software from mineral group matched data Pattern list identified for 20% replacement of GGBFS concrete results at 28 days curing period (G-20)

Pos. [°2Th.]	Height [cts]	FWHM [°2Th.]	d-spacing [Å]	Rel. Int. [%]	Compound Name
20.7573	43.30	0.3542	4.27935	36.31	Quartz, Berlinite, Cebaite, Frondelite

21.9187	13.89	0.3542	4.05516	11.65	Albite high, Cebaite, Albite, calcian low
26.6276	119.24	0.4723	3.34777	100.00	Quartz, Berlinite, Cebaite, Frondelite, Albite calcian low
27.7055	24.87	0.4723	3.21992	20.85	Albite high, Cebaite, Frondelite, Albite calcian low
29.2726	23.26	0.3542	3.05101	19.51	Cebaite, Frondelite, Nitratine, Albite calcian low
32.4352	5.88	0.7085	2.76038	4.93	Berlinite Albite high Cebaite Frondelite
36.4986	13.55	0.3542	2.46186	11.36	Quartz, Berlinite, Albite high, Cebaite, Frondelite, Albite calcian low
39.3743	34.39	0.3542	2.28843	28.84	Quartz, Berlinite, Albite high, Cebaite, Frondelite, Nitratine, Albite calcian low
40.1460	7.83	0.3542	2.24621	6.57	Quartz, Berlinite, Cebaite, Frondelite, Albite calcian low
42.3831	19.82	0.3542	2.13268	16.62	Quartz, Berlinite, Albite high, Cebaite, Frondelite, Nitratine, Albite calcian low
45.7512	7.48	0.3542	1.98321	6.28	Quartz, Berlinite, Cebaite, Frondelite, Albite calcian low
47.1046	9.67	0.3542	1.92934	8.11	Berlinite, Albite high, Cebaite Frondelite, Nitratine, Albite calcian low
50.0255	19.80	0.3542	1.82332	16.60	Quartz, Berlinite, Albite high, Cebaite, Frondelite, Albite calcian low
59.9163	28.18	0.3542	1.54383	23.63	Quartz, Berlinite, Albite high, Cebaite, Frondelite, Nitratine, Albite calcian low
63.9881	4.52	0.3542	1.45506	3.79	Quartz, Berlinite, Albite high, Cebaite, Nitratine, Albite calcian low
68.1587	19.84	0.3542	1.37584	16.63	Quartz, Berlinite, Albite high, Nitratine

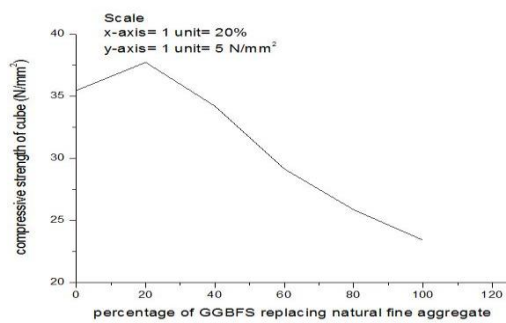


Figure 1: Variation between cube compressive Strength and percentage of GGBFS replacing natural fine aggregate

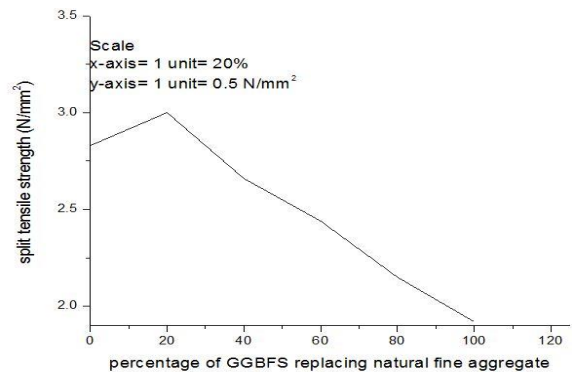


Figure 3: Variation between split tensile strength and percentage of GGBFS replacing natural fine aggregate

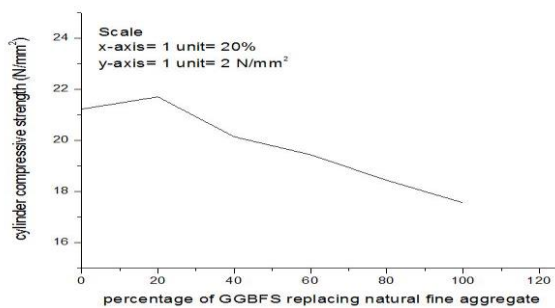


Figure 2: Variation between cylinder compressive Strength and percentage of GGBFS replacing natural fine aggregate

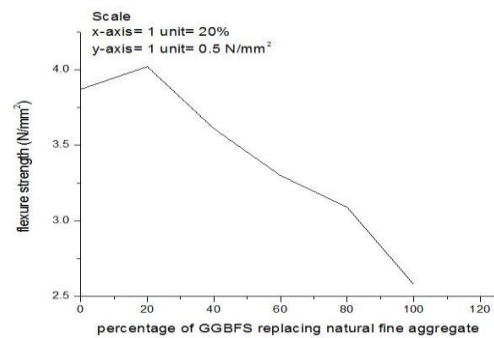


Figure 4: Variation between flexural strength and percentage of GGBFS replacing natural fine aggregate

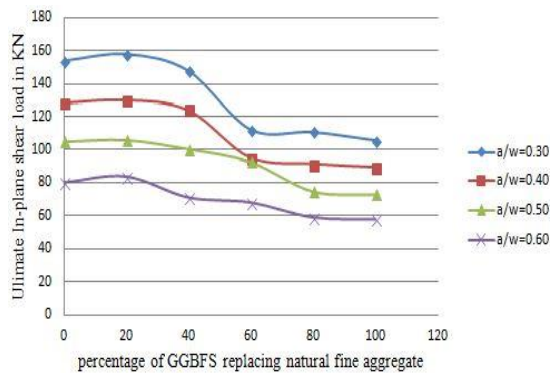


Figure 5: superimposed Variation between ultimate in-plane shear load and percentage of GGBFS replacing natural fine aggregate

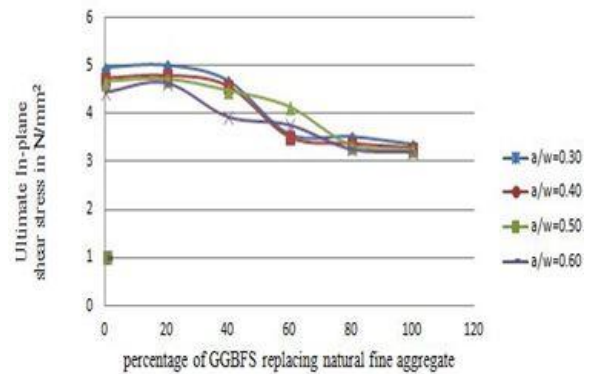


Figure 6: superimposed Variation between ultimate in-plane shear stress and percentage of GGBFS replacing natural fine aggregate

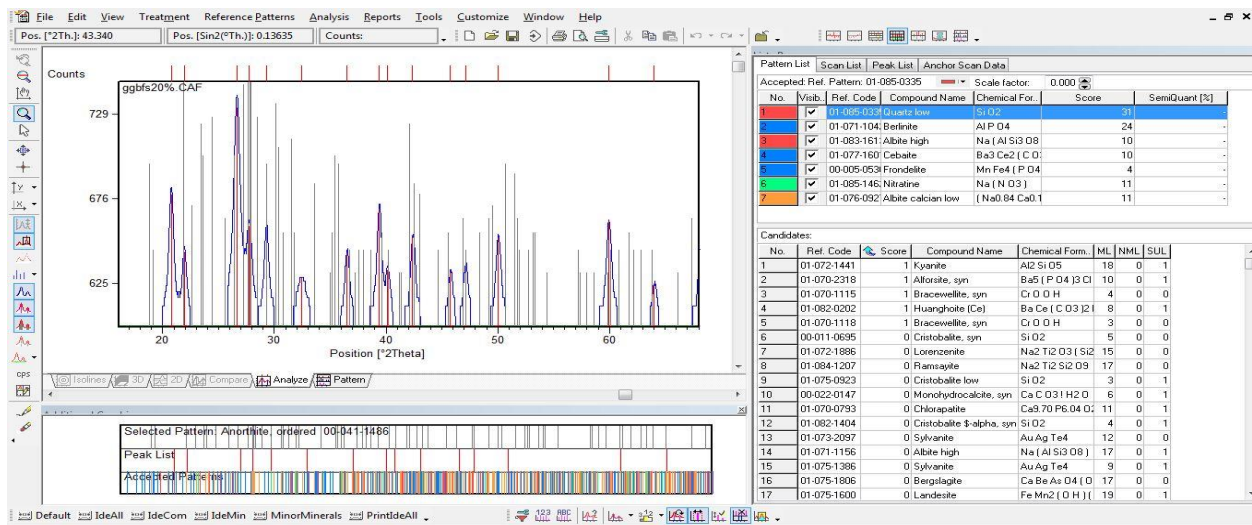


Figure 7: Using X' Pert High Score software from mineral group matched data Pattern list identified for 20% replacement of GGBFS concrete results at 28 days curing period (G-20)



Plate 1: View of cracks at ultimate load of testing specimens

IV. CONCLUSION

From the limited experimental investigation carried out the following conclusions can be drawn:

1. With the increase in addition of GGBFS replacing the fine aggregate in different percentages, it adversely affects the workability properties of the concrete due to the more absorption of water by GGBFS. Hence addition of super plasticizers is

- recommended specially after mixing 60% of GGBFS for the more workability
2. With the increase in percentage of GGBFS content replacing the sand, it is observed that the compressive strength is increased upto 20% replacement (37.71 N/mm²) and afterwards it is decreased.
 3. With the increase in percentage of GGBFS content replacing the sand, it is observed that the split tensile strength is increased upto 20% replacement (3 N/mm²) and afterwards it is decreased.
 4. All the beams have failed in the flexural zone and evidently all the beams are failed as such. The flexural crack has propagated from the bottom side to top with crushing of concrete at the top surface with no horizontal cracks at the level of the reinforcement, indicating no bonding failure. With the increase in percentage of GGBFS content replacing the sand, it is observed that the flexure tensile strength is increased upto 20% replacement (4.01 N/mm²) and afterwards it is decreased.
 5. Ultimate loads in Mode-II fracture are found to increase upto 20% and afterwards they are found to decrease continuously with the percentage increase in the GGBFS content beyond 20% for an $\frac{a}{w}$ ratios.
 6. The addition GGBFS content significantly enhanced the in-plane shear strength. During the test it is clearly observed that the crack is developed more or less along the notches. Further the in-plane shear strength increases with upto 20% GGBFS addition. As in other cases the strength decreases with increasing the replacement of sand by GGBFS beyond 20%.
 7. From the X-Ray diffraction test using X' Pert High Score software, for 20% replacement of sand by GGBFS maximum percentage of Quartz with the score 31 is identified from the pattern list and in peak list the chemical compounds of Quartz low, Berlinite, Albite high, Cebaite, Frondelite, Nitratine, Albite calcian are observed.
 8. Based on the experimental investigations, it could be recommended that GGBFS could be effectively utilized as fine aggregates in all the concrete constructions.
 9. Keeping all the strength considerations as a via media the GGBFS can be effectively utilised upto 50% replacement as there is not much strength decrease. However some durability long term tests are necessary before going for official utilization.
 10. The substitution of natural fine aggregate with GGBFS has positive impact on the strength properties. From this experimental study it may be construed that GGBFS can be effectively used in various civil engineering works.

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Evaluating the Prospects and Challenges of Sustainable Housing on National Development in Nigeria

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ABSTRACT

The paper presents an assessment of the prospects and challenges of sustainable housing provision in Nigeria using the novel Holistic Sustainability Approach (HSA). The HSA can be used to identify, examine and address the challenges and challenges of sustainable housing development in Nigeria based on the core tenets of sustainability; society, economy and environment and the twin concepts of needs and limitation. The study identified that the numerous challenges facing housing provision in Nigeria are largely due to poverty, redundant housing policies and financial bottlenecks. Others include high cost of building materials, lack of financial instrument for building construction projects as well as the palpable lack of innovative building technologies. This is in addition to uncontrolled development, poor maintenance culture and social infrastructure. Despite of these challenges, the authors posit sustainable housing provision has numerous prospects for the future. Consequently, effective provision of housing in Nigeria will spur sustainable socio-economic leading to enhanced well-being of the society. This will spur a ripple effect in long term socio-economic development of the nation's human capital. Furthermore, it will provide job prospects, disposable income, and improved standards of living, reduce greenhouse gas (GHGs) emissions and improve affordability and overall life span cycle of buildings in the country.

Keywords: Sustainability, Housing, National, Development, Nigeria.

I. INTRODUCTION

Nigeria is the most populous country in Africa with a population of 180 million people comprising over 500 ethnic groups. The nation similarly bears the distinctive hallmark as Africa's largest economy with a gross domestic product (GDP) of \$568.5 billion. Backed by these stellar socioeconomic dynamics, analysts predict that the Nigerian economy will grow at an impressive rate of 7 % annually over the next five years spurred by growth in the oil, agriculture, telecommunications, and financial services sector [1, 2]. Economically, Nigeria is blessed with abundant natural and mineral resources with 37 billion barrels of crude oil (petroleum), 33.7 billion Cubic meters of natural gas, 4 billion tonnes of coal, limestone, uranium and arable agricultural land (78 % of land mass) [3-5]. The dominance of petroleum and natural gas exports which account for over 90 % of Nigeria's export earnings, has also earned Nigeria the

distinction as the largest crude oil producer in Africa. Geographically, Nigeria has a total area of 923,768 km² located in West Africa, adjoining the Gulf of Guinea, between Benin and Cameroon on longitude 10 00 N, and latitude 8 00 E. The climate of Nigeria typically varies from arid in the north tropical in the middle belt and equatorial in the south [3].

Contrariwise, the nation is plagued by a plethora of socio-economic and environmental challenges despite its abundant human, capital and mineral resources. These challenges can largely be ascribed to persistent corrupt, slow legislative reforms, unreliable regulatory environment, widespread political instability, inadequate insecurity and unreliable dispute resolution mechanisms due to an incompetent judiciary. As a result, the nation is blighted by insufficient power supply, poor infrastructure, along with other socioeconomic challenges such as poor health care delivery, widespread

illiteracy, poor sanitation and inadequate housing typical of low income nations detailed in the United Nations Millennium Development Goals (MDGs) charter.

II. METHODS AND MATERIAL

Consequently, the UN seeks to address these pertinent issues particularly sustainable housing due to its significant influence on the overall wellbeing of people living in developing countries [6]. Accordingly, the analysts posit that sustainable housing provision can improve the access to education, ensure environmental sustainability, promote gender equality, maternal health, reduce child mortality, combat diseases, and stimulate global development [7-9]. In addition, the strategic importance of adequate shelter and sanitation in developing countries characterized by large population of slum dwellers is responsible for the dedication of the 2 out the 8 MDGs to housing [10]. Currently, nearly 880 million urban dwellers around the globe reside in slum conditions compared to 689 million in 1990 [6]. Consequently, the UN envisages to halve the population of slum dwellers without sustainable access to safe drinking water and basic sanitation and improving the lives of 100 million slum dwellers by the year 2020 [6, 7]. The surge in global slum dwelling population has been attributed to rapid urbanization, population growth and lack of suitable land and housing policies around the world [9, 10].

Like most developing countries Nigeria is plagued by lack of adequate housing and modern sanitation facilities especially for urban slum and rural dwellers. According to *Muazu and Oktay* [11] Nigeria's housing challenges can be primarily attributed to rapid spate of rural-urban migration due to lack of social infrastructure and amenities which leads to migration of rural dwellers into urban centers in Nigeria. However, these can be attributed to numerous other social, economic and environmental factors. Conversely, the solution to these problems presents promising prospects for national development in Nigeria and the developing world at large. Consequently this study seeks to examine and highlight the challenges and prospects of sustainable housing provision to future national development in Nigeria. The paper will attempt to institute and propose working relationship between national housing and sustainable development using a holistic approach.

III. RESULTS AND DISCUSSION

A. National Housing and Sustainable Development

Housing is a fundamental need necessary for the welfare, safety and survival of mankind [12]. The World Health Organization stipulates that good housing must satisfy the fundamental needs of shelter, sanitation and protection from externalities [13]. Sustainable housing is measure or index for assessing the living standards and social importance of people in many societies around the world [14]. Housing can be viewed as the end product of planned, coordinated and implemented construction aimed at providing structural design, lighting space, and sanitary facilities among other human conveniences through urban and regional planning, environmental and construction management. Housing also encompasses the rehabilitation, maintenance and re-modeling of existing structures to cater for accommodation, relocation and resettling of individuals in a society.

In view of the importance of housing to sustainable national development, the Federal Government of Nigeria (FGN) promulgated the National Housing Policy (NHP) in 1991. This was aimed at alleviating the problems of housing by providing a legal framework for the achievement of a national housing scheme [14]. Another goal of the NHP was to proffer solution to the housing crises through provision of affordable, accessible and long term housing to accommodate Nigerians. This is to be achieved taking into consideration vital concerns such as safety, health, finance, social infrastructure, locally sourced building materials, maintenance, repair and policy reform [14, 15]. NHP can be viewed as a legal tool for decision and policy makers for effective urban town planning, construction management and housing provision [16]. However, many years after the enactment of the policy, the provision of qualitative and quantitative housing needs of the populace remains a source of national embarrassment. Numerous authors have examined the housing crises vis-a-vis the NHP in Nigeria and identified the root causes of housing problems. Reasons identified as causes of the housing crises in Nigeria include socioeconomic problems such as lack of basic building technology, uncontrolled urbanization, unplanned development, and inadequate maintenance of existing structures. Others include poor social

infrastructure, poor waste management menace, and health hazard. This can be attributed to economic reasons such as pervasive poverty, high cost of materials, poor utilization of indigenous materials, lack of financial instrument for housing and bureaucratic red tape tied to land acquisition and documentation of title deed related to ownership [12-14, 17-19]. The existence of these challenges have prevented the sustainable development of the housing sector in Nigeria.

The concept of sustainable development (SD) has been widely debated in social, policy, and academic circles over the years. However, the most prominent description of sustainable development was advocated by the World Commission on Environment and Development (WCED) in the eminent Brundtland Report [20]. According to the report, SD can be defined as development that meets the needs of the present without conceding the ability of future generations to meet their own needs. The designation comprises two major parts namely the “concept of needs” and “idea of limitations”. These presuppose the prioritization of societal needs of the poor in spite the socioeconomic and techno-environment limitations.

Consequently, sustainable housing can be defined as the provision of affordable housing that integrates environmentally and societal based practices with the aim of reducing the negative impacts of homes on the environment through the use of sustainable building materials and eco-friendly design [21]. In the Nigerian context, the sustainable provision of housing and other social infrastructure such as health care, education, water, health and sanitation is vital to the needs of the citizenry. Incidentally, the provision of these basic needs for Nigerians is the crux of the 8 objectives of the MDGs which include; poverty and hunger eradication, universal primary education, gender equality for women, eradicating child mortality, improving maternal health, combating infectious diseases, environmental sustainability and global development [8, 22-24]. However, without adequate and sustainable housing, the attainment of the MDGs in Nigeria will remain a mirage since according to Tibaijuka [8], housing provision is an integral part of all the 8 goals of the MDGs.

It stands to reason that access to affordable, sustainable and long term housing in developing countries is the unquestionably the most promising route for the

achievement of the MDGs. Consequently the challenges of housing provision in Nigeria must be identified, examined and addressed in order to ensure sustainable development in the country. This is also help identify the potential prospects of housing provision to advancement of national goals and aspirations of the Nigerian citizenry. Sections 2.3 & 2.4 will therefore outline the challenges and future prospects of housing for sustainable development using a novel method called the holistic sustainability approach.

B. Holistic Sustainability Approach (HSA)

The Holistic Sustainability Approach or (HSA) is a novel approach aimed at identifying, examining and addressing the prospects and challenges of housing for sustainable development in Nigeria. The approach takes into cognisance the core tenets of sustainability; social, economic and environmental as well as the key sustainable development (SD) concepts of societal needs and techno-environmental limitations. The proposed HSA will be used to outline the challenges and prospects of housing for sustainable development in Nigeria.

C. Challenges of Sustainable Housing

Housing is an integral societal need, yet the provision of this vital necessity particularly in developing countries like Nigeria is plagued by socioeconomic and environmental factors all which hamper sustainable development. Consequently, the provision of housing for sustainable development is based on the application of the core tenet of sustainability from the conceptual stage to construction of the buildings [25]. This is aimed at reducing the socioeconomic and environmental outlays incurred by poor construction thereby minimizing the influences on natural resources, and improving the comfortability of its inhabitants [26].

i. Socioeconomic Factors

The socioeconomic challenges to housing in Nigeria are largely due to poverty, redundant or inconsistent policies and financial bottlenecks. As a low middle nation [27], Nigeria is considered low income nation as such pervasive poverty accounts for the problem of housing. In urban areas as well as rural areas the cost of housing is often beyond the reach of many citizens prompting residence in low quality shelters and abodes. In addition,

the high cost of materials and the poor utilization of indigenous materials [28], also accounts for the socioeconomic factors impeding housing provision in Nigeria. It is important to state that building materials comprise the largest input (60 - 65%) in the construction of houses [26, 29] which ultimately results in higher costs of completed homes. This certainly constitutes a challenge to sustainable housing provision in Nigeria.

Other socioeconomic factors include lack of financial instrument for construction and bureaucracy in Nigeria. In general, the palpable lack of innovative building technologies, uncontrolled development, maintenance culture and poor supporting social infrastructure also contribute to housing shortages in Nigeria [30]. Since the NHP like all promulgated policies in Nigeria is derived from laws, regulations and organisational practices, it is imperative that it adheres to the fundamental principles of freedom, justice, and equity in the interest of the public. However, the NHP has failed to adequately cater for the housing needs of Nigerians as stipulated in the statutes of its formulation due to lack of reforms in the policy over the years. Consequently, this has led to redundancy in its functions and hampered its successful implementation. As such, the NHP needs to be reformed to cater for the present day needs of Nigerians by taking into cognisance the present socioeconomic and political climate in the country. Hence, the NHP be ratified into the laws and constitution of the country to enable it correct the incongruities marring housing provision, land ownership and financing.

ii. Techno-environmental Factors

The Techno-environmental challenges of housing provision in Nigeria can be attributed to issues related to technicalities related to the choice of building materials, construction of buildings, and environmental land practices. In addition factors such as poor maintenance culture, climate change [31] and improper vocational training of professionals in the field contribute to poor housing provision in the country [32]. The choice of building materials plays a significant role in the cost, longevity and overall life cycle of buildings. In Nigeria, the natural preference of professionals in the building industry is to opt for foreign or imported building materials. Since this factor accounts for over 60 % of the cost of the buildings, houses built in the country are

typically expensive and beyond the financial reach of citizenry. In addition, the importation and utilization of imported building materials results in the emission of greenhouse gases (GHGs) and particulate pollutants which adversely affect the life cycle and environmental burden of buildings in the country [31]. The long term effects is often the short life span evidenced by the spate of building collapses across the country. Hence, the implementation of green building materials, sustainable practices and life cycle analysis in the building sector will improve housing provision in the country [33-35]. It is imperative for all tiers of government, the building industry as well as consumers to encourage the use of low cost, renewable and sustainable locally sourced building materials particularly wastes from agricultural residues, municipal solids, and the timber wood industry [28, 36-42].

Other factors affecting housing provision in Nigeria include environmental change and land practices [43]. Land availability and its governing laws and statutes directly influences housing affordability [44] and provision [45], the activities of professionals in the buildings industry, agriculture and urban development in Nigeria can affect housing provision as well . These underlying dynamics need to overhauled, reformed and revisited to improve land availability, practices and utilization for effective housing delivery.

D. Prospects of Sustainable Housing

The future prospects of sustainable housing in Nigeria will be examined using the proposed Holistic Sustainability Approach (HSP). Hence, the prospects of sustainable housing will be assessed based on socio-economic and techno-environmental factors. The provision of housing in Nigeria will spur socio-economic growth and sustainable growth in the country. According to the MDGs charter, housing provision can improve the literacy levels amongst women and children, promote female gender equality and productivity, maternal health care, mental health and combat the spread of contagious infections. The ripple effect will be long term socio-economic development of the nation's human capital comprising productive women and children.

Furthermore, sustainable housing provision will improve the job prospects, disposable income and improved

standards of living for individuals in the society. In addition, the adoption and utilization of sustainable building materials will reduce the nations stock of greenhouse gas emissions (GHGs), pollutant emissions and improve the overall life span and life cycle of buildings in the country. In the same vein, the use of sustainable green building materials will spur further research into material science and building construction techniques in the nation's tertiary institution, research institutes and centres of excellence.

The incorporation of the proposed HSA will help prioritize the concept of needs and limitations in the buildings industry. This will reduce wastes, excess and unwanted costs of building and constructions and help drive down the prices of houses in the country. With increased affordability the spate of homelessness, destitution and high crime due to lack of basic amenities in the society will be curbed considerably. Overall the socio-economic prospects of sustainable housing provision in Nigeria will improve social wellbeing and economic activities in the country.

The techno-environmental prospects of sustainable housing provision can potentially improve the technological knowhow and environmental sustainability in the country. Current practices in the industry have led to undue burden on the environment due to poor material utilization, poor energy efficiency, poor buildings waste management and maintenance. With improved reforms and adoption of sustainable practices such maladies will be relegated to the past.

However, this can only be achieved by improving legislation, training, and skills acquisition by professionals in the Nigerian building sector. Consequently, the success of these measures will strategically reposition the country as hub for innovative sustainable building technology, and construction management in Africa. Ultimately, this will attract greater research funding for the academic, research and construction sectors of the Nigerian society. If achieved, such milestones will increase UN and international cooperation and collaboration on future clean development mechanism (CDM) projects.

Overall the techno-environmental prospects of sustainable housing provision will greatly impact the buildings sector in Nigeria through improved skills,

training and funding aimed at improving the availability, affordability and life span-cycle of buildings in the country. In addition it will improve the institutional framework for housing delivery, enhance land settlements and development policies, supply flexible housing finance, lower building materials and construction costs, and aid the mobilisation of the private sector in monitoring and evaluation future sustainable housing programmes and schemes in the country.

IV. CONCLUSION

The prospects and challenges of sustainable housing provision in Nigeria were examined in this study. This was achieved using a novel approach termed the Holistic Sustainability Approach (HSA) which was aimed at identifying, examining and addressing the prospects and challenges of housing for sustainable development in Nigeria based on the social, economic and environmental aspects of housing. The study identified numerous challenges as well as future socio-economic and techno-environmental prospects for the adoption and provision of affordable housing in Nigeria.

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Weather-Climate Forecasting System for Early Warning in Crop Protection

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ABSTRACT

Weather and Climate forecasting is the application of science and technology to predict the state of the atmosphere for a given location. This provide occurrence or change in severity of plant diseases. At the field scale, these systems are used by growers to make economic decisions about disease treatments for control. Often the systems ask the grower a series of questions about the susceptibility of the host crop, and incorporate current and forecast weather conditions to make a recommendation. Forecasting system provide information about plants disease which happen due to Weather and Climate changes and it happen in such a fashion that disease can occur and cause economic losses.

Keywords

FAO, phenology, Weather-Climate Forecasting System, Temperature, Solar radiation, Humidity, Cloud, Pressure, Wind, Precipitation

I. INTRODUCTION

Analysis of meteorological and climatic data allows providing near real-time information about the crop state, in quality and quantity, with the possibility of early warning on alarm/alert situations so that timely interventions can be planned and undertaken. Crop forecasting philosophy is based on various kinds of data collected from different sources: meteorological data, agrometeorological (phenology, yield), soil (water holding capacity), and remotely sensed, agricultural statistics. Based on meteorological and agronomic data, several indices are derived which are deemed to be relevant variables in determining crop yield, for instance crop water satisfaction, surplus and excess moisture, average soil moisture, etc.

Crop forecasting is the art of predicting crop yields (tons/ha) and production before the harvest actually takes place, typically a couple of months in advance. Crop forecasting relies on computer programmes that describe the plant-environment interactions in quantitative terms. Such programmes are called

"models", and they attempt to simulate plant-weather-soil interactions. They need, therefore, information and data on the most important factors that affect crop yields - the model **inputs**. After passing "through" the model, the inputs are converted to a number of **outputs**, such as maps of crop conditions and yields.

Violent weather factors - cyclones, floods and storms - catch the attention of the public and usually receive wide media coverage. Due to their rare occurrence and unpredictable timing, they are usually extremely difficult to model. It should be stressed, however, that far more agricultural production is lost to "chronic" problems, such as local droughts, and recurrent pest attacks, than to the violent ones.

Weather data are among the most important factors that condition the inter-annual variability of crop yields. Depending on the prevailing climatic conditions, limiting factors can be either rainfall (in semi-arid areas), sunshine (in many equatorial or temperate countries). In addition, weather affects crops indirectly, through pests and diseases.

Over the last 20 years, FAO (Food and Agriculture Organization) has developed a crop forecasting "philosophy" through a number of national projects to establish national early warning systems. The FAO approach to crop forecasting philosophy is characterized by the following:

1. **Integration** of ground-based agrometeorological information with remotely-sensed (satellite) information, both at the data and at the product, or analysis, level
2. **A modular approach**, i.e. crop forecasting tools that are largely independent but can be combined, or "chained" as required by local conditions. The modularity is an essential ingredient of the sustainability of a national crop forecasting system as it facilitates maintenance, training and upgrading of forecasting systems.

II. METHODS AND MATERIAL

2.1 Weather Elements

Weather is a phrase of climate representing atmospheric condition at a given place and at a given instant of time as against climate, representing atmospheric condition for longer period of time over a large area. Components of weather and climate or simply weather elements include:

- Temperature
- Solar radiation
- Humidity
- Cloud
- Pressure
- Wind
- Precipitation

The influence of weather and climate on crop growth and development and final yield is complicated by complexity of interactions with crops and the environment during the crop season. The influence of weather and climate on crop productivity can be summarized as indicated below:

2.2. Weather parameters with favourable influence

- i. Weather and climate are important factors to determining the success or failure of agriculture.
- ii. All the agriculture operations from sowing to harvest of crops depend on the mercy of weather.

- iii. Climate determines suitability of a crop to a particular region while weather plays a major role in the productivity of a crop in the region.
- iv. The excess or shortage of elements of weather and climate exerts a negative influence on crop growth, development and final yield.
- v. The effect of weather and climate is complex as elements of climate operate simultaneously in nature.
- vi. Due to complexity of environment in which a crop is grown, it is difficult to assign an optimum value of climatic element for maximum crop productivity.

2.3 Weather parameters with negative influence

- Excessively and untimely rains.
- Scanty rains with prolonged dry spells.
- Heat and cold waves.
- Dust-storms, thunderstorms and hailstorms.
- High winds.
- Floods.

2.4 Weather variables having both positive and negative effects on crop productivity.

- Solar radiation.
- Temperature.
- Humidity.
- Wind.
- Precipitation.

2.5 Factors controlling weather and climate.

Geographical factors influencing weather and climate are referred to as climate controls. They are:

- Latitude.
- Altitude.
- Land and water bodies.
- Mountains.
- Topography.

The distance from the equator, either from south or north, largely creates variations in climate. Based on latitude, the climate has been classified as tropical, subtropical, temperate and polar climates. The height from mean sea level adds to variation in climate. Temperature and pressure decreases with increasing height from mean sea level. Based on altitude, the climate is described as mountainous and valley climates. Nearness to large

bodies of water also causes variation in climate. The climates are referred to as continental and maritime.

This system represents general of above weather parameters The assumption is that farmers access to pest and disease warnings, either directly by mobile internet/SMS, or through advisory service officers, enables improved targeting of crop protection measures which both can give increased crop yield and quality, as well as reduced pesticide use/or timely use and less production costs to farmers. The benefits for the public of a working system are reduced risks from pesticides in food and environment.

III. RESULT AND DISCUSSION

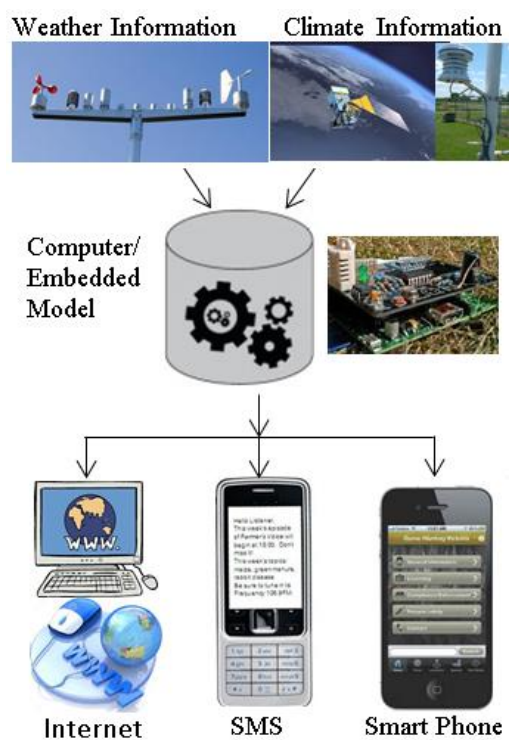


Figure 1: Weather-Climate Forecasting System

The system is a weather driven forecasting system for plant pests and diseases. This is just a general architecture. This system helps to warn Indian farmers on weather driven attacks on crops from pests and diseases. The system is computer/embedded technology based framework.

IV. CONCLUSION

Weather or Climate forecasts are made by collecting quantitative data about the current state of the atmosphere on a

given place and using scientific understanding of atmospheric processes to project how the atmosphere will change. Once an all-human endeavor based mainly upon changes in barometric pressure, current weather conditions, and sky condition, weather forecasting now relies on computer-based models that take many atmospheric factors into account. Human input is still required to pick the best possible elements which impact on crop growth.

Moreover, such a system is also implicitly addressing the climate change impacts on the pest and disease situation in crop like rice. Currently, the scientific literature is reviewed for availability of forecasting models and climate response information for the selected pests. The next steps of development in the project will be to implement selected models to operate against all weather stations of Gujarat and put the dissemination service online.

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Solving Elasto-Static Problem in Plane Stress Case By Meshfree Method

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ABSTRACT

Computational numerical simulation has increasingly become a very important approach for solving complex practical problems in engineering and science. It provides an alternative tool of scientific investigation, instead of carrying out expensive, time-consuming experiments in laboratories. Mesh free (MF) methods are among the breed of numerical analysis technique that are being vigorously developed to avoid the drawbacks that traditional methods like Finite Element method (FEM) possess. The Element Free Galerkin (EFG) method is a meshless method in which only a set of nodes and a description of model's boundary are required to generate the discrete equations. Although it is considered meshless, the EFG utilizes a background mesh to assembly the equations system that describes the problem. In this paper the EFG method is applied to 2-D beam problem and results obtained using MATLAB program are compared with the analytical solution by using Timoshenko Beam Theory.

Keywords : EFG, MLS shape functions, weight functions, Meshfree, Matlab

I. INTRODUCTION

The development of the finite element method (FEM) in the 1950s was one of the most important advances in the field of numerical methods. The FEM is a robust and thoroughly developed method, and hence it is widely used in engineering fields due to its versatility for complex geometry and flexibility for many types of linear and non-linear problems. This mesh based numerical methods (FEM, FDM, CFD etc.) despite of great success; suffer from difficulties in some aspects, which limit their applications in many complex problems such as crack propagation, problems with phase change, large-strain deformations, etc.

The finite element methods are well established and powerful computational techniques which are used for modelling and analysis of physical phenomena in different fields of engineering and applied sciences, but it is with some shortcomings that rely on meshes or elements that are connected together by nodes in a properly predefined manner. The following limitations of FEM are becoming increasingly evident [1]:

- In stress calculations, the stresses obtained using FEM packages are discontinuous and often less accurate. The need for full compatibility in the assumed displacement field in the FEM results in the loss of freedom in the shape function construction.
- When handling large deformation, considerable accuracy can be lost and the computation can even break down because of element distortions.
- It is rather difficult to simulate both crack growth with arbitrary and complex paths and phase transformations due to discontinuities that do not coincide with the original nodal lines.
- It is very difficult to simulate the breakage of material into a large number of fragments as FEM is essentially based on continuum mechanics, in which the elements formulated cannot be broken. The elements can either be totally "eroded" or stay as a whole piece. This usually leads to a misrepresentation of the breakage path. Serious error can occur because the nature of the problem is nonlinear, and therefore the results are highly path dependent.

- Remesh approaches have been proposed for handling these types of problems in FEM. In the remesh approach, the problem domain is remeshed at steps during the simulation process to prevent the severe distortion of meshes and to allow the nodal lines to remain coincident with the discontinuity boundaries. For this purpose, complex, robust, and adaptive mesh generation processors have to be developed. However, these processors are only workable for 2D problems. There are no reliable processors available for creating quality hexahedral meshes for 3D problems due to technical difficulty.
- Adaptive processors require “mappings” of field variables between meshes in successive stages in solving the problem. This mapping process often leads to additional computation as well as a degradation of accuracy. In addition, for large 3D problems, the computational cost of remeshing at each step becomes very high, even if an adaptive scheme is available.
- FDM works very well for a large number of problems, especially for solving fluid dynamics problems. It suffers from a major disadvantage in that it relies on regularly distributed nodes. Therefore, studies have been conducted for a long time to develop methods using irregular grids. Efforts in this direction are still on.

II. METHODS AND MATERIAL

2. Mesh Free Method

A recent strong interest is focused on the next generation computational methods meshfree methods, which are expected to be superior to conventional mesh based FEM in many applications[5]. The key idea of the meshfree methods is to provide accurate and stable numerical solutions for integral equations or PDEs with all kinds of possible boundary conditions with a set of

3. Element Free Galerkin Method (EFG):

The Element Free Galerkin (EFG) method proposed by Belytschko et al (1994) is based on the diffuse element method developed by Nayroles et al (1992). In EFG method only a set of points and the description of the model of boundaries are necessary to generate the discrete equations. In EFG we use the moving least square (MLS) method for constructing the shape functions. Moving least square method was first proposed by Lancaster and Salkauskas (1981), as an interpolation method. It was used in element free methods by Belytschko *et al.* (1994), with use of Lagrange multiplier to invoke essential boundary. [2, 3]

arbitrarily distributed nodes (or particles) without using any mesh that provides the connectivity of these nodes or particles.

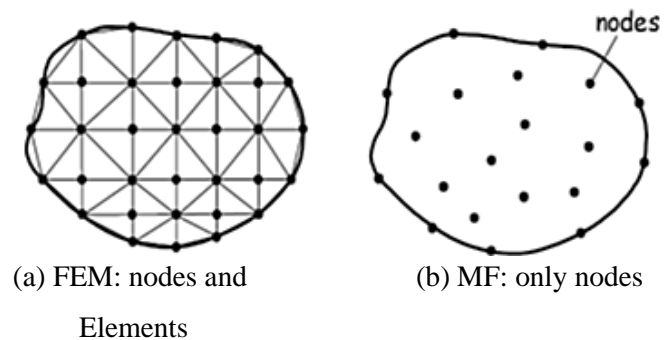


Figure 1: Modelling in the FEM and MF

Meshless methods are used to establish systems of algebraic equations for the domain altogether of a problem without a predefined mesh. These methods operate with a set of distributed points inside the domain Ω (fig.1) as well as with sets of points distributed on its boundary to represent (but not discretize) the domain of the problem and its boundary. This set of distributed points does not generate a mesh, meaning that it is not required any information about the relations between these points (Liu, 2004) (Belytschko et al, 1996). The principal attraction of mesh free methods is the possibility of simplifying adaptivity and problems with moving boundaries and discontinuities, such as phase changes or cracks. In crack growth problems, for example, nodes can be added around a crack tip to capture the stress intensity factors with the desired accuracy; this nodal refinement can be moved with a propagating crack through a background arrangement of nodes associated with the global geometry. Adaptive meshing for a large verity of problems including linear and nonlinear stress analyses can be effectively treated by these methods in a simple manner.

3.1 System of Equation:

Consider a displacement function $u(x)$ of a field variable defined on the domain Ω , the approximated value of $u(x)$ can be represented as,

$$u(x) \approx \hat{u}(x) = \sum_{i=1}^m p_i(x) a_i(x) = P^T(x) a(x)$$

Where, P represents the polynomial basis function, m is the number of polynomial coefficients and $a(x)$ is the unknown coefficient matrix.

For 2-D problems,

$$P^T(x) = [1, x, y] \quad \text{Linear, } m=3 \text{ and } a^T(x) = [a_0(x) \ a_1(x) \ a_2(x) \ \dots a_m(x)]$$

The unknown parameters $a(x)$ at any given point are determined by minimizing the difference between the local approximation at that point and the nodal parameters u_i . Let the nodes whose supports include x be given local node numbers 1 to n . In order to determine the unknown coefficients a , a functional J is constructed. It sum up the weighted quadratic error for all nodes inside the support domain as

$$J = \sum_{i=1}^n W(x-x_i) (\hat{u} - u_i)^2 = \sum_{i=1}^n W(x-x_i) (P^T(x_i) a(x) - u_i)^2$$

Where n is the number of nodes in the neighbourhood of x for which the weight function, $W(x-x_i) \neq 0$, and u_i refers to the nodal parameter of u at $x = x_i$.

The weights functions like cubic weight function, quartic weight, exponential weight etc, perform two actions, one as a medium of imparting smoothness or desired continuity to the approximation and other one, more important, is the establishment of the local nature of the approximation. The polynomial basis and the weight function together cast a major influence on the performance of the MLS method. Then we want to minimize this functional, so we differentiate with respect to the unknown vector $a(x)$, containing the coefficient,

$$\frac{\partial J}{\partial a} = 0$$

By inserting the expression for J , the equation ends up with

$$\begin{aligned} \frac{\partial J}{\partial a} &= \sum_{i=1}^n W(x-x_i) \frac{\partial (P^T(x_i) a(x) - u_i)^2}{\partial a} \\ &= \sum_{i=1}^n W(x-x_i) 2(P^T(x_i) a(x) - u_i) P(x_i) = 0 \\ &= \sum_{i=1}^n W(x-x_i) P(x_i) P^T(x_i) a(x) = \sum_{i=1}^n W(x-x_i) P(x_i) u_i \end{aligned}$$

This can be written in a compact matrix form as,

$$A(x) a(x) = B(x) U(x)$$

Where the matrices are given by,

$$\begin{aligned} A(x) &= \sum_{i=1}^n W(x-x_i) P(x_i) P^T(x_i) \in M(m \times m) \\ B(x) &= [W(x-x_1) P(x_1) \dots W(x-x_n) P(x_n)] \in M(m \times n) \end{aligned}$$

$$U(x) = \begin{bmatrix} u_1 \\ \cdot \\ \cdot \\ u_n \end{bmatrix} \in M(n \times 1)$$

The unknown vector $a(x)$ can now be determined as,

$$A(x) = A^{-1}(x) B(x) U(x)$$

By inserting this expression in, we get a new formulation of the displacement field,

$$\hat{u} = P^T(x)a(x) = \underbrace{P^T(x)A^{-1}(x)B(x)}_{\phi(x)} U(x) = u(x) = \sum_{i=1}^n \phi_i(x)u_i$$

So the displacement in a point x are approximated as a sum of shape functions multiplied with respectively displacement.

The discrete equation system is obtained by imposition of boundary conditions using Lagrange's multipliers in a weak form of a problem of linear elasticity and by making use of the approximation equations for field variables [2]:

$$\begin{bmatrix} K & G \\ G^T & 0 \end{bmatrix} \begin{bmatrix} U \\ \lambda \end{bmatrix} = \begin{bmatrix} F \\ q \end{bmatrix}$$

Where,

$$K_{IJ} = \int_{\Omega} B_I^T D B_J d\Omega$$

$$G_{IK} = - \int_{\Gamma_u} \Phi_I N_K d\Gamma$$

$$f_t = \int_{\Gamma_f} \Phi_t \bar{t} d\Gamma + \int_{\Omega} \Phi_t \bar{t} d\Omega$$

$$q_k = - \int_{\Gamma_u} N_k \bar{u} d\Gamma$$

$$B_t = \begin{bmatrix} \phi_{t,x} & 0 \\ 0 & \phi_{t,y} \\ \phi_{t,y} & \phi_{t,x} \end{bmatrix}$$

$$N_k = \begin{bmatrix} N_k & 0 \\ 0 & N_k \end{bmatrix}$$

$$D = \frac{E}{1-\nu^2} \begin{bmatrix} 1 & \nu & 0 \\ \nu & 1 & 0 \\ 0 & 0 & \frac{(1-\nu)}{2} \end{bmatrix}$$

In which, K is the stiffness matrix, G is the boundary condition matrix, U is the nodal displacements vector, λ is the Lagrange multipliers, F is the force vector and q is a boundary condition vector, and E and ν are Young's modulus and Poisson's ratio, respectively.

4. Numerical Examples

In this section, a plane stress Timoshenko beam problem is solved using an EFG program written in MATLAB. This example serves to illustrate the accuracy of the EFG method by comparing it to the exact solution for both the displacements and stresses.

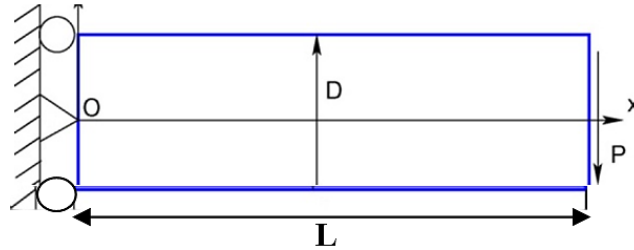


Figure 2 : Timoshenko Beam

Consider a beam of length $L = 48$ unit subjected to parabolic traction at the free end as shown in figure. The beam has characteristics height $D=12$ unit and is considered to be of unit depth and is assumed to be in a state of plane stress with $P= 1000$ unit, $\nu = 0.3$ and $E= 3.0 \times 10^7$.

The exact analytical solution of Timoshenko beam is given by the following equations [2]. The expressions for displacements in x direction, u_x , and in y direction, u_y , are respectively:

$$u_x = -\frac{Py}{6EI_m} \left[(6L - 3x)x + (2 + \nu) \left(y^2 - \frac{D^2}{4} \right) \right]$$

$$u_y = -\frac{P}{6EI_m} \left[3\nu y^2 (L - x) + (4 + 5\nu) \frac{D^2 x}{4} + (3L - x)x^2 \right].$$

Where P , is the maximum load applied, E is the modulus of elasticity, x and y are the coordinates in x axis and y axis for the analyzed nodal point and I_m is the inertial moment $= D^3/12$. The stresses are given by:

$$\sigma_x = -\frac{P(L - x)y}{I_m} \quad \sigma_y = 0 \quad \sigma_{xy} = -\frac{P}{2I_m} \left(\frac{D^2}{4} - y^2 \right)$$

III. RESULTS AND DISCUSSION

5. Numerical Results

The solutions were obtained using a linear basis function with cubic spline weight function. In this paper, a set of uniform distributed scattered nodes is chosen, and a mesh of background cells is developed only for integration. The displacement and stress values along different section are plotted and comparative performance is evaluated with exact analytical solution.

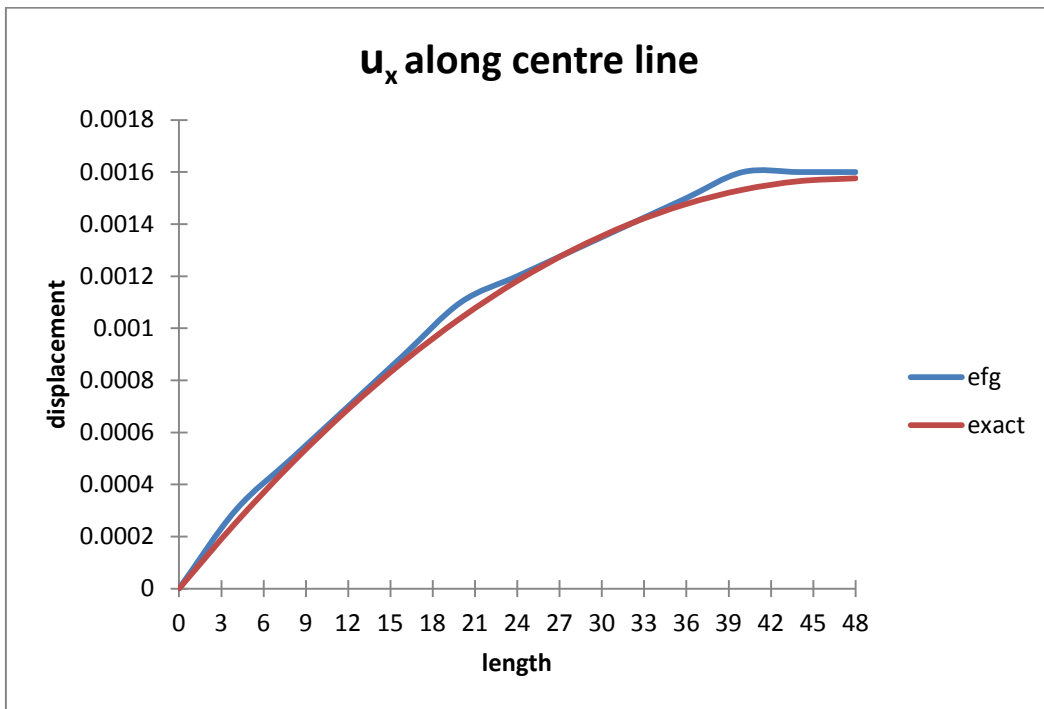


Figure 3 : Displacement for EFG and Exact

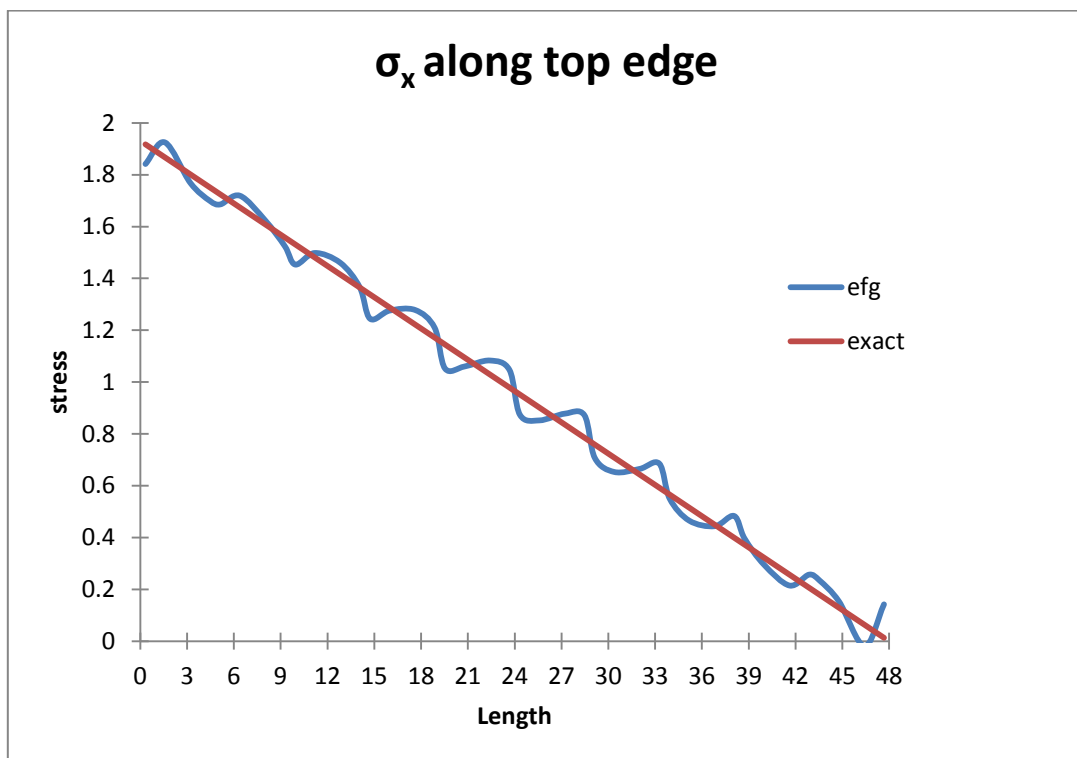


Figure 4 : σ_x for EFG and Exact

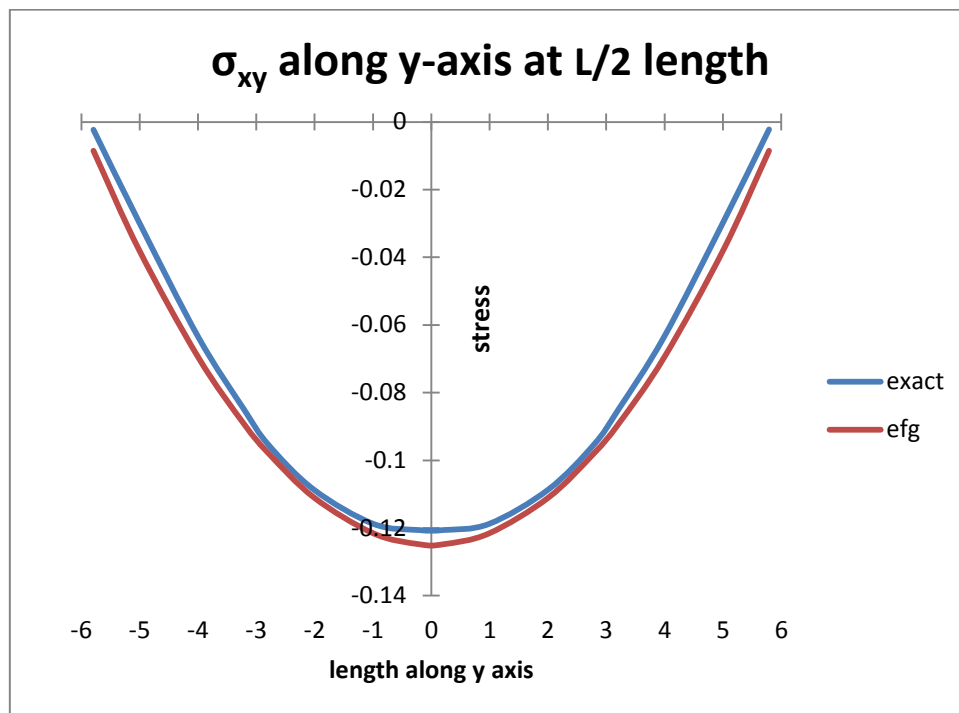


Figure 5 : σ_{xy} for EFG and Exact

IV. CONCLUSION

The details of the Element Free Galerkin (EFG) method and its numerical implementation have been presented for 2-D beam problem. It is observed that EFG method is quite promising in the performance as the results calculated from analytical solution and proposed mesh free method are quite same. We also verify that the results for normal stress and displacement fields are better than the response of the shear stress field because we utilize a linear basis in the approach.

The running time of the two-dimensional EFG program written for this paper is substantially greater than that of a comparable finite element program. However, the potential for meshless methods for certain classes of problems diminishes the importance of these disadvantages.

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Modeling and Simulation of Hybrid Solar Photovoltaic-Wind System Based on Artificial Intelligence

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ABSTRACT

Now a day's electricity is most needed facility for the human being. All the conventional energy resources are depleting day by day. So we have to shift from conventional to non-conventional energy resources. In this the combination of two energy resources is takes place i.e. wind and solar energy. This process reviles the sustainable energy resources without damaging the nature. Renewable energy sources have become a popular, the commonly used renewable sources are solar photovoltaic and wind energy systems have received a great acceptance in field of power generation for pollution free performance, free availability and for great reliability. Further development and effective use of natural resources, the hybrid systems are developed. Hybrid power systems can provide a good solution for such problems because they integrate renewable energy along with the traditional power plants. Hybrid systems are characterized by containing two or more technologies of electrical generation, in order to optimize global efficiency of the processes. Basically this system involves the integration of solar, wind with battery storage device that will gives continuous power. A simple control technique which is also cost effective has been proposed to track the operating point at which maximum power can be coerced from the PV system and wind turbine generator system under continuously changing environmental conditions. In this Paper, the modeling of hybrid Solar Photovoltaic-Wind Stand-Alone Generation System is done by using MATLAB/SIMULINK software and results are presented.

Keywords- Hybrid Energy system, MPPT, Wind Energy, Solar Photovoltaic System Battery Storage, Matlab/Simulink

I. INTRODUCTION

Due to the critical condition of industrial fuels which include oil, gas and others, the development of renewable energy sources is continuously improving. This is the reason why renewable energy sources have become more important these days. Few other reasons include advantages like abundant availability in nature, eco-friendly and recyclable. Many renewable energy sources like solar, wind, and tidal are there. Among these renewable sources solar and wind energy are the world's fastest growing energy resources. With no emission of pollutants, energy conversion is done through wind and PV cells. Day by day, the demand for electricity is rapidly increasing. But the available base load plants are not able to supply electricity as per demand. So these energy sources can be used to bridge the gap between supply and demand during

peak loads. This kind of small scale stand-alone power generating systems can also be used in remote areas where conventional power generation is impractical. The importance of hybrid systems grown as they appeared to be the right solution for a clean and distributed energy production. In this Paper, the modeling of hybrid Solar Photovoltaic-Wind Stand-Alone Generation System is modeled by using MATLAB/SIMULINK.

II. METHODS AND MATERIAL

1. Overview Of Hybrid Energy System

Solar-Wind hybrid Power system is the combined power generating system by wind mill and solar energy panel. It also includes a battery which is used to store the energy generated from both the sources.

Using this system power generation by windmill when wind source is available and generation from PV module when light radiation is available can be achieved. Both units can be generated power when both sources are available. By providing the battery uninterrupted power supply is possible when both sources are idle. The design process of hybrid energy

systems requires the selection and sizing of the most suitable combination of energy sources, power conditioning devices, and energy storage system together with the implementation of an efficient energy dispatch strategy. The selection of the suitable combination from renewable technology to form a hybrid energy system depends on the availability of the renewable resources in the site where the hybrid system is intended to be installed. In this proposed system solar, wind power with battery storage system is used for generating power. Solar and wind has good advantages than other than any other non-conventional energy sources. Both the energy sources have greater availability in all areas with lower cost.

2. Solar PV Energy

Solar energy is that energy which is gets by the radiation of the sun the sun. Solar panels are the medium to convert solar energy into the electrical energy. Solar panels can convert the energy directly or heat the water with the induced energy. PV (Photo-voltaic) cells are made up from semiconductor structures as in the computer technologies. Sun rays are absorbed with this material and electrons are emitted from the atoms. This release activates a current. Photovoltaic is known as the process between radiation absorbed and the electricity induced. Solar power is converted into the electric power by a common principle called photo electric effect. The solar cell array or panel consists of an appropriate number of solar cell modules connected in series or parallel based on the required current and voltage. The sun is the original source of almost all the energy used on earth. The earth receives a stock ring amount of energy from the sun, as much energy falls on the planet each hour is the total human's population uses in a whole years.

3. Wind Energy

Wind energy is the energy which is extracted from wind. For extraction we use wind mill. The wind energy needs less cost for generation of electricity. Maintenance cost is also less for wind energy system. Wind energy is present almost 24 hours of the day. It has less emission. Initial cost is also less of the system. Generation of electricity from wind is depend upon the speed of wind flowing. Wind energy is a source of renewable power which comes from the air currents flowing across the earth's surface. Wind turbines are used to convert the wind power into electric power. Electric generator inside the turbine converts the mechanical power into the electric power. Wind turbine systems are available ranging from 50W to 3-4 MW. The energy production by wind turbines depends on the wind velocity acting on the turbine. Wind power is able to feed both energy production and demand in the rural areas. It is used to run a windmill which in turn drives a wind generator or wind turbine to produce electricity.

4. Battery Storage Device

The batteries in the system provide to store the electricity that is generated from the wind or the solar power. Any required capacity can be obtained by serial or parallel connections of the batteries. The battery that provides the most advantageous operation in the solar and wind power systems are maintenance free dry type and utilizes the special electrolytes. These batteries provide a perfect performance for long discharges.

A battery is a device that converts chemical energy directly to electrical energy. An electric battery is a device consisting of one or more electrochemical cells with external connections provided to power electrical devices. Each cell consists of three main parts: a positive electrode (terminal), a negative electrode, and a liquid or solid separating them called the electrolyte. When a battery is connected to an external circuit, a chemical reaction takes place in the electrolyte causing ions (in this case, atom with a positive electrical charge) to flow through it one way electrolytes are able to move as ions within, allowing the chemical reactions to be completed at the separate terminals and so deliver energy to the external circuit. It is the movement of those ions within the battery

which allows current to flow out of the battery to perform work. The energy storage device is used basically for three purposes, energy stabilization, ride through capability and dispatch ability. The energy stabilization permits the hybrid system to run at a constant stable level with the help of the energy storage devices, even if load fluctuations rapidly. The ride through capability is the capability of energy storage devices which provides the proper amount of energy to loads, when the hybrid system generators are unavailable. Since both wind and PVs are intermediate sources of power, it is highly desirable to incorporate energy storage into such hybrid power systems. The hybrid system is shown in Figure. 1. In the following sections, the model of components is discussed.

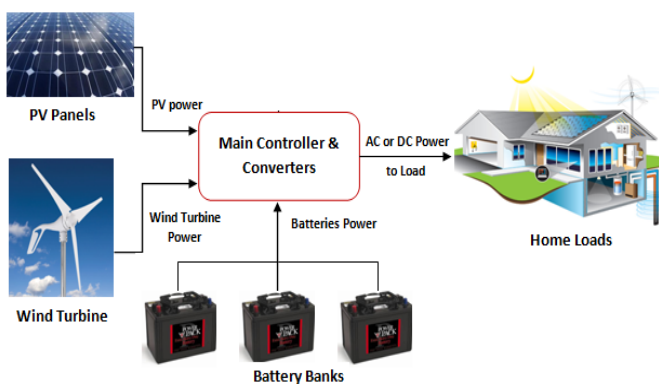


Figure 1. Block diagram of a hybrid power generation system

5. Modeling of Hybrid Energy System

✓ Modeling of PV Cell

The model of the solar PV cell can be realized by an equivalent circuit that consists of a current source in parallel with a diode as shown in Fig. 2 for ideal model R_s , R_p and C components can be neglected.

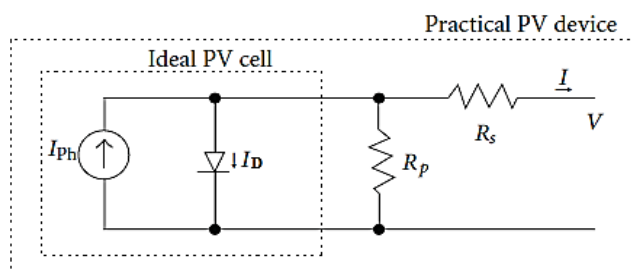


Figure 2. Equivalent circuit diagram of a solar pv cell

The diode is the one which determines the current-voltage characteristic of the cell. The output of the current source is directly proportional to the light falling on the cell. The open circuit voltage increases

logarithmically according to the Shockley equation which describes the interdependent of current and voltage in a solar cell. An equation that represents I -V characteristics of a solar array is given by the following mathematical equation as: The power output of a single diode solar cell is given by (Villalva et al. 2009)

$$P = VI \quad \text{----- (1)}$$

The photocurrent (I_{ph}) which mainly depends on the solar irradiation and cell temperature is described as (Villalva et al. 2009)

$$I_{ph} = [\mu_{sc}(T_c - T_r) + I_{SC}]S \quad \text{----- (2)}$$

Where μ_{sc} is the temperature coefficient of the cell's short circuit current; T_r is the cell's reference temperature; I_{sc} is the cell's short circuit current at a 25°C and 1kW/m^2 ; and S is the solar irradiation in kW/m^2 . Furthermore, the cell's saturation current (I_s) varies according to the cell temperature and can be described as (Villalva et al. 2009)

$$I = I_{ph} - I_s \left(e^{\frac{q(v+IR_s)}{mkT}} - 1 \right) - \left[\frac{V+IR_s}{R_p} \right] \text{---- (3)}$$

Equation (3.1) is used in computer simulations to obtain the output characteristics of a solar cell. To simulate the selected PV array, a PV mathematical model having N_p cells in parallel and N_s cells in series is used according to the following equation (neglecting shunt resistance):

$$I = N_p I_{ph} - N_p I_s \left(e^{\frac{q(v+IR_s)}{mkTN_s}} - 1 \right) \text{---- (4)}$$

Assuming N_p the above equation can be rewritten as:

$$I = I_{ph} - I_s \left(e^{\frac{q(v+IR_s)}{mkTN_s}} - 1 \right) \text{---- (5)}$$

In particular, the cell reverse saturation current, I_s , varies with temperature according to the following equation as:

$$I_s = I_{s(T_1)} * \left(\frac{T}{T_1} \right)^{\frac{3}{m}} * e^{\frac{-qV}{mK}} \left(\frac{1}{T} - \frac{1}{T_1} \right) \quad \text{----- (6)}$$

$$I_{s(T_1)} = \frac{I_{sc(T_1)}}{(e^{qV_{oc}(T_1)/mKT_1} - 1)} \text{----- (7)}$$

The photo current I_{ph} , depends on the solar radiation (S) and the temperature (T) according to the following equation as:

$$I_{ph} = I_{ph}(T_1)(1 + K_0(T - T_1)) \text{-----(8)}$$

$$I_{ph}(T_1) = S * I_{SC}(T_1, norm) / S_{norm} \text{-----(9)}$$

Where $K_0 = (I_{S}(T_2) - I_{S}(T_1)) / (T_2 - T_1) \text{-----(10)}$

The series resistance of the cell is given as

$$R_s = \frac{dV}{dI_{voc}} - \left(\frac{1}{X_V}\right) \text{----- (3.9)}$$

Where $X_V = I_{0}(T_1) * q / mKT_1 * (e^{qV_{oc}(T_1) / mKT_1} \text{----- (11)}$

The PV power, P, is then calculated as follows

$$P = N_p I_{ph} V - N_p I_S V \left(e^{\frac{q(v+IR_s)}{mKTn_s}} - 1 \right) = VI \text{-----(12)}$$

where

V - output voltage of PV module,

I - output current of PV module,

R_s - series resistance of cell (Ω)

R_{sh} - shunt resistance of cell (Ω)

q - electronic charge ($1.602 * 10^{-19}$ C),

I_{sc} - light-generated current,

K - Boltzman constant ($1.38 * 10^{-23}$ J/k),

T_k - temperature (K), n_s number of PV cells connected in series,

N_p - number of PV cells connected in parallel,

I_0 - reverse saturation current which depends on the ambient temperature

m - diode factor (usually between 1 and 2);

n_s : number of PV cell in series

n_p : number of PV cell in parallel

✓ PV Module and Array

The basic element of a PV System is the photovoltaic (PV) cell, also called a Solar Cell. A PV / Solar Cell is a semiconductor device that can convert solar energy into DC electricity through the Photovoltaic Effect • (Conversion of solar light energy into electrical energy). When light shines on a PV / Solar Cell, it may be reflected, absorbed, or passes right through. But only the absorbed light generates electricity. To increase their utility, a number of individual PV cells are interconnected together in a sealed, weatherproof package called a Panel (Module). To achieve the desired voltage and current, Modules are wired in series and parallel into what is called a PV Array. The flexibility of the modular PV system allows designers to create solar power systems that can meet a wide

variety of electrical needs. Fig. 3 shows PV cell, Panel (Module) and Array. The cells are very thin and fragile so they are sandwiched between a transparent front sheet, usually and a backingsheet, usually glass or a type of tough plastic. This protects them from breakage and from the weather. An aluminum frame is fitted around the module to enable easy fixing to a support structure. To increase the power, the cells are connected in series-parallel configuration on a module. For photovoltaic systems, the PV array is the group of several PV modules which are connected in series and parallel circuits to generate the required voltage and current.

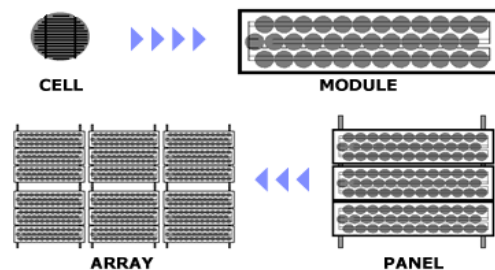


Figure 3. PV cell, module, and array

The equivalent circuit for the solar module arranged in N_p parallel and N_s series branches is shown in Figure. 4.

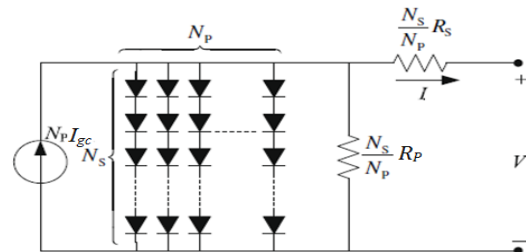


Figure 4. General equivalent circuit of PV module

The block diagram of the proposed model is implemented based on the mathematical equations of the PV cell and shown in Fig. 5 and corresponding I-V and P-V output characteristics of PV cell shown in Fig. 6.

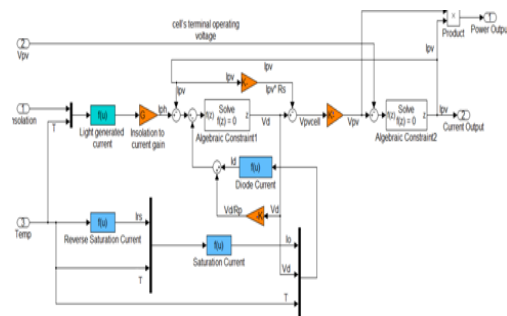


Figure 5. implementation of the PV model in Simulink

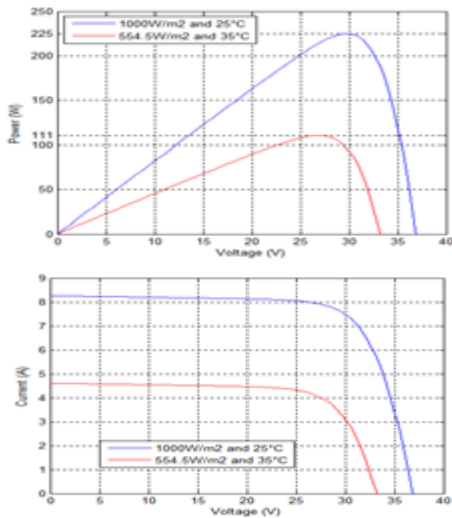


Figure 6. I-V and P-V output characteristics

✓ Wind Generator Model

Modeling the wind energy converter is made considering the following assumptions:

Friction is neglected; Stationary wind flow; Constant, shear-free wind flow; Rotation-free flow; Incompressible flow ($\rho=1.22 \text{ kg/m}^3$); Free wind flow around the wind energy converter.

On the above condition the maximum physical achievable wind energy conversion can be derived using theoretical model that is independent of the technical construction of a wind energy converter. The flow air mass has certain energy. This energy is obtained from the air movement on the earth's surface determined by the difference in speed and pressure. This the main source of the energy used by the wind turbines to obtain electric power. The Kinetic energy W taken from the air mass flow m at speed v_1 in front of the wind turbines pales and at the back of the pales at speed V_2 is illustrated by equation (13):

$$W = \frac{1}{2}m(v_1^2 - v_2^2) \text{-----(13)}$$

The resulted theoretical medium power p is determined as the ratio between the kinetic energy and the unit of time and is expressed by equation (14).

$$P = \frac{1}{2} \frac{m}{t} (v_1^2 - v_2^2) = \frac{1}{2} \frac{V\rho}{t} (v_1^2 - v_2^2) \text{-----(14)}$$

Where:

V- air mass volume; t- time; ρ - Air density.

Assuming the expression of the mean air speed

$$V_{med} = \frac{1}{2}(v_1 + v_2)$$

the mean air volume transferred per unit time can be determined as follows:

$$V_{med} = \frac{V}{t} = Av_{med} \text{-----(15)}$$

The equation for the mean theoretical power is determined using equation (15)

$$P = \frac{1}{4}A\rho(v_1^2 - v_2^2)(v_1 + v_2) = \frac{A}{4}A\rho v_1^3 \left(1 - \frac{v_2^2}{v_1^2}\right) \left(1 + \frac{v_2}{v_1}\right) \text{-----(16)}$$

We can conclude that an adequate choice of v_1/v_2 ratio leads to a maximum power value taken by the wind converter from the kinetic energy of the air masses, as shown by equation (17)

$$P_{max} = \frac{8}{27}A\rho v_1^3 \text{-----(17)}$$

This power represents only a fraction of the incident air flow theoretical power given by

$$P_{wind} = \frac{1}{2}A\rho v_1^3 \text{-----(18)}$$

Equations (17) and (18) leads to:

$$P_{max} = \frac{8}{27}A\rho v_1^3 = \frac{1}{2}A\rho v_1^3 = P_{wind} \cdot C_p \text{---(19)}$$

Where C_p represents the mechanical power coefficient which express that the wind kinetic energy cannot be totally converted in useful energy. This coefficient, meaning the maximum theoretical efficiency of wind power. The electrical power obtained under the assumptions of a wind generator's electrical and mechanical part efficiency is given by

$$P_{ele} = \frac{1}{2}C_e A\rho v_1^3 \text{-----(20)}$$

Where C_e represents the total net efficiency coefficient at the transformer terminals.

The wind energy generator model was implemented by a module having configurable parameters based on the equation (20) and using the equivalent model of a

generator. This model takes the following form and is shown in figure. 7

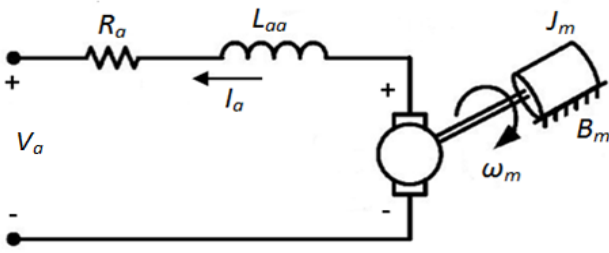


Figure 7. Equivalent circuit diagram of a small wind generator

In the equivalent circuit diagram of a small wind generator the notations are:

R_a - rotor winding resistance

I_a - generator separate excitation winding; current I_a through this winding generates the main field

V_e - induced voltage in the rotor (armature) V - terminal voltage, Kirchoff's voltage law, the electrical side of the PMDC generator can be presented as follows,

$$V_a = K_m \omega_m - I_a R_a - L_{aa} \frac{dI_a}{dt} \text{-----(21)}$$

Where V_a is the generator output voltage (V), K_m is the torque constant (N-m/A), ω_m is the motor speed (rad/s), I_a is the armature current (A), R_a is the armature resistance (Ω), and L_{aa} is the armature inductance (H).

On the mechanical side, the electromagnetic torque (T_e) developed by the DC machine is proportional to the armature current I_a , as shown below

$$T_e = K_m I_a \text{-----(22)}$$

The applied torque produces an angular velocity ω_m according to the inertia J_m and the friction B_m of the machine and load. The relations are described by

$$J_m \frac{d\omega_m}{dt} = T_e - T_L - B_m \omega_m \text{-----(23)}$$

Where J_m is the total inertia (Kg.m^2), T_L is the load torque (N-M), T_e is the electromagnetic torque (N-M), and B_m is the viscous friction coefficient (N-M-S).

The amount of power that a wind turbine can extract from the wind depends on the turbine design. Factors such as the wind speed and the rotor diameter affect the amount of power that a turbine can extract from the wind. The wind turbine was modeled using the mathematical equations. Figure. 8 shows the wind turbine model which adopted for this study. As illustrated, there are three inputs and one output. The three inputs are the generator speed, the pitch angle, and the wind speed. The output is the torque applied to the generator shaft.

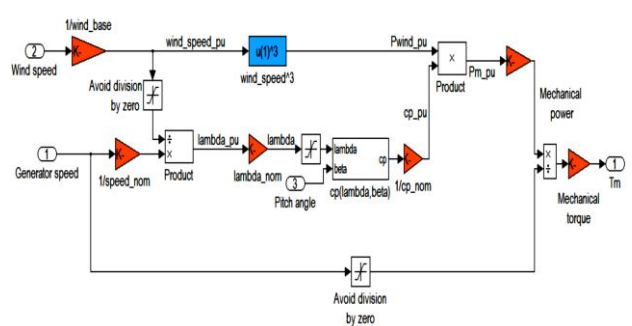


Figure 8. implementation of the wind turbine in Simulink

The built-in SimPower System block model of a DC machine is used as a power generator driven by the wind turbine (MathWorks 2012). As shown in Fig. 9, the rotor shaft is driven by the wind turbine which produces the mechanical torque according to the generator and wind speed values and the Figure. 10 shows the wind turbine characteristics.

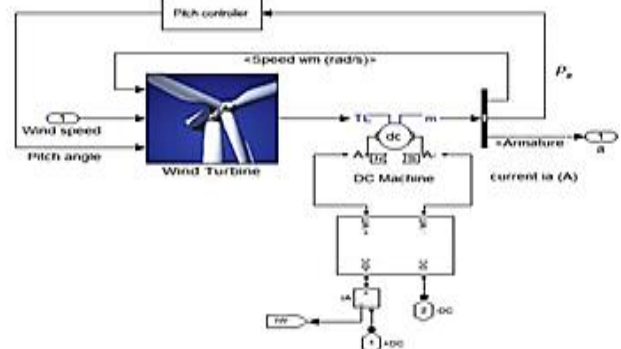


Figure 9. Implementation of the wind turbine DC generator model in Simulink

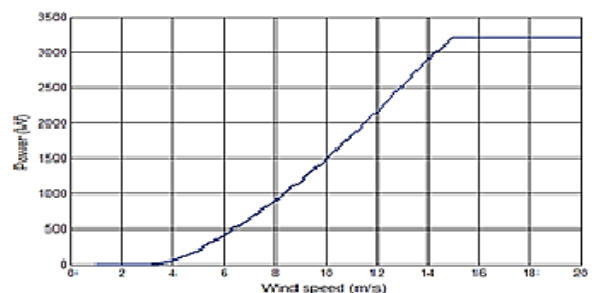


Figure 10. wind turbine characteristics

✓ **Battery Storage Model**

The battery is modeled using a controlled voltage source in series with a constant resistance, as shown in Figure. 11

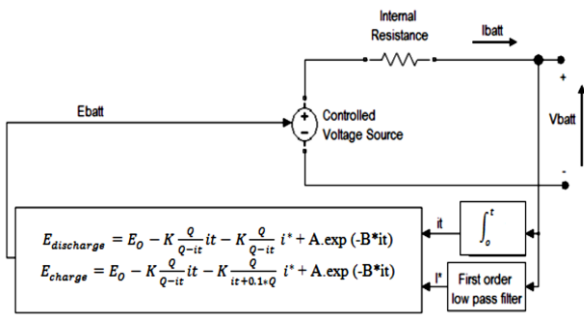


Figure 11. Battery model equivalent circuit

Discharge Model:

The Discharging battery model used is based on the Shepherd model (Shepherd 1965) but, it can represent accurately the voltage dynamics when the current varies and takes into account the open circuit voltage (OCV) as a function of state-of-charge (SOC). The OCV varies non-linearly with the SOC. Therefore, a term concerning the polarization voltage has been added $[K \frac{Q}{Q-it}]$ to better represent the OCV behaviour.

The battery voltage (V_{batt}) obtained can be described as (Tremblay & Dessaint 2009):

$$V_{batt} = E_0 - K \frac{Q}{Q-it} it - Ri - K \frac{Q}{Q-it} i^* + A * \exp(-B it) \quad (24)$$

Where E_0 is the battery constant voltage (V), K is the polarization constant (Ah^{-1}), Q is the maximum battery capacity (Ah), it ($\int i dt$) is the actual battery charge (Ah), R is the internal resistance (Ω), i is the battery current (A), i^* is the low frequency current dynamics (A), A is the exponential zone amplitude (voltage drop during the exponential zone) (V), & B is the exponential zone time constant inverse (Ah)⁻¹.

Charge Model :

The battery charge behaviour, especially the end of the charge characteristic, is different and depends on the battery type. This phenomenon can be modeled by the polarization resistance term ($K \frac{Q}{it}$). The polarisation resistance increases until the battery is almost fully charged ($it = 0$). Above this point, the polarization resistance increases suddenly. Theoretically, when it =

0 (fully charged), the polarization resistance is infinite. This is not exactly the case in practice. Actually, experimental results have shown that the contribution of the polarization resistance is shifted by about 10% of the capacity of the battery (Tremblay & Dessaint 2009). Hence the polarization resistance of the charge model can be described as:

$$Pol \text{ Resistance} = K \frac{Q}{0.1Q+it} \quad (25)$$

Similar to the discharge model, the exponential voltage for the Li-Ion battery is $A * \exp(-B it)$ term. Hence, the battery voltage obtained can be described as (Tremblay & Dessaint 2009):

$$V_{batt} = E_0 - K \frac{Q}{Q-it} it - Ri - K \frac{Q}{0.1Q+it} i^* + A \exp(-B it) \quad (26)$$

For the fully charged voltage (V_{full}), the extracted charge is 0 ($it = 0$) and the filtered current (i^*) is '0' because the current step has just started:

$$V_{full} = E_0 - (R * i) + A \quad (27)$$

In steady state the filtered current is equal to (i). Hence, the exponential zone voltage (V_{exp}) can be described as

$$V_{exp} = E_0 - K \frac{Q}{Q-Q_{exp}} (Q_{exp} + i) - Ri + A * \exp(-\frac{3}{Q_{exp}} Q_{exp}) \quad (28)$$

And the nominal zone voltage (V_{nom}) can be given by:

$$V_{nom} = E_0 - K \frac{Q}{Q-Q_{nom}} (Q_{nom} + i) - Ri + A * \exp(-\frac{3}{Q_{exp}} Q_{nom}) \quad (29)$$

The model of the is implemented in MatLab/Simulink based on the mathematical equations. as shown in Figure. 12 and 13 shows the typical charge characteristics of the battery.

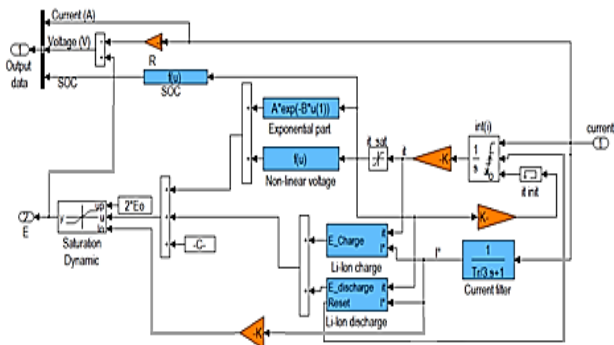


Figure 12. implementation of the battery model in Simulink

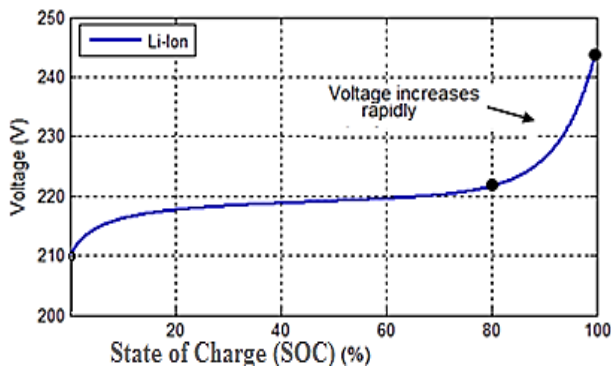


Figure 13. Typical charge characteristic

6. The Power Converter Models

Power electronics is the technology associated with efficient conversion, control and conditioning of electric power from its available form into the desired electrical output form. Power Electronics refers to control and conversion of electrical power by semiconductor devices, wherein these devices operate as switches. The main task of power electronics is to control and convert electrical power from one form to another. The four main forms of conversion are: AC-to-DC rectification, DC-to-AC conversion, DC-to-DC conversion, and AC-to-AC conversion. In the following discussion, we will explain the basic characteristics of DC/DC converter, and DC/AC inverter.

A. DC-DC Boost Converter

To connect a photovoltaic, wind turbine an external power system (e.g. DC load), it is necessary to boost their voltage or to increase their number. Therefore, a DC averaged switched model converter is needed to regulate the output voltage before being supplied to other electronic devices. There are many DC-to-DC converters including the step-down (buck) converter, the step-up (boost) converter, the buck-boost converter

and many others. Most DC to DC converter circuits also regulate the output voltage. Some exceptions include high-efficiency LED power sources, which are a kind of DC to DC converter that regulates the current through the LEDs, and simple charge pumps which double or triple the output voltage. DC to DC converters developed to maximize the energy harvest for photovoltaic systems and for wind turbines are called power optimizers.

The following will evaluate the step-up (boost) converter which is shown in Figure. 14.

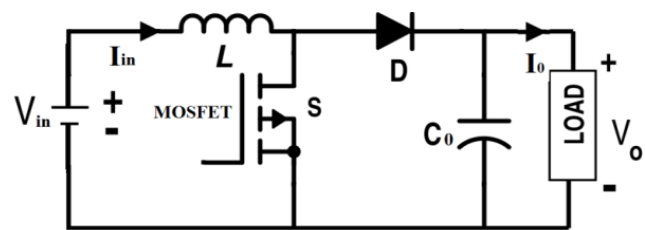


Figure 14. Boost Converter

Power for the boost converter can come from any suitable DC sources, such as batteries, solar panels, rectifiers and DC generators. A process that changes one DC voltage to a different DC voltage is called DC to DC conversion. A boost converter is a DC to DC converter with an output voltage greater than the source voltage. A boost converter is sometimes called a step-up converter since it "steps up" the source voltage. Since power must be conserved, the output current is lower than the source current. which has boosting the voltage to maintain the maximum output power constant for all the conditions of temperature and solar irradiance variations. The MPPT uses the converter to regulating the input voltage at the PV MPP and providing load-matching for the maximum power transfer. The regulation is normally achieved by PWM at a fixed frequency and the switching device is generally BJT, MOSFET or IGBT. There are several different types of dc-dc converters, buck, boost, buck-boost topologies, have been developed and reported in the literature to meet variety of application specific demands .The topology used for DC to DC converter is boost converter. The boost converter is shown in fig. 6 when the switch S is on, the current builds up in the inductor L due to the positive inductor voltage is equal to the input voltage. When S is off, the voltage across L reverses and adds to the input voltage, thus makes the output voltage greater than the input voltage. For steady state operation, the average voltage across the

inductor over a full period is zero. By designing this circuit we can also investigate performance of converters which have input from solar energy the boost converter output voltage can be calculated as follows:

$$\int_0^{T_s} V_L(t) dt = V_{in}(DT_s) + (V_{in} - V_0)(1 - D)T_s \quad (30)$$

Where V_L is the inductor voltage, V_{in} is the input voltage, V_0 is the output voltage, T_s is the switching period and D is the switch duty cycle ($0 \leq D \leq 1$). Equal to zero and collect term:

$$V_{in}(1 + D - D) - V_0(1 - D) = 0 \quad (31)$$

Therefore, the voltage conversion ratio for the boost is:

$$R(D) = \frac{V_0}{V_{in}} = \frac{1}{1 - D} \quad (32)$$

Consequently, from the above equations, a DC switch model converter is built and implemented using MatLab/Simulink. The proposed model is implemented as shown in Figure. 15

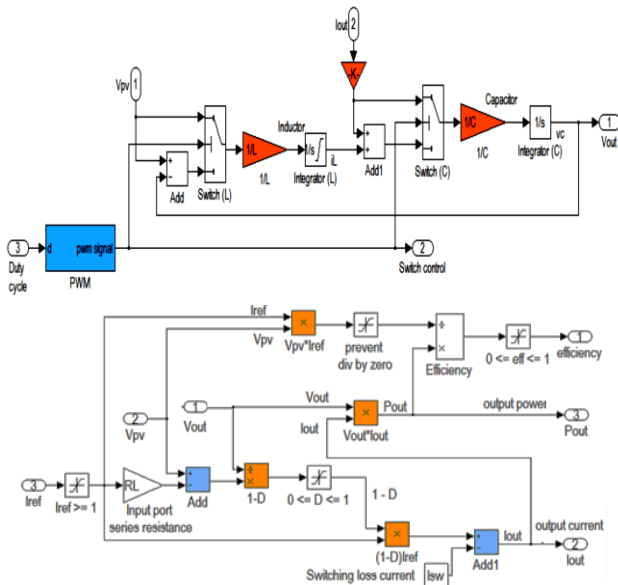


Figure 15. Subsystem implementation of the DC/DC converter model with (a) Duty cycle control (b) Input current reference (Natsheh&Albarbar 2011).

B. The DC/AC Inverters

A DC/AC switching inverter is developed, As shown in Figure. 16

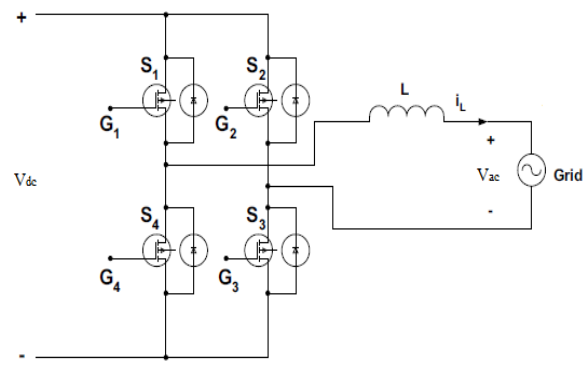


Figure 16. DC/AC switching inverter

The basic operation of the DC/AC switching inverter is to generate AC waveform from the DC signal, by operating each pair of switches S1-S3 and S2-S4 alternately with their duty cycle for each switching period. By applying net volt-seconds to the inductor over one switching period, the AC output voltage can be calculated as follow:

$$V_L = \frac{1}{T_s} \int_0^{T_s} V_L(t) dt = D(V_{dc} - V_{ac}) + (1 - D)(-V_{dc} - V_{ac}) \quad (33)$$

$$(2D - 1)(V_{dc} - V_{ac}) = 0 \quad (34)$$

Therefore, the voltage conversion ratio for the inverter is:

$$R(D) = \frac{V_0}{V_{in}} = 2D - 1 \quad (35)$$

With a voltage conversion ratio equal to $(2D-1)$, an AC averaged switch model inverter is built and implemented using MatLab/Simulink (Natsheh&Albarbar 2012), to convert the direct current into alternating current, at a switching frequency greater than the AC line frequency (50Hz - 60Hz). Losses are included due to output-port series resistance and input-port switching loss current.

The proposed model is implemented as shown in Figure 17

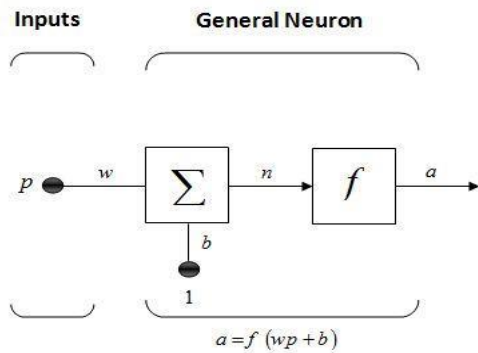


Figure 19. Architecture of a single artificial neuron

Figure 19 shows a single artificial neuron with an input vector p , a connection weight vector w , a bias b , an activation function f and an output a . The output (a) of this neuron is defined as follows (Haykin 1998):

$$a = f(\mathbf{p} \cdot \mathbf{w} - b) = f\left(\sum_{n=1}^N p_n \cdot w_n - b\right), \nabla \mathbf{p} = \begin{pmatrix} p_1 \\ \vdots \\ p_N \end{pmatrix}, \nabla \mathbf{w} = \begin{pmatrix} w_1 \\ \vdots \\ w_N \end{pmatrix}$$

The effect of the bias b on the activation function f is a shift to the left or the right, depending on whether it is positive or negative. The activation function f can be taken from a set of activation functions (as piecewise-linear function, hard limit function, sigmoid function). Some of the most popular activation functions are shown in Figure 20.

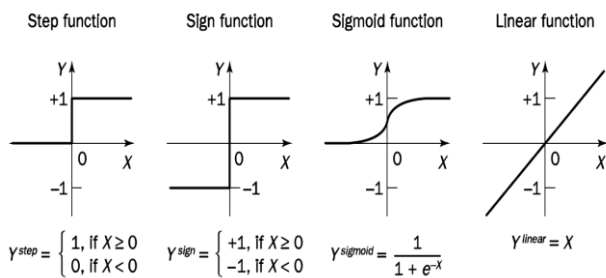


Figure20. Popular activation functions used in ANN

Using this basic model of a neuron as shown in Figure 19, different ANN architectures have evolved, among them feed-forward neural network. Feed-forward ANNs allow signals to travel in one way only; from inputs to outputs. They are extensively used in nonlinear system modeling (Hagan & Bemuth 1996). The earliest kind of neural network is a single layer perceptron network which consists of a single layer of output nodes; the inputs are fed directly to the outputs

via a series of weights. In this way it can be considered the simplest kind of feed-forward network. The next popular feed-forward model, as shown in Figure 21, is the multi-layer perceptron. It is a feed forward neural network model that maps sets of input data onto a set of outputs. It has more than two layers. The layers are fully connected. So that, every neuron in each layer is connected to every other neuron in the adjacent forward layer.

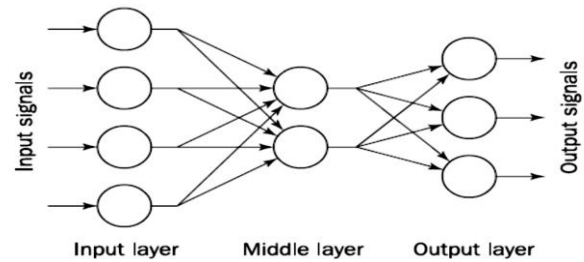


Figure 21. Architecture of a multilayer perceptron

A neuron determines its output in a way similar to Rosenblatt's perceptron (Negnevitsky 2004). First, it computes the net weighted input

$$\sum_{i=1}^n x_i w_i - \theta \quad \text{-----} 36$$

Where n is the number of inputs and θ is the threshold applied to the neuron

B. Fuzzy Expert System

It is often suggested that the power of the human brain is a function of its ability to efficiently process imprecise information. To introduce this "fuzzy logic" to a computational setting, the critical elements are not numbers but fuzzy sets. Fuzzy sets allow for quick processing of information by association of vaguely similar patterns while providing the means to deal scientifically with subjectivity - a territory that traditional science has essentially ignored. Fuzzy logic is a type of logic that recognizes more than simple true and false values. It reflects how people think. It attempts to model our sense of words, our decision making and our common sense. Fuzzy logic is determined as a set of mathematical principles for knowledge representation based on degrees of membership rather than on crisp membership of classical binary logic (Zadeh 1965). In 1973, Lotfi Zadeh succeeded in outlining a new approach to analysis of complex systems (Zadeh 1973). He

suggested capturing human knowledge in fuzzy rules. A fuzzy rule can be defined as a conditional statement in the form:

IF x is A
THEN y is B

Where x and y are linguistic variables, A and B are linguistic values determined by fuzzy sets on the universe of discourses X and Y , respectively.

In general, a fuzzy expert system incorporates not one but several rules that describe expert knowledge. The output of each rule is a fuzzy set, but usually we need to obtain a single number representing the expert system output.

To obtain a single crisp solution for the output variable, a fuzzy expert system first aggregates all output fuzzy sets into a single output fuzzy set, and then defuzzifies the resulting fuzzy set into a single number. Although there are several defuzzification methods (Cox 1999), the most popular one is the centroid technique. It finds the point where a vertical line would slice the aggregate set into two equal masses. Mathematically this centre of gravity can be expressed as (Negnevitsky 2004):

$$COG = \frac{\sum_{x=a}^b \mu_A(x)x}{\sum_{x=a}^b \mu_A(x)} \dots\dots\dots 37$$

Where x is an element of the universe X , A is a fuzzy set of the universe X , and $\mu_A(x)$ is the membership function of set A . In 1975, Mamdani built one of the first fuzzy systems to control a steam engine and boiler combination (Mamdani&Assilian 1975). He applied a set of fuzzy rules supplied by experienced human operators.

In general, the Mamdani-style fuzzy inference process is performed in four steps: fuzzification of the input variables, rule evaluation, aggregation of the rule outputs, and finally defuzzification. To shorten the time of fuzzy inference single spike, singleton, is used as the membership function of the rule consequent (Sugeno 1985). A singleton, or more precisely a fuzzy singleton, is a fuzzy set with a membership function that is unity at a single particular point on the universe of discourse and zero everywhere else. Sugeno-style fuzzy inference is similar to the Mamdani method.

Sugeno changed only a rule consequent. Instead of a fuzzy set, he used a mathematical function of the input variable. The format of the Sugeno-style fuzzy rule is:

IF x is A AND y is B
THEN z is $f(x, y)$

Where x , y and z are linguistic variables, A and B are fuzzy sets on universe of discourses X and Y , respectively, and $f(x, y)$ is a mathematical function.

The most commonly used zero-order Sugeno fuzzy model applies fuzzy rules in the following form:

IF x is A AND y is B
THEN z is k

Where k is a constant.

In this case, the output of each fuzzy rule is constant. In other words, all consequent membership functions are represented by singleton spikes.

The result (crisp output) is then obtained by finding the weighted average of these singletons.

It was found (Negnevitsky 2004) that Mamdani method is widely accepted for capturing expert knowledge. It allows us to describe the expertise in more intuitive, more human-like manner.

C. MPPT PV Control Systems

The fact that the output of the PV system is dependent upon the solar irradiance and temperature. In order to get maximum power from the solar panels the Maximum Power Point Tracking (MPPT) controllers can play an important role in photovoltaic systems, they have to operate at their maximum power point (MPP) despite the changes in the environment conditions. Maximum Power Point Tracking (MPPT) which significantly increases the efficiency of the solar photovoltaic System. There are different MPPT control methods used for solar PV systems, Incremental conductance(IC), Perturb and observe(P&O), Constant Current method, Constant Voltage method, Fuzzy Control, and Neural Network Control.

Furthermore, the solar irradiation is unpredictable, which makes the MPP of the PV module change continuously, as shown in Figure 22.

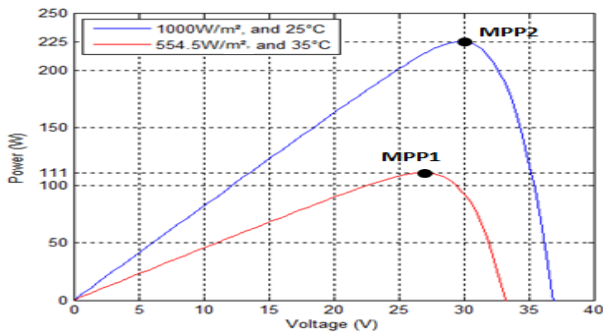


Figure 22. MPP of a PV module under different conditions

Hence tracking the maximum power point (MPP) of a photovoltaic array is an essential part of a PV system. As such, many maximum power point tracking (MPPT) techniques have been developed and implemented (Esrām & Chapman 2007). Among these techniques, hill-climbing MPPT such as perturb and observe (P&O), which is a simple algorithm that does not require previous knowledge of the PV module characteristics and is easy to implement with analogue and digital circuits. In the literature there are two methods for implementing P&O algorithm: direct method (duty ratio perturbation) and indirect method (reference voltage/current perturbation). In the direct methods, the MPP is searched by continuously perturbing the duty cycle of the DC-DC converter. Although the simplicity is the main feature of this method, it has a slower transient response compared to the indirect method and worse performance at rapidly changing irradiance (Elgendy et al. 2012). In this section, intelligent control technique using artificial neural network is associated to an MPPT controller in order to increase the tracking response and consequently increase the tracking efficiency.

✓ **Perturb and Observe Method**

The problem considered by MPPT techniques is to automatically find the optimum voltage (V_{MPP}) or current (I_{MPP}) at which a PV array should operate, under a given solar irradiance and temperature. Perturb and observe method is the most commonly used technique because of its simplicity and ease of implementation (Natsheh & Albarbar 2011). It requires two inputs: measurement of the current (I_{pv}) and

measurement of the voltage (V_{pv}). The P&O algorithm operates by periodically perturbing (incrementing or decrementing) the PV array terminal voltage or current, and comparing the PV output power with the previous one. If it is positive the control system moves the PV array operating point in the same direction; otherwise, it is moved in the opposite direction. In the next perturbation cycle the algorithm continues in the same way. Figure 23 shows the flow chart of P&O algorithm. The advantage of using this method to track MPP is that it is more efficient than the I&C method in a way that it is able to correctly locate the operating point of the PV array. There is a tradeoff between the power efficiency and reliability of tracking MPP. Since the I&C method will move away from the power operating point under rapidly changing light condition and not be able to go back the maximum operating point quickly, this will lead to the inefficient use of the PV array and hence this affects the whole system performance of tracking MPP.

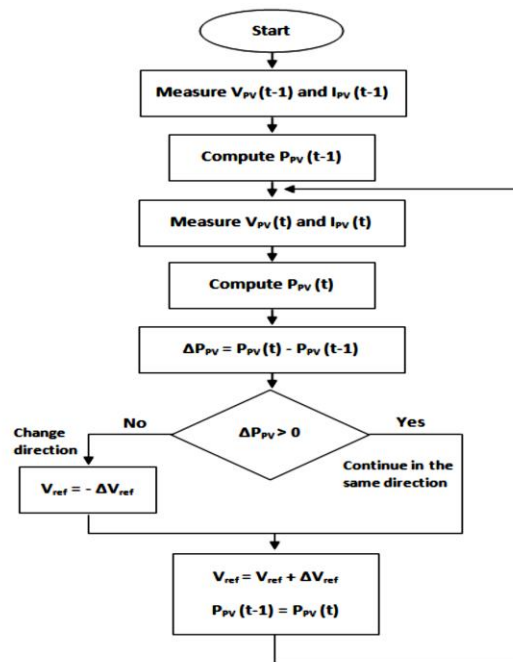


Figure 23. P&O algorithm flow chart

The main problem of this method can be seen when solar radiation rapidly change. As illustrated in Figure 24, starting from an operating point A, if atmospheric conditions stay approximately constant, the voltage perturbation (ΔV) will bring the operating point to B and the perturbation will be reversed due to a decrease in power.

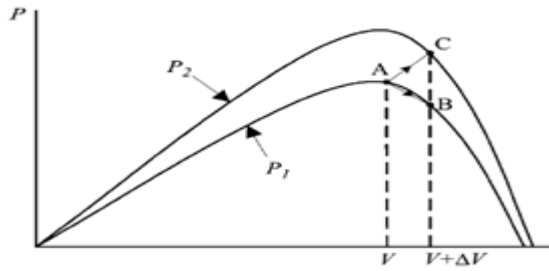


Figure 24. Divergence of P&O from MPPT

Furthermore, P&O technique may cause many oscillations around the MPP, and this slows down the response of the system. Hence, to remove power fluctuates and to keep the load voltage stable, different controller has been used along with the P&O.

✓ **Artificial Neural Network Method**

A neural network is an artificial representation of the human body that tries to simulate its learning process. In other words, ANN is an adaptive system that changes its structure based on internal or external information that flows through the network. The aim of using ANN here is to optimize the response of the MPPT, in order to increase the tracking efficiency. Figure 25 shows the structure of the proposed PV control system.

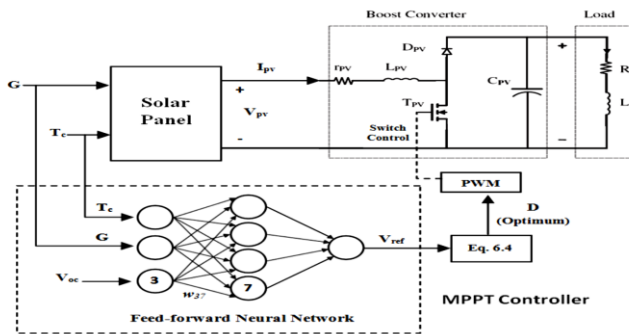


Figure 25. shows the structure of the proposed PV control system

As shown the neural network control (NNC) is used to estimate the PV array operating voltage (V_{ref}) which corresponds to P_{max} at any given solar radiation and cell temperature. It consists of three layers. The input layer is composed of three nodes in inputs that are; the solar radiation (S), cell temperature (T_c) and the cell's open circuit voltage (V_{oc}) at a $25^{\circ}C$ and $1kW/m^2$. The hidden layer composed of four nodes whose function of activation is hyperbolic tangent sigmoid transfer function. The output Hybrid Power Systems Energy Management Based on Artificial Intelligence layer is

composed of one node that is the optimum operating voltage (V_{ref}) whose function of activation is of linear type.

III. RESULTS & CONCLUSION

In this chapter the simulation results of the proposed hybrid system and its control strategy shown in Figure 18 will be discussed. Here, P&O algorithm is proposed MPPT controller system. The total power of the solar power plant and wind Turbine are shown in figure 26 (a) and (b).

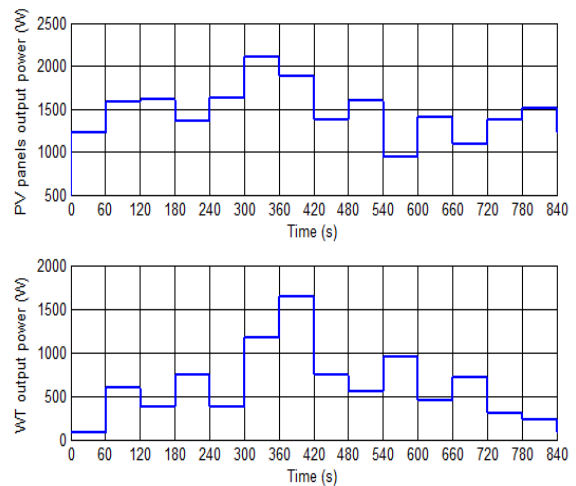


Figure 26 (a) Total power of the solar power plant (b) Total power of the wind Turbine

The figure. 27 and 28 illustrates the voltage waveform and current measured at the bus bar.

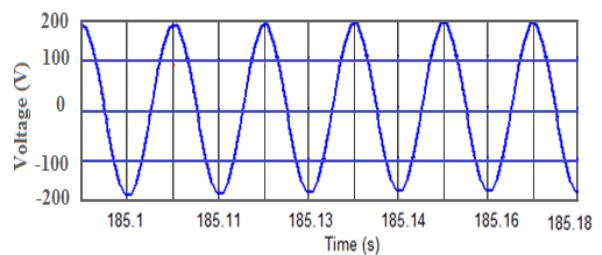


Figure 27. Voltage waveforms at load side

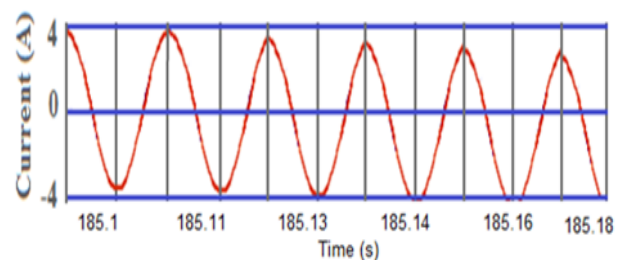


Figure 18. Current waveforms at load side

This paper presented the modeling of a hybrid solar-wind energy system with battery storage using Matlab/Simulink. This application is useful for analyze and simulate a real hybrid solar-wind energy system connected to a local grid. The blocks like wind model, solar energy model conversion and load are implemented and the results of simulation are also presented. Hybrid power generation system is good and effective solution for power generation. People should motivate to use the non-conventional energy resources. It is highly safe for the environment as it doesn't produce any emission and harmful waste product like conventional energy resources. It is cost effective solution for generation. It only need initial investment. It has also long life span. Overall it good, reliable and affordable solution for electricity generation

IV. ACKNOWLEDGMENT

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Evaluation of Different Parameters of IEEE 802.15.4 and Other Short Range Networking Technology

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ABSTRACT

Zigbee is a high level communication protocol based on IEEE 802.15.4 standard. Zigbee 802.15.4 is used to create personal area networks for communication between hand held devices like cell phone or tabs etc, with small, low-power digital radios such as for home automation, medical device data collection. This technology is very suitable for sensor and control devices used in industry as well as home which require slow speed, less power consumption, low-bandwidth needs and wireless connection designed for small scale projects. Zigbee provides Medium access control and physical layer wireless standard. Zigbee operates in the industrial, scientific and medical (ISM) over different radio bands i.e. 868 MHz in Europe and 915 MHz in the USA and Australia, 784 MHz in China. It is being used with small transmitters for next generation automated manufacturing in industry, to connect a central computer with other devices in a project allowing a less expensive and longer power supply for communication between devices and central computer.

Keywords: WPAN, Bandwidth, MAC, SEP, CSMA/CA, FFD.

I. INTRODUCTION

Zigbee is a new technology to support short range wireless communication which provides a smart alternate to other existing technologies like Bluetooth or wireless fidelity. It is known for its smart energy saving features because it consumes very less power which enabled the batteries to last longer as compared with other technologies and with fewer expenses. The name Zigbee came from the communication method employed by honey bees in the form of dance called waggle dance. In this paper we will study about various devices which are used in zigbee communication and protocols in stack, and compare specifications of zigbee with other similar technology. In zigbee communication, a group of a group of technology are employed to make standard to meet self organising, self robustness and a scalable network. Zigbee over IEEE 802.15.4 standard supports a generic mesh topology in which each device has a dedicated connection with other devices in the network. Zigbee supports both tree as well as star network topologies. Zigbee has a defined transmission rate of 250 Kbit/s which is good rate for periodic or irregular data transmission. It is well suited for a single signal

transmission from a sensor or input device. The 802.15.4 standard zigbee network addressing follows 64-bit IEEE and 16-bit short addressing, which support over 65,000 nodes per network.

I. OVERVIEW OF 802.15.4 STANDARD

IEEE 802.15.4 is a standard for wireless communication and is defined and maintained by the IEEE 802.15 working group. It specifies the physical layer and media access control for low range wireless personal area network. It was defined in 2003. The 802.15.4 form basis for zigbee and others such as ISA100.11a, MiWi (Microchip Wireless protocol), SNAP and wirelessHART (Highway Addressable Remote Transducer Protocol). The 802.15.4 can also be used with 6LoWPAN technology, which can be used to define the upper layers to deliver the IPv6 version of the Internet Protocol(IP) over WPANs.

In this section we will examine the structure, devices and application of zigbee. Zigbee operates over Media access control (MAC) and physical layer defined by IEEE in

802.15.4 standard which support a low rate wireless personal area network for home held networking as well as industry. The basic unit of data transmission is frame, frames are of four fundamental types (data frame, acknowledgment frame, beacon frame and MAC command frames), which enable a user for a reasonable tradeoffs between simplicity and robustness.

II. ARCHITECTURE AND WORKING OF 802.15.4 STANDARD

ARCHITECTURE

In 802.15.4 standard, devices are connected over a simple wireless network to communicate with each other. Network layer is defined on the basis of OSI reference model. Only the lower layers are defined in this but mapping with the upper layers may be provided by using logical link control (802.2) accessing the MAC. There are three frequency bands available on which devices can operate; these are 868MHz (870MHz), 915MHz (902 to 928 MHz) and 2450MHz (2.4GHz). Data rate may ranges from 20kbps to maximum rate of 250kbps. An 802.15.4 protocol stack is shown in figure 1.

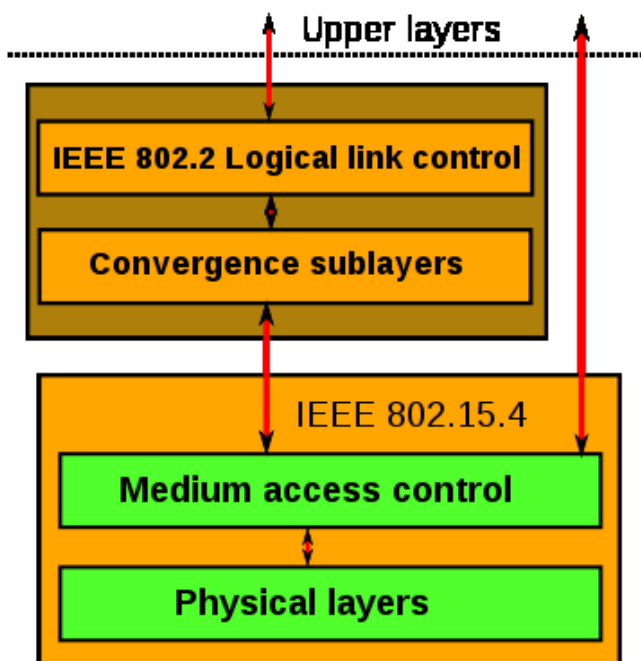


Fig. 1 The IEEE 802.15.4 protocol stacks.

Zigbee plays its role above physical layer and MAC in network layer and application framework and also concern with security in network layer. Above these in the upper layers its responsibility of user profiles in application layer as the profiles are user defined.

Physical layer- Physical layer is lowest layer which is closest to physical transmission media and it responsible for ultimately data transmission service. This layer perform channel selection, signal and energy management functions. It manages RF transceiver. It operates on one of three different frequency bands:

- 868.0–868.6 MHz- this band allows single communication channel. It is used in Europe.
- 902–928 MHz- supports up to 10 channels and in use in North America. Channels are extended up to 30.
- 2400–2483.5 MHz- It is used worldwide, it supports up to sixteen channels.

These frequency bands are unlicensed. Initially in the first version (2003) of standard there were two techniques based on direct sequence spread spectrum (DSSS), one among them 868/915 band with speed of 20 and 40kbps and other technique on 2.4GHz with data rate of 250kbps. In the next version 2006 data rate was improved which supports 100 and 250kbps for 868/915 band. In the later versions, IEEE 802.15.4c and IEEE 802.15.4d were released expanding the available PHYs with several additional PHYs: one for 780 MHz band using O-QPSK or MPSK another for 950 MHz using GFSK or BPSK.

The MAC layer- the transmission of MAC frames is enabled with MAC layer through use of the physical channel. Along with the data service, it also provides a management interface and access to the physical channel it manages itself. It offers network beaconing. It also guarantees time slots, controls frame validation, and handles node associations. And finally, for security service it offers hook points.

IEEE 802.15 standard does not exchange standard Ethernet frames because it does not use 802.1D or 802.1Q. The physical frame-format is specified in IEEE802.15.4-2011 in section 5.2.

*Upper Layers-*In IEEE802.15.4 standard upper/higher layers are not defined. Interpretability sub layers are also not defined.

Types of Node- standard has defined two types of network node these are “full function device’ (FFD) and

“reduced function device” (RFD). FFD works as a coordinator for WPAN and act as a general node on network while RFD is simple device which can communicate only with FFD and hence cannot act as a coordinator node.

Zigbee Smart Energy -version 2.0 (SEP 2) is the latest version for product development, SEP 2 avails a global standard for IP-based control, both wired and wireless, for energy management in WPAN. SEP 2 version is an evolution of Zigbee Smart Energy 1.x and offers new capabilities i.e. control of plug-in hybrid electric vehicles (PHEVs) charging, HAN deployments in multi-dwelling units such as apartment buildings.

WORKING

Topology-In zigbee, two types of network can be formed, one is peer to peer network and other is star network. On each type of network, a full function device must act as a coordinator on network. Groups of devices with a limited range of distance construct the network. Each device on network is assigned a unique 64 –bit address identifier. But a shorter identifier may also be used in personal area network. In point to point or peer to peer network, network can be extended to the limit of distance between pair of connected devices. Because standard do not define any network layer, routing in not performed however additional layer can support a multimode communication in the network. The network structure can be extended to form a Mesh network in which each node has a dedicated link with other nodes on the network which increase reliability. A star network is more structured network in which the coordinator node is the central node to which other hops are connected. A star network is formed when a full functioning device (FFD) create its own personal area network. FFD itself act as a coordinator. All other devices or nodes which are connected to network are independent of other nodes in the network.

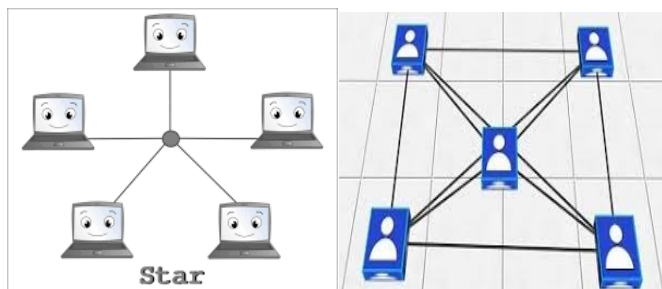


Fig. 2. Star and point to point network topology.

The basic unit of data transmission is frame; frames are of four basic types data frame, acknowledgment frame, beacon frame and MAC command frames. Generally all implemented procedures follow a typical request-confirm or indication-response scheme. Two types of addressing schemes are possible Direct Addressing and Indirect Addressing. Endpoint identifiers and radio address both are used in direct addressing scheme. While every relevant field like address, cluster, endpoints and attributes are consulted in indirect addressing. In indirect addressing, association and translation requests for communication are managed by network coordinator node. To minimise storage requirements and keep devices simple, indirect addressing is better than direct addressing. A coordinator node on the network can also define a superframe. In point to point network, unslotted CSMA/CA (carrier sense multiple access with collision avoidance) or other synchronization methods to avoid collision. A beacon synchronization phase is required to coordinator data transfer followed by CSMA if a superframe is in use. Device request is followed in data transfer, but signal request is followed if beacon are in use. If a request is received, coordinator node acknowledges the request and sends the requested data in packets and after receiving data, the device send acknowledgments. The devices which are communicating must use a common application protocol. These application protocols are grouped in profiles.

Device Types- there are three categories of Zigbee devices. These are Zigbee coordinator, Zigbee Router and Zigbee end device (Zigbee Leaf Node). Among them coordinator is most powerful and capable device which help to connect two network and act as a bridge between. It behaves as root or centre of tree network. There is only one coordinator device in a network which as a repository contains information about the network. Router in zigbee performs the function of routing data from hope to hope. And an end device in zigbee is less expensive device because it needs least amount of energy and long lasting battery time. It can only communicate to router or coordinator device but cannot forward any data from one to next node.

Device discovery-Various different types of methods are can be used in device discovery on network, selection of method depends upon the available information about the device. If a network address is not known then IEEE

address can be requested using broadcast scheme but when network address is valuable then unicast method is used to request IEEE address. External devices are assisted by extended discovery protocol to locate a device on the network.

Security- In Zigbee 128Bit AES Encryption and also application layer security is used. There are two modes a Secure MAC Mode and insecure MAC mode. Desired level of protection can be reached using MAC sub layer and upper layers. Symmetric key cryptography may be performed by upper layers processes. An access control list is constructed to secure group of devices to enforce security constraints. Access control list can also be used in peer to peer networking. 16 bit CRC protection is implemented in zigbee.

III. COMPARISON WITH OTHER TECHNOLOGIES

In this section we will compare various short range communication technologies. Other similar technologies to create a small network are Wi-Fi, Bluetooth, Mi-Fi, SNAP and wirelessHART (Highway Addressable Remote Transducer Protocol). But out of these only Bluetooth and Wi-Fi are in use, so we will compare various parameters of them with the help of a table.

Parameter	Difference with other techniques
Standard	Zigbee is defined under 802.15.4 standard of IEEE, and Bluetooth was defined under 802.15.1 but now it not under IEEE. Wi-Fi is defined in IEEE 802.11ac.
Frequency	Zigbee operates in three different frequencies i.e. 968MHZ, 918MHz and 2400MHz in different regions, while Bluetooth and Wi-Fi operates over 2.4GHz.
Distance Coverage	Zigbee can cover from 10 to 1600 meter distance while Bluetooth and Wi-Fi can cover 10 to 100 meters.
Data Transmission	Zigbee supports up to 250kbps data transfer rate which is lower

Speed	than that of Bluetooth (1Mbps) and Wi-Fi which has a excellent data rate of 1-54Mbps.
Number of Hopes supported	Zigbee support a large number of nodes around 65335 as compared with Bluetooth and Wi-Fi which supports 8 and 50nodes respectively.
Energy consumption and Battery life	Poser consumption is very low as compared with other similar technology as result battery last long (for Years) while in case of Wi-Fi and Bluetooth its only in hours or days.
Architectural Complexity and cost	Complexity of Zigbee is very simple as compared to more complex structure of Wi-Fi. And operating cost is also low than these other techniques.
Spectrum technique and network application type	Bluetooth works on Frequency Hopping Spread Spectrum technique while Zigbee uses Direct Spread Spectrum technique. Zigbee is generally used to build a small Personal area network PAN and Wi-Fi is suitable to Wireless Local Area Network (WLAN) for high data rate transfer.
Security and Reliability	In Zigbee 128Bit AES Encryption and also application layer security is used. In Bluetooth 64 bit and 128bit encryption scheme is applied and in Wi-Fi WPA/SSID is applied. 16 bit CRC is used for protection in Zigbee which is 32 bit in Wi-Fi for CRC. So Zigbee can be considered reliable networking method.

Table 1. Comparison of parameters of zigbee and other technologies.

IV. DISCUSSION AND CONCLUSION

From above comparison it is clear that Zigbee can be proven to be a better alternative to existing technology for a small personal area networking which require a long lasting power backup with minimum expense. Latest version of zigbee can cover longer distance than Bluetooth or Wi-Fi; hence it is a good option to use for controlling and monitoring in small scale industry or offices, hospitals and other organisation. So these technologies differ in application. Zigbee is better in controlling and monitoring where low data rate transmission speed is sufficient as it posses about 250kbps data transfer speed limits, but Wi-Fi is more suitable for high speed transmission. Selection of appropriate alternative is depends upon distance or area to be covered in network. Wi-Fi is suitable for creation of wireless local area network and zigbee is applicable in wireless personal area network. Numbers of nodes or devices to be connected is also an important factor. Zigbee 802.15.4 supports a large numbers of nodes as compared with Bluetooth or Wi-Fi. Zigbee is used in various appliances, because it can be programmed in chip and embedded in devices to function automatically. One can control and monitor whole organisation only sitting in control room with the help of devices connected through zigbee. Less expensive and long lasting backup enable vendors to embed small devices with zigbee chip so that these devices can be controlled through personal area networking at a reasonable cost and ensuring proper security.

V. ACKNOWLEDGEMENTS

Authors express their gratitude to their teachers and their family for their continuous support.

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Investigation of UREA-SCR in C.I. Engine Fuelled with Diesel and Jatropha Blends

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ABSTRACT

An Experimental Investigation was conducted to examine the performance and exhaust emission of diesel Engine by using Selective Catalytic Reduction (SCR) concept fuelled with diesel and Biodiesel namely Jatropha (25% of Jatropha and 75% Diesel blends). A test was conducted in four cylinder direct injection diesel engine with different loading condition. And the urea with distilled water solution was sprayed at the Exhaust manifold before it enters the SCR setup for different concentrations and the emission parameters were investigated are CO, HC, NO_x and Smoke Opacity. Results showed that Biodiesel reduced the NO_x and other emission. The result showed that the Biodiesel derived from jatropha oil showed comparable performance in the Selective Catalytic Reduction system (SCR). Results indicated that a maximum of 73.94% of NO_x reduction was achieved with constant flow rate of 0.75 lit/hr with a urea concentration of 32.5% by means of the Titanium dioxide catalyst in Selective Catalytic Reduction (SCR) System.

Keywords: Selective Catalytic Reduction (SCR); Biodiesel; Diesel; Oxides of Nitrogen (NO_x); Unburned Hydrocarbon (HC); Carbon Monoxide (CO).

I. INTRODUCTION

In the last few decades many attempts were made wide to protect life on earth. One of the main areas where a lot of attention is being paid is the vehicular pollution. Light and heavy duty vehicle manufactures face serious challenges from National Ambient Air quality standards (NAAQS) to combat at stringent levels stipulated.

Among the various types of internal combustion engines, petrol and diesel are well established. The diesel engines have become more popular because of their better torque characteristics. The use of diesel engines has increased exponentially in the last decade. Diesel engines are widely used owing to their high thermal Efficiency and low Maintenance.

Inspite of these benefits Diesel engine emission case serious human discomforts all over the world. Oxides of Nitrogen and particulates are the major pollutants from the diesel engines. Reducing Oxides

of Nitrogen and particulate matter in exhaust gas of diesel Engine has become very important to protect environment and to save energy.

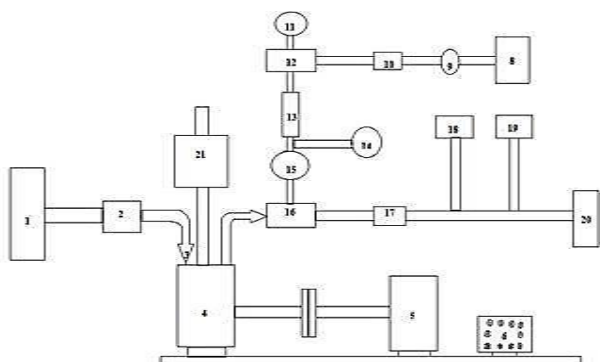
The Primary objective of this project is to control the NO_x formation in the diesel engines using the Selective Catalytic Reduction System (SCR).

The SCR method is capable of oxidizing the Greenhouse gas (NO_x) which is a by product of C.I. engines at high temperatures. Diesel Engine trucks are the workhorses of today's society, delivering the majority of goods used all over the world [3-6]. Now, after two decades of dramatic emissions reductions by developing so many different kinds of technologies, heavy truck industry has been challenged to develop even cleaner diesel engine exhaust gases to reduce environmental pollution. The leading solution is Selective Catalytic Reduction (SCR) - an emissions-reduction technology with the ability to deliver near-zero emissions of nitrogen oxides (NO_x), a smog-causing pollutant and

greenhouse gas. SCR reduces NO_x emissions to high levels, while at the same time delivering excellent fuel economy and reliability but the system doesn't change the design or operation of the basic engine setup and only need some extra fitting to a vehicle which is being used already. This technology just treats the exhaust gas coming out of C.I. engine with high performing oxidizing catalyst. The SCR system itself requires very little maintenance and no driver action while the truck is operating [7-10]. The Objective of this Experiment is to determine the maximum reduction of NO_x emission using the Selective Catalytic Reduction (SCR) System.

II. EXPERIMENTAL SETUP AND PROCEDURE

The Experiment was conducted in a light duty stationary single cylinder, four stroke, air cooled, direct injection Kirloskar Engine of 4.4kW as shown in the Figure and photographic view of the setup is shown in appendix. The engine was connected to an electrical dynamometer and AVL FGA and AVL smoke meter. The torque can be varied from the control panel.



1. Air tank
2. Air filter
3. Inlet Valve
4. Engine
5. Electrical Dynamometer
6. Loading device
7. Exhaust Valve
8. Urea tank
9. Motor
10. Pressure relief Valve
11. Battery
12. Relay
13. Heater

14. Pressure gauge
15. Solenoid Valve
16. Mixing Chamber
17. SCR catalyst
18. CRYPTON Gas Analyzer
19. AVL Smoke meter
20. Exhaust gas
21. Jatropa tank

Figure 2.1. Schematic diagram of Selective catalytic reduction system

Engine Specifications

The Selective catalytic Reduction system incorporate engine specifications are given below: **Table 2.1.1** Engine Specification

1.	Type	Four Stroke, Single Cylinder vertical Air Diesel Engine
2.	Rated Power	4.4 kW
3.	Rated Speed	1500rpm
4.	Bore Dia (D)	87.5 mm
5.	Stroke (L)	110 mm
6.	Compression ratio	17.5:1
7.	C.V. of Fuel	42500 kj/kg
8.	Density of Diesel	860 kg/m ³
9.	Density of Jatropa	932.9 kg/m ³
10.	Fuel injection	Direct injection
11.	Dynamometer Type	Electrical Dynamometer

Table 2.2.1 Properties of Urea solution

1.	Chemical Formula	(NH ₃) ₂ CO.7H ₂ O
2.	Molecular Weight (g/mol)	60.06
3.	Concentration	32.5
4.	Density (15°C)	1.085 kg/1t
5.	Appearance	Clear Transparent
6.	Smell	Odorless
7.	Acidity (PH)	9-11
8.	Freezing Point	-11°C (12°C)
9.	Self-Ignition Temperature (°C)	630

2.2 Properties of Aqueous Urea Solutions

The properties of as aqueous solutions of urea used in Selective Catalytic Reduction is given in the table

2.3 Components and connections

Experimental setup consists of various components listed in the following table

- Motor (0.75 lit/hr)
- Relay and control switch
- Copper Heater (80°C, 12 volts)
- Pressure relief valve
- Pressure valve (20 bar)
- Nozzle Injector
- valve (12 volts)
- Five gas
- Five gas Plastic storage tank (2litre)
- Copper tubes

An aqueous urea solution is stored in plastic container, which pressurized by motor and allows flow through a copper tube towards heater and passed towards solenoid valve through pressure valve and finally preheated aqueous urea solution is injected in tail pipe of engine through nozzle injector.

2.4 AVL Smoke meter

The smoke present in engine exhaust gas is measured by an AVL 437 C Smoke meter in opacity (%). The specification of AVL Smoke meter is given below

2.5 CRYPTON 295 Five Gas Analyzer (FGA)

The various gases are present in Engine Exhaust gases were measured by using CRYPTON 295 Five Gas Analyzer (FGA). The Technical specification of CRYPTON 295 Five Gas Analyzer (FGA) is given as below table

2.6 Experimental Procedure

In this Experiment urea solution must be atomized and injected into the exhaust manifold at a constant pressure of 6 bar throughout the experiment this is achieved by adjusting the flow control valve and pre-

setting the injection pressure. Urea solution of concentration varying with 30%, 32.5% and 35% by weight should be prepared before starting the engine. The heater has provided to pre-heat and vaporize the urea solution the timed spray of urea solution is to be controlled by 12V solenoid valve.



Figure 2.2. Photographic view of SCR

In our research we are going to do experiments on Diesel Engines which will be fuelled with diesel and then the Diesel and Jatropha curcas are been blend. The Jatropha curcas used is 25 percent Esterified and 75 percent of Diesel and hence no need of heating the fuel before using it since the viscosity of the fuel reduces after etherification. Urea solution with water is also used Selective catalytic Reduction (SCR) of NO_x by Urea over catalyst has become one amongst the main solutions to realize these aggressive reductions. As such, organic compound solution is injected into the exhaust gas manifold, gaseous and rotten to ammonia via compounding with the hot exhaust gas before passing through an SCR catalyst. Organic compound mixers, during this regard, are crucial to ensure made evaporation and compounding since its liquid state poses significant barriers, especially at temperature conditions that incur unsought deposits. A ceramic honeycomb composite structure adapted to be used as a catalyst support comprises a ceramic honeycomb body and ceramic layers integrally provided thereon having surfaces including therein microscopic holes, a sum of volumes of the holes 5 microns or more being coated with titanium dioxide which is the very good oxidizing catalyst this setup is fixed after Urea injection. At first engine in fuelled with Diesel and by varying the load must be gradually increased from 0% to 100% (0%, 25%, 50%, 75%, and 100%) and Urea concentration in water solution as like 30%, 32.5%, 35% and three readings are taken. The emission parameters such as Unburned Hydrocarbon, Carbon

Monoxide, Carbon-di-oxide, oxides of Nitrogen, and Smoke Opacity were recorded for every load. Again the engine should be fuelled with Biodiesel same as above concentrations of urea solution three readings are taken.

2.7 Process of Selective Catalytic Reduction system

An aqueous solution of urea injection in engine tail pipe carried out four different steps, as given below:

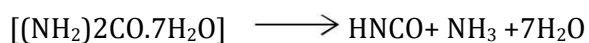
A. Hydrolysis of urea

First step of SCR process is hydrolysis of urea. In this a crystal chemically bounded urea (32.5%) is added with (67.5%) of water and stirred up to form aqueous solution. Due to high solubility and weak chemical bond of urea, water is easily mixed to form aqueous solution.



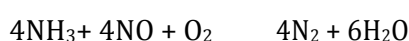
B. Evaporation of urea

Second step of SCR process is evaporation of urea. In this an aqueous solution of urea is evaporated due to thermal activity of Exhaust Gas Temperature. Due to evaporation of urea, it starts to decompose into products of isocyanic acid and ammonia. This process was carried out before aqueous solution of urea reaches honeycomb catalyst bed.



C. Reduction of NO_x

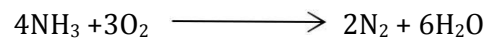
Third step of SCR process is reduction of NO_x. In this method, by products of decomposed ammonia readily reacts with Oxides of Nitrogen present in exhaust gases to form clean environment free nitrogen gas and water vapor.



D. Oxidation of excess ammonia

Final step of SCR process was oxidation of ammonia. In this method, excess ammonia present in exhaust

gases readily reacts with oxygen to form clean nitrogen and water vapor.



III. RESULTS AND DISCUSSIONS

Experiments were conducted at various concentrations of urea solution from varying 30% to 35% with constant flow rate of 0.75 liters per hour. The figures indicate that variation of various Engine emissions with respect to Engine load for various concentrations of urea solution.

3.1 Variation of Oxides of Nitrogen with injection of urea solution

Figure 3.1 shows the variation of NO_x emission with engine load of diesel fuel with various concentrations of urea solution and a constant flow rate 0.75lit/hr with SCR at constant speed of the engine. From the graph it shows that the NO_x emission decreases drastically by introducing titanium dioxide as SCR in exhaust pipe in engine.

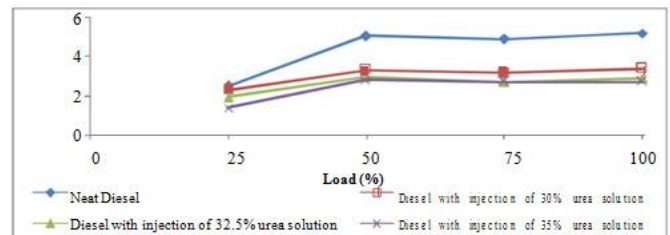


Figure 3.1 Variation on oxides of Nitrogen with Engine Load (Varying urea concentration)

A varying of urea concentration solution was prepared and injected in engine exhaust pipe with a constant flow rate of 0.75lit/hr and constant pressure of 6 bar inducing the reduction of NO_x emission rate gradually decreasing due to presence of SCR catalyst and reducing ammonia gas present in urea solution.

3.2 Variation on Unburned Hydrocarbon with injection of urea solution

A variation on HC emission with engine load of diesel fuel with various concentration of urea solution and a constant flow rate 0.75 lit/hr with SCR at constant

speed of the engine. From the graph it shows that the HC emission as SCR in exhaust pipe in engine

3.3 Variation on Unburned Hydrocarbon with Engine Load (Varying urea concentration)

A varying of urea concentration solution was prepared and injected in engine exhaust pipe before catalytic converter chamber with a constant flow rate of 0.75lit/hr and constant pressure of 6 bar inducing the variation of HC emission rate equal to normal steady state diesel engine emission, due to absence and reduction of oxygen content in exhaust gas in SCR system.

3.4 Variation of Smoke Opacity with Injection of urea solution

A variation of smoke opacity emission with engine load of diesel fuel with various concentration of urea solution and a constant flow rate 0.75 lit/hr with SCR at constant speed of the engine. From the graph it shows that the smoke emission decreases drastically by introducing titanium dioxide as SCR in exhaust pipe in engine. A varying of urea concentration solution was prepared and injected in Engine tail pipe before SCR catalyst with a constant flow rate of 0.75 lit/hr and constant pressure of 6 bar. This inducing the variation of Smoke emission rate decreases while compared neat diesel engine emission, due to decreasing of exhaust gas temperature in SCR system.

3.5 Variation of Oxide of Nitrogen with engine load for varying urea concentration (Biodiesel)

A variation of NO_x emission with engine load of Biodiesel fuel with various concentration of urea solution and a constant flow rate 0.75lit/hr with SCR at constant speed of the engine. From the graph it shows that the NO_x emission decreases drastically by introducing titanium dioxide as SCR in exhaust pipe in engine.

A varying of urea concentration solution was prepared and injected in engine exhaust pipe with a constant flow rate of 0.75lit/hr and constant pressure of 6 bar inducing the reduction of NO_x emission rate gradually decreasing due to presence

of SCR catalyst and reducing ammonia gas present in urea solution.

3.6 Variation of Unburned Hydrocarbon with engine load for varying urea concentration (Biodiesel)

The variation on HC emission with engine load of Biodiesel fuel with various concentration of urea solution and a constant flow rate 0.75 lit/hr with SCR at constant speed of the engine. From the graph it shows that the HC emission as SCR in exhaust pipe in engine.

A varying of urea concentration solution was prepared and injected in engine exhaust pipe before catalytic converter chamber with a constant flow rate of 0.75lit/hr and constant pressure of 6 bar inducing the variation of HC emission rate equal to normal steady state Biodiesel engine emission, due to absence and reduction of oxygen content in exhaust gas in SCR system.

3.7 Variation of Carbon Monoxide with engine load for varying urea concentration (Biodiesel)

A variation of Co emission with engine load of diesel fuel with various concentration of urea solution and a constant flow rate 0.75 lit/hr with SCR at constant speed of the engine. From the graphs that the CO emission gradually decreases with increasing drastically by introducing titanium dioxide as SCR in exhaust pipe in engine.

A varying of urea concentration solution was prepared and injected in engine tail pipe before SCR catalyst with a constant flow rate of 0.75 lit/hr and constant pressure of 6bar inducing the variation of CO emission rate increase with increasing compared to normal steady state diesel engine emission., due to absence and reduction of oxygen content in exhaust gas in SCR system.

3.8 Variation of Smoke Opacity with engine load for varying urea concentration (Biodiesel)

Figure: 3.8 shows that variation of smoke opacity emission with engine load of Biodiesel fuel with various concentration of urea solution and a

constant flow rate 0.75 lit/hr with SCR at constant speed of the engine. From the graph it shows that the smoke emission decreases drastically by introducing titanium dioxide as SCR in exhaust pipe in engine. A varying of urea concentration solution was prepared and injected in Engine tail pipe before SCR catalyst with a constant flow rate of 0.75 lit/hr and constant pressure of 6 bar. This inducing the variation of Smoke emission rate decreases while compared neat diesel engine emission, due to decreasing of exhaust gas temperature in SCR system.

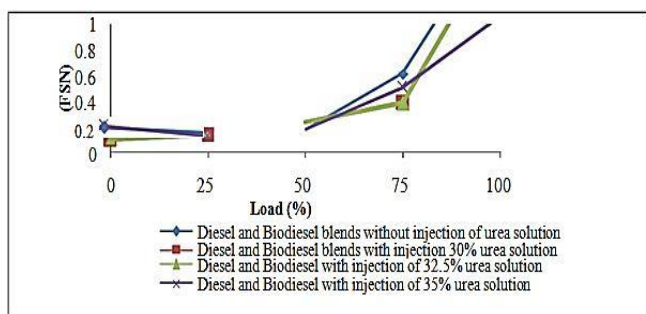


Figure 3.2. Variation of Smoke Opacity with engine load for varying urea concentration (Biodiesel)

IV. CONCLUSIONS

1.The selective catalytic reduction is an after-treatment process and it reduced the NO_x emission. The result reported that the titanium content strongly influences the thermal stability of Selective Catalytic Reduction system catalysts. The titanium catalyst surface in selective catalytic reduction system support influencing selectivity for the reduction of oxides of Nitrogen (NO_x) by ammonia.

2.Based on about result it is concluded that Biodiesel reduced maximum NO_x than the Diesel, urea injected with titanium dioxide as Selective Catalytic Reduction system in the Exhaust pipe gives a reduction of 66% in neat diesel while it is 73.94% in Biodiesel with urea concentration of 32.5%. The above result indicated that urea injected with titanium dioxide as selective Catalytic Reduction catalyst, the level of Unburned Hydrocarbon and Carbon Monoxide are also been reduced than the conventional diesel emission.

Thus, the experiments concluded that the NO_x reduction in the exhaust from C.I Engine was achieved by Selective Catalytic Reduction system

(SCR) at the Exhaust manifold when a CI engine fuelled with Biodiesel compare to neat Diesel.

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Performance and Emission Characteristics of Lemongrass Oil Fueled CI Engine

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ABSTRACT

The combustion of homogeneous charge compression ignition (HCCI) engine fuelled with neat lemongrass oil, diesel was evaluated the performance and Emission characteristics. In this regard, the combustion phenomena of lemongrass oil were investigated at engine speed of 1500 rpm and compression ratio of 17.5 in a four-stroke cycle engine. Furthermore, the engine tests were conducted with homogeneous charge compression ignition engine. The tests were conducted to measure fuel consumption, indicated power, Brake thermal efficiency, combustion characteristics and compared with conventional diesel fuel operation. The results indicated that the higher specific fuel consumption, the brake thermal efficiency was nearly equal to the diesel fuel. The experimental outcomes disclosed that successful ignition and energy release trends can be obtained from a homogeneous charge compression ignition engine fuelled with lemongrass oil.

Keywords : lemongrass oil, HCCI, Performance, Combustion

I. INTRODUCTION

Rising petroleum prices, increasing threat to the environment from exhaust emissions and global warming have generated intense international interest in developing the alternative non-petroleum fuels for engines. A lot of research work is going on for an alternative fuel. One of the great potential alternative fuels is biodiesel which is produced from vegetable oil and animal fats. For long term, the usage of vegetable oils to produce biodiesel may compete with food supply and they are seasonal and far too expensive to be used as fuel at present [1].

The country has been hit hard by the increased cost and uncertainty and so is exploring other energy sources occurring biodiesel extracted from trees is one such alternative under considerations. Bio-diesel burns cleaner than traditional petroleum diesel fuel and is biodegradable, making it an interesting alternative fuel option in terms of both environmental production and energy independence [2]. Bio-diesel would be cheap to produce as it can be extracted from certain species of tree that are common in many parts of India. Of the various alternative fuels under consideration, biodiesel,

derived from esterified vegetable oils, appears to be the most promising alternative fuel to diesel due to the following reasons [3,4].

- Biodiesel obtained from vegetable sources does not contain any sulfur, aromatic hydrocarbons, metals or crude oil residues.
- Biodiesel can be used in the existing engines without any modifications.
- Biodiesel is an oxygenated fuel; emissions of carbon monoxide and soot tend to reduce.
- Unlike fossil fuels, use of biodiesel does not contribute to global warming as the CO₂ so produced absorbed by the plants. Thus in nature CO₂ is balanced.
- The occupational Safety and Health Administration classify biodiesel as a non-flammable liquid.
- The use of biodiesel can extend the life span of diesel engines because it is more lubricating than petroleum diesel fuel.
- Biodiesel is mostly obtained from renewable vegetable oils/animal fats and hence it may improve the fuel or energy security and thus leading to economy independence.

Biodiesel is capable of solving the problems of fuel supply in a decentralized fashion and can simultaneously help to reduce environmental related problems [6,7].

HCCI engines are being actively developed because they have potential they have the potential to be highly efficient and to produce low emissions. The new combustion concept, namely homogeneous charge compression ignition (HCCI), has taken the advantage of the working principles of both Spark Ignition (SI) and Compression Ignition (CI) engines. The HCCI engine operates at nearly constant volume combustion, resulting in high thermal efficiency and improved fuel economy. Lower oxides of Nitrogen (NO_x) could be achieved due to localized mixture being relatively lean homogeneous nature [8]. Particulate emission can be reduced significantly due to homogeneous charge combustion. Even though HCCI has the advantage of the high emission reduction potential and improved fuel economy, it has many challenges such as obtaining the homogeneous mixture and controlled auto ignition. In addition, HCCI engines have been shown to operate with a range of fuels, e.g. natural gas, gasoline and bioethanol. Many institutes have already studied HCCI, but only a few of them performed experiments using biodiesel as a potential alternative fuel.

Lemongrass (*Cymbopogon flexuosus*) is a native aromatic tall sedge which grows in many parts of tropical and sub-tropical South East Asia and Africa. In India, it is cultivated along Western Ghats (Maharashtra, Kerala), Karnataka and Tamil Nadu states besides foothills of Arunachal Pradesh and Sikkim [9]. Furthermore, lemongrass is a high biomass crop that may have applications for biofuel production. Owing to the content of its high value essential oil, the cost for production of biofuel may be low, since the biomass would be a by-product of essential oil production. Lemongrass may demonstrate to be a new high value specialty crop and a worthy source for biofuel in the southeastern United States (a region known for its hot and humid climate).

Most of the experiments are conducted in different types of biodiesel prepared from different oils but some of the studies show that neat oils are mixed with diesel fuel and tested in HCCI engine[10].

In this paper, bio-diesel from lemongrass oil and to compare the performance and characteristics of homogeneous charge compression ignition engine using diesel and bio-diesel blends.

The properties of biodiesel fuel have higher viscosity, density and flash point than the diesel fuel [11]. Further the energy content or net calorific value of biodiesel is less than that of diesel fuel. There are various economically and environmental advantages to utilize this unique fuel. Indian Oil Corporation has tied up with Indian Railways to introduce the production of biodiesel producing crops over 1 million square kilometers On 12 September 2008, the Indian Government announced its 'National Biofuels Policy'. It aims to meet 20% of India's diesel demand with fuel derived from plants. Biodiesel has physical and chemical properties similar to conventional petroleum-based diesel.

II. MATERIAL AND METHODS

A) Test fuel-lemongrass oil

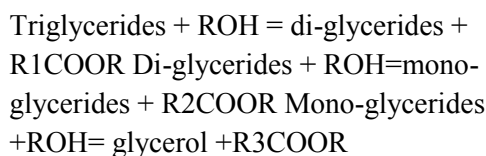
Lemongrass has a lemony, sweet smell and is dark yellow to amber and reddish in color with a watery viscosity. Lemongrass oil, often found in soaps and perfumes, is used for many beauty purposes. Lemongrass oil contains quantities of Farnesol, Nerol, Citronellal, Myrcene, Geranyl acetate. The lemongrass oils were isolated by the steam distillation method. They were extracted separately from leaves and stalks of lemongrass at certain time based on the optimization range to give a mixture of water/essential oil. Dichloromethane was used to separate the essential oil from the water layer.

In this, in order to understand the effects of LGO usage in CI engine, in cylinder gas pressure traces were examined. Although an in-depth explanation of the combustion process in diesel engine is extremely difficult due to unsteady liquid jet phenomena and mixture of non-uniformity, some useful data to highlight and explain the combustion characteristics of LGO are presented in this work. This was done with an high-resolution data acquisition system.

B) Transesterification of oil

The main aim of transesterification was to lower the viscosity of vegetable oils. In general, vegetable oil

contains 97% of triglycerides and 3 % di- and mono-glycerides and fatty acids. The process of removal of all glycerol and the fatty acids from the vegetable oil in the presence of a catalyst is called transesterification. The vegetable oil reacts with methanol and forms esterified vegetable oil in the presence of sodium/potassium hydroxide as catalyst. Transesterification is crucial for producing biodiesel from oils. The transesterification process is the reaction of a triglyceride (fat/oil) with a bio-alcohol to form esters and glycerol. However; consecutive and reversible reactions are believed to occur. These reactions are represented in equations below:



Catalyst is usually a strong alkaline (NaOH, KOH or sodium silicate) medium.

Alcohol + Ester → different alcohol + different ester.

The first step is the conversion of triglycerides to di-glycerides followed by the conversion of di-glycerides to mono-glycerides and of mono-glycerides to glycerol yielding one methyl ester molecule from each glycerides at each step. Meher et al. reported that the experimental study revealed that the optimum reaction condition for methanolysis of karanja oil was 1% KOH as catalyst. MeOH/oil of molar ratio 6:1 reaction temperature 65⁰c, at the rate of mixing 360 rpm for a period of 3 hrs.

TABLE 1. Comparison of neat lemongrass oil with diesel

Properties	LGO	Diesel
Gross Calorific value (MJ/kg)	36.279	43.35
Kinematic viscosity (cst) at 40 ⁰ c	4.18	3.25
Specific gravity (g/cc) at 27 ⁰ c	0.984	0.84
Flash point ⁰ c	50	55
Fire point ⁰ c	58	63
Cetane Index	38	45-50

The yield of methyl ester was >85% in 15 min and reaction was almost complete in 2 h with a yield of 97 – 98% with 12:1 molar ratio of MeOH oil or higher, the reaction was completed within 1 h. the reaction was incomplete with a low rate of stirring at high rpm was a time efficient process

Experimental test setup

The engine used in this experiment was a single cylinder, water cooled, kirloskar oil engine, the engine was coupled with an eddy current dynamometer through a load cell. All the experiments were conducted at standard temperature and pressure. The engine is integrated with a data acquisition the system to store the data for the off-line analysis. Cooling water is circulated separately to the engine and the dynamometer at the required flow rates. Necessary provisions are made to regulate and measure through electronic control unit of flow rates of air, fuel and coolant.

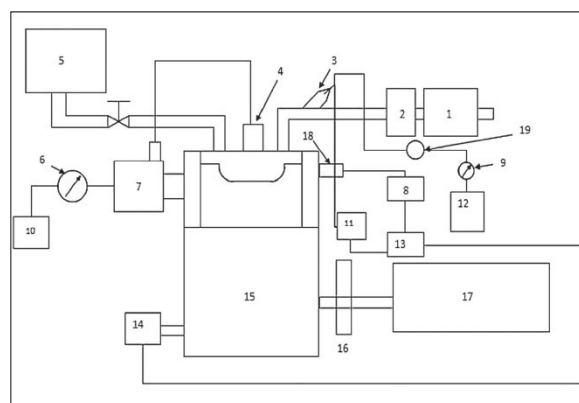


Figure 1. Block diagram of engine

- 1-Air surge tank
- 2-Electric heater
- 3-Auxillary fuel injector
- 4-Main fuel injector
- 5-Exhaust gas analyser
- 6-Flow meter
- 7-Fuel injector pump
- 8-Charge amplifier
- 9-Flow meter
- 10-Main fuel tank
- 11-Temperature controller
- 12-Port fuel tank
- 13-Data acquisition
- 14-Crank angle encoder
- 15-Engine
- 16-Flywheel
- 17-Dynamometer
- 18-Pressure Transducer
- 19-Fuel control valve

The engine was loaded with eddy current dynamometer and the loads are applied in steps of 0, 25, 50, 75 and 100 percentage of full load. For each load , the engine

performance parameters and engine emissions were recorded; the dynamic fuel injection timing was set at 27° by BTDC. Fuel consumption was measured by a burette attached to the engine and a stop watch was used to measure fuel consumption time for every 10 cm^3 fuel. Carbon-monoxide, unburned hydrocarbon, and NO_x emission were measured by Wahum Cubic Gas Analyzer. Smoke emissions were measured by means of Bosch smoke meter. Chromyl-alumel (k-type) thermocouple was used to measure the exhaust gas temperature[12]. The engine is started by using standard diesel and the engine operating temperature was reached and then loads are applied. The warm up period ends when cooling water \times temperature is stabilized at 60°c [13]. The tests are conducted at the rated speed of 1500 rpm. In every test, volumetric fuel consumption and exhaust gas emission such as carbon monoxide, unburned hydrocarbon, nitrogen oxides, are measured. From the initial measurement, brake thermal efficiency (BTE), specific fuel consumption (SFC), brake power (BP), Indicated mean effective pressure (IMEP), mechanical efficiency and exhaust gas temperature for different ratio are calculated and recorded

TABLE II. Engine specification

Engine manufacturer	Kirloskar engines
Bore and stroke	87.5 x 110 (mm)
Number of cylinders	1
Compression ratio	17.5:1
Speed	1500 rpm
Cubic capacity	0.661 litres
Method of cooling	Water cooling
Clearance volume	37.8 cc
Nozzle opening pressure	200 bars

III. RESULTS AND DISCUSSION

A. Performance analysis

a) Brake thermal efficiency

For neat LGO, brake thermal efficiency is increased by 11 % (at 25% load), 11.7 % (at 50% load), 13.5 % (at 75% load) and decreased by 5.3% (at Full load) because of better vaporization and the combustion chamber surface is relatively hot and that would help in better air entrainment for better mixing.

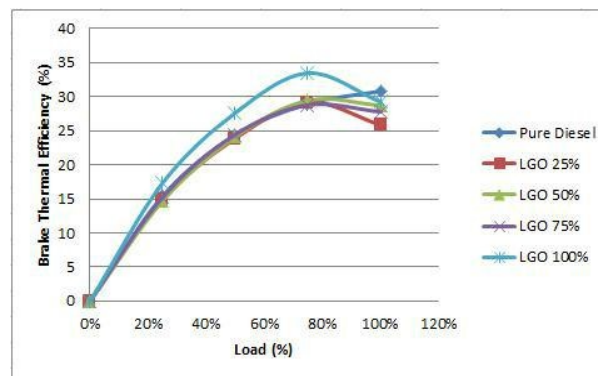


Figure 2. Variation of Brake thermal efficiency and load

b) Indicated thermal efficiency

The graph shows a similar trend for all the loads of operation. For the entire blending ratio, the Indicated thermal efficiencies are nearly equal to diesel fuel except neat LGO (at Full load). For LGO, ITE is increased by 7.3% (no load),

13.6% (at 25% load), 10.3 % (at 50% load), 17.4 % (at 75% load) but decreases at full load by 0.5%.

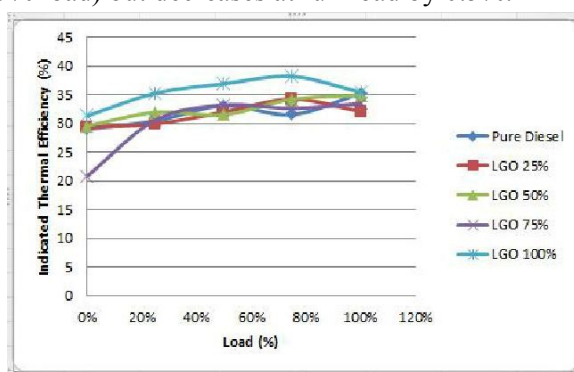


Figure 3. Variation of Indicated thermal efficiency and load

c) Specific fuel consumption

The graph shows a similar trend for all the loads of operation. For all the ratios, specific fuel consumption is increasing while comparing with pure diesel fuel. For LGO, SFC is increased by 6.25 % (at 25% load), 5.5 % (at 50% load), 3.57 % (at 75% load) and 20.8 % (at full load). This could be due to lower calorific value of higher ratios of LGO. But lower values of SFC are desirable one.

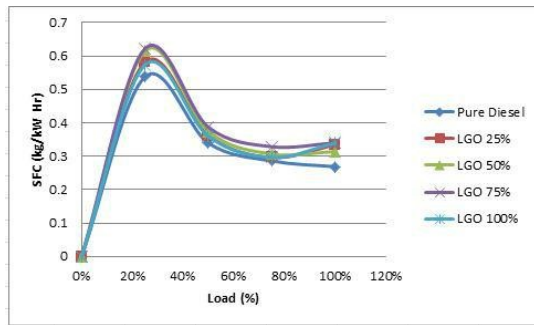


Figure 4. Variation of Specific fuel consumption and load

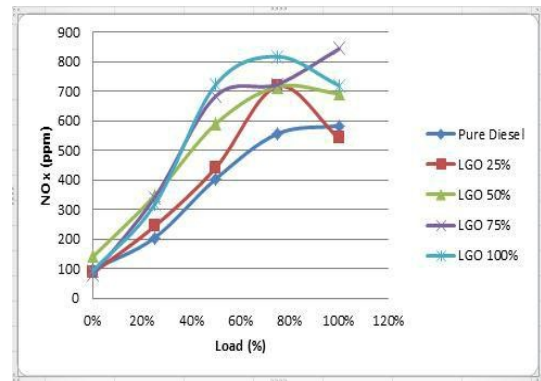


Figure 6. Variation of NO_x and load

d) Exhaust gas temperature

The variation of exhaust gas temperature for different ratios of LGO is shown in fig.6. The results indicate that exhaust gas temperature is almost same as that of diesel fuel. The maximum temperature was measured for LGO: 50 at full load of operation ($446^{\circ}C$) when compared with diesel fuel ($433^{\circ}C$). For LGO: 25 & LGO: 50 the temperature values are lower than that of diesel fuel.

B. Emission analysis

a) NO_x Emission

It is observed that the NO_x emission is increasing trend than that of diesel. NO_x emission is higher by 23.28% for LGO: 100 at full load condition when compared to diesel fuel and the maximum NO_x emission is at 50% load condition (44.06 %) than that of diesel emission. The reason for higher NO_x emission could be due to higher peak flame temperature

b) CO emission

CO emission for LGO:75 is very close to diesel fuel emission and it is found that for LGO:25 & LGO:50, the CO emission is higher by 86% and 71% respectively when compared with diesel fuel. This could be due the shortage of oxygen at high speed, and lesser amount of time available for complete combustion and further rising temperature in the combustion chamber, physical & chemical properties of the fuel and A/F ratio.

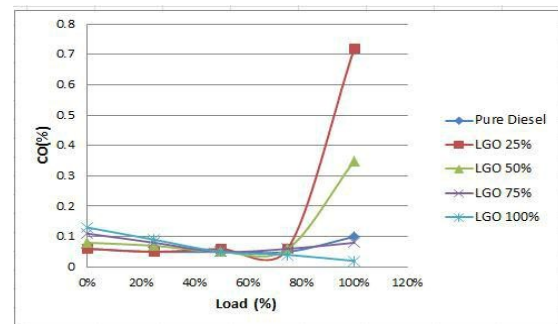


Figure 7. Variation of CO_2 and load

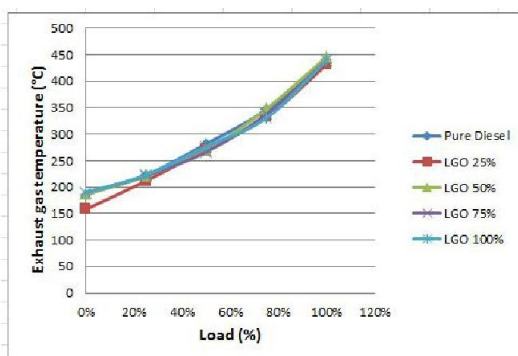


Figure 5. Variation of Exhaust gas temperature and load

C) Analysis of cylinder pressure data

Combustion in diesel engines is a complex heterogeneous process. Mixture formation and combustion is controlled by interactions between several parameters such as the injection spray, air motion and combustion chamber geometry. Mixture formation and combustion are highly dependent on fuel injection parameters. Precise control of fuel injection and, spray formation and fuel atomization is essential for controlling combustion.

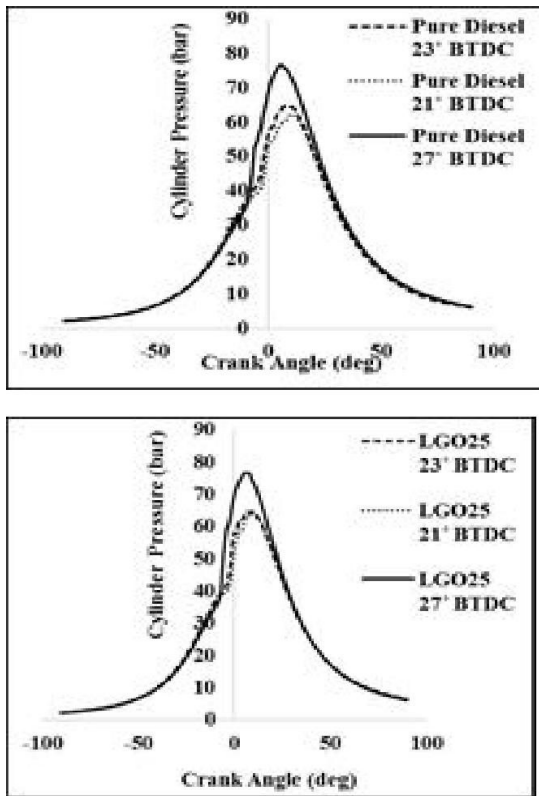


Figure 8. Variation of Heat release rate with Crank angle for LGO-Diesel blends for different Injection timings

If the fuel injection starts later, the temperature and pressure are initially higher but then decrease as the delay proceeds. From the Figure, it is observed that cylinder pressure is increased during the advanced injection timing when compared with other injection timings for all the blends of LGO-Diesel fuels[14]. For Pure diesel, the maximum cylinder pressure is observed as 76.692 bar at advanced injection timing which is higher by 15.5% and 18.71% than the normal and retarded injection timings respectively. For LGO25, the cylinder pressure is increased by 15.7% and 16.1% at advanced injection timing than other fuel injection timings. Moreover, it is increased by 10.2% and 13.42% at advanced injection timing for LGO50 when compared to retarded and normal fuel injection timings respectively. For Neat Lemongrass oil fuel operation, the maximum cylinder pressure is observed as 78.808 bar at advanced injection timing which is higher by 13.95% and 12.4% than retarded and normal injection timings respectively.

D) Ignition delays

Ignition delay is an important parameter in combustion phenomenon for diesel, premixed and neat LGO at

different loads. The delay period or ignition delay mentioned here refers to the time difference between the start of injection and start of combustion, that is, time interval during which each fuel droplet gets ready for combustion. This period is generally determined from the change in slope of the pressure versus crank angle diagram or from the heat-release analysis. The time delay decides the quantity of premixed flame. The rate of pressure rise, peak pressure, engine noise, vibrations and mechanical stress also depend on the ignition delay[15]. In general, a lot of parameters such as fuel type and quality, air-fuel ratio, engine speed, fuel atomization, intake air pressure and temperature influence the ignition delay. Among these, the fuel type is an important parameter affecting the delay period. It is also apparent from the table that the ignition delay of diesel is longer than that of premixed LGO (particularly 5%) and neat LGO in the entire engine operation. In spite of the slightly higher viscosity of LGO, the ignition delay appears to be lower for premixed and neat LGO than for diesel. The primary reason may be the complex and rapid pre flame chemical reaction that takes place at high temperatures. As a result of the high cylinder gas temperature, LGO has undergone thermal cracking and lighter compounds might have been produced, which might have ignited earlier to result in a shorter delay period.

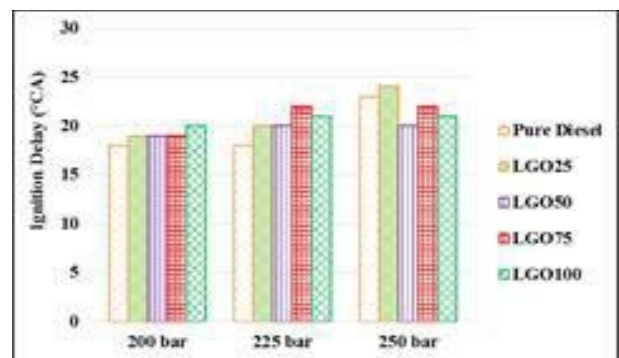


Figure 9. Variation of Ignition delay for various LGO-Diesel blends for various blends

IV. CONCLUSION

The performance, emission and combustion characteristics of a direct injection HCCI engine fuelled with neat lemongrass oil and diesel have been investigated and compared with that of standard diesel fuel and conclude the following aspects.

1. LGO can be used as a sole fuel in engine without any pre-treatment processes such as transesterification, pyrolysis or emulsion.
2. The Indicated thermal efficiencies are nearly equal to diesel fuel except neat LGO.
3. The combustion pressures are increased because of the fuel absorbs more amount of heat from the cylinder immediately after injection and resulting in higher combustion pressure.
4. The heat release rates for LGO ratios are higher than that of diesel fuel. This could be due to the better vaporization and atomization of lemongrass oil inside the combustion chamber and better spray formation
5. For neat LGO, Brake thermal efficiency (BTE) is increased and SFC is increased. This could be due to lower calorific value of higher ratios of LGO. But lower values of SFC are desirable one and also Mechanical efficiency is decreased.
6. Results showed that at lower load conditions only, smoke emissions are higher than the diesel fuel. But for 75% full load conditions, it is observed that lower smoke emissions. This is due to the complete combustion of lemongrass oil in the combustion chamber.
7. On this last concern scientific advancements are fundamentally required in current engine technology to address the global issue on depletion of easily accessible fossil fuels

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Diffusion-Key Role in Solid State Crystalline Material - A Review

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ABSTRACT

Solid-state diffusion is a process which is responsible for the transport of atoms or ions of the solid reactant and product during the reaction and crystal growth of the solid product. The overall kinetics is usually significantly influenced by the relatively slow and highly activated solid-state diffusion. Due to the involvement of nucleation and crystal growth of the solid product, crystallographic properties of the solid reactant and product have a large influence on the overall kinetics as well since those properties determine how nucleation and crystal growth proceed. Diffusion is the net movement of molecules or atoms from a region of high concentration (or high chemical potential) to a region of low concentration (or low chemical potential) as a result of random motion of the molecules or atoms. The main advantage of diffusion methods is that one can grow crystals of insoluble substances under normal conditions without special apparatus. It is sufficient to cause two substances to diffuse in opposite directions, whereupon the product is formed by reaction.

Keywords: Diffusion, Nucleation, Lattice, Solid-State Diffusion, Crystal Growth, Diffusivity.

I. INTRODUCTION

Diffusion describes the process by which atoms move in a crystal lattice. Although this includes self-diffusion phenomena, our interest is in the diffusion of impurity atoms that are introduced into the silicon lattice for the purpose of alternating its electronic properties. In addition to concentration gradient and temperature. Geometrical feature of the crystal lattice (such as crystal structure and defect concentration) play a key role in this process. Diffusion can be defined as the mass flow process in which atoms change their positions relative to neighbors in a given phase under the influence of thermal and a gradient. The gradient can be a compositional gradient, an electric or magnetic gradient, or stress gradient. Solid state diffusion is believed to be responsible for the transport of ions and atoms which are necessary for the reaction and crystal growth of the solid product.

However, in kinetic modeling of gas-solid reactions, crystal growth and solid-state diffusion are either not considered or not considered properly. In this article, the important roles of solid-state diffusion and crystal growth of the solid are discussed mainly.

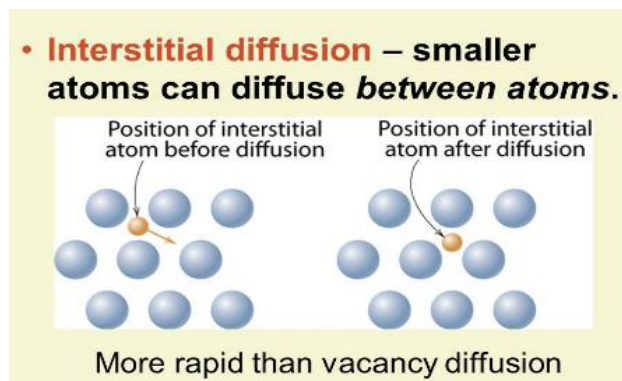
1.0. Diffusion mechanisms, Steady-state and Non-steady-state diffusion

In pure metals self-diffusion occurs where there is no net mass transport, but atoms migrate in a random manner throughout the crystal. In alloys inter-diffusion takes place where the mass transport almost always occurs so as to minimize compositional differences. Various atomic mechanisms for self-diffusion and inter-diffusion have been proposed. The most energetically favorable process involves an interchange of places by an atom and a neighboring vacancy. Vacancy Diffusion: This process demands not only the motion of vacancies, but also the

presence of vacancies. The unit step in vacancy diffusion is an atom breaks its bonds and jumps into neighboring vacant site.

1.1 Interstitial diffusion:

Here impurity atoms move through the crystal lattice by jumping from one interstitial site to the next. They may start at either lattice or interstitial sites and may finally end up in either type of site. However, interstitial site to another adjacent interstitial site. Hydrogen, Carbon, Nitrogen and Oxygen diffuse interstitially in most metals, and the activation energy for diffusion is only that associated with motion since the number of occupied, adjacent interstitial sites usually is large.



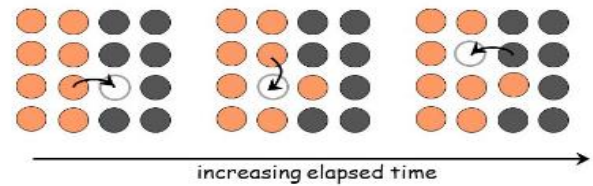
1.2. Substitutional Diffusion:

Here impurity atoms wander through the crystal by jumping from one lattice site to the next. Thus substituting for the original host atom. However, it is necessary that the adjacent site be vacant; that is, vacancies must be present to allow substitutional diffusion to occur. These vacancies are provided by thermal fluctuations in the lattice. Since equilibrium concentration of vacancies is quite low, it is reasonable to expect substitutional diffusion to occur at a much slower rate than interstitial diffusion. However, the equilibrium number of self-interstitial atoms present at any temperature is negligible in comparison to the number of vacancies. This is because the energy to form a self-interstitial is extremely large.

Substitution-diffusion

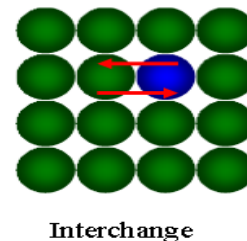
Vacancy Diffusion:

- applies to substitutional impurities
- atoms exchange with vacancies
- rate depends on (1) number of vacancies;
(2) activation energy to exchange.



1.3. Interchange Diffusion:

This occurs when two or more atoms diffuse by an interchange process. Such a process is known as a cooperative interchange when a large number is involved. The probability of interchange diffusion effects is relatively low.



There is a difference between diffusion and net diffusion. In a homogeneous material, atoms also diffuse but this motion is hard to detect. This is because atoms move randomly and there will be an equal number of atoms moving in one direction than in another. In inhomogeneous materials, the effect of diffusion is readily seen by a change in concentration with time. In this case there is a net diffusion. Net diffusion occurs because, although all atoms are moving randomly, there are more atoms moving away from regions where their concentration is higher.

II. STEADY-STATE DIFFUSION

Diffusional processes can be either steady-state or non-steady-state. These two types of diffusion processes are distinguished by use of a parameter called flux. It is defined as net number of atoms crossing a unit area perpendicular to a given direction per unit time. For steady-state diffusion, flux is constant with time, whereas for non-steady-state

diffusion, flux varies with time. A schematic view of concentration gradient with distance for both steady-state and non-steady-state diffusion processes are shown in figure.

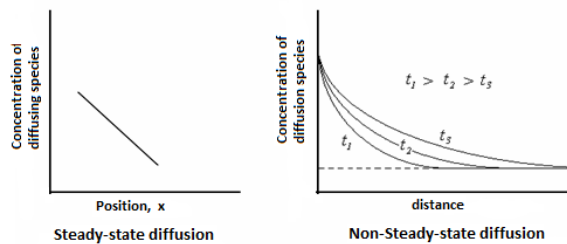


Figure 1. Steady-state and Non-steady-state diffusion processes.

Steady-state diffusion is described by Fick's first law which states that the diffusion flux(J) along x is proportional to the concentration gradient. The constant of proportionality is called diffusion coefficient (diffusivity), D (cm^2/sec). Diffusivity is characteristic of the system and depends on the nature of the diffusing species, the matrix in which it is diffusing, and the temperature at which diffusion occurs. Thus under steady-state flow, the flux is independent of time and remains the same at any cross-sectional plane along the diffusion direction. For the one-dimensional case, Fick's first law is given by

$$J_x = -D \frac{dc}{dx} = \frac{1}{A} \frac{dn}{dt}$$

and $J_x \neq f(x, t)$

where D is the diffusion constant, dc/dx is the gradient of the concentration c , dn/dt is the number of atoms crossing per unit time a cross-sectional plane of area A . The minus sign in the equation means that diffusion occurs down the concentration gradient. Although, the concentration gradient is often called the driving force for diffusion (but it is not a force in the mechanistic sense), it is more correct to consider the reduction in total free energy as the driving force.

2.1. Non Steady-state diffusion:

Most interesting cases of diffusion are non-steady-state processes since the concentration at a given position changes with time, and thus the flux changes with time. This is the case when the diffusion flux depends on time, which means that a type of atoms accumulates in a region or is depleted from a region

(which may cause them to accumulate in another region). Fick's second law characterizes these processes, which is expressed as: $\frac{dc}{dt} = -\frac{dJ}{dx} = \frac{d}{dx} \left(D \frac{dc}{dx} \right)$

where dc/dt is the time rate of change of concentration at a particular position, x . If D is assumed to be a constant, then $\frac{dc}{dt} = D \frac{d^2c}{dx^2}$

Solution to the above expression is possible when meaningful boundary conditions are specified. One common set of boundary conditions can be written as

$$\text{For } t = 0, \quad C = C_0 \quad \text{at } 0 \leq x \leq \alpha$$

$$\text{For } t > 0, \quad C = C_s \quad \text{at } x = 0$$

$$C = C_0 \quad \text{at } x = \alpha$$

And the solution is

$$\frac{C_x - C_0}{C_s - C_0} = 1 - \text{erf} \left(\frac{x}{2\sqrt{Dt}} \right)$$

Where C_x represents the concentration at depth x after time t . The term **erf** stands for Gaussian error function. Corresponding error function values for a variable are usually found from standard mathematical tables. The above equation demonstrates the relationship between concentration, position, and time. Thus the equation can be used to explain many practical industrial problems like corrosion resistance of duralumin, carburization and de-carburization of steel, doping of semi-conductors, etc.

Factors that influence diffusion:

Ease of a diffusion process is characterized by the parameter D , diffusivity. The value of diffusivity for a particular system depends on many factors as many mechanisms could be operative.

Diffusing species: If the diffusing species is able to occupy interstitial sites, then it can easily diffuse through the parent matrix. On the other hand if the size of substitutional species is almost equal to that of parent atomic size, substitutional diffusion would be easier. Thus size of diffusing species will have great influence on diffusivity of the system.

Temperature: Temperature has a most profound influence on the diffusivity and diffusion rates. It is known that there is a barrier to diffusion created by neighboring atoms those need to move to let the diffusing atom pass. Thus, atomic vibrations created by temperature assist diffusion. Empirical analysis of the system resulted in an Arrhenius type of relationship between diffusivity and temperature.

$$D = D_0 \exp\left(-\frac{Q}{RT}\right)$$

Where D_0 is a pre-exponential constant, Q is the activation energy for diffusion, R is gas constant (Boltzmann's constant) and T is absolute temperature. From the above equation it can be inferred that large activation energy means relatively small diffusion coefficient. It can also be observed that there exists a linear proportional relation between $(\ln D)$ and $(1/T)$. Thus by plotting and considering the intercepts, values of Q and D_0 can be found experimentally.

Lattice structure: Diffusion is faster in open lattices or in open directions than in closed directions.

Presence of defects: As mentioned in earlier section, defects like dislocations, grain boundaries act as short-circuit paths for diffusing species, where the activation energy is less. Thus the presence of defects enhances the diffusivity of diffusing species.

III. CONCLUSION

Fick's law for the diffusion of adatoms in surface reconstruction was derived systematically via the homogenization of a Burton-Cabrera-Frank (BCF) type model. The effective surface diffusivity and adatoms mobility involve discrete averages of microscale material parameters. The mathematical procedure applied here, based on multiscale expansions under singular perturbation, differs from the direct coarse graining of kinetic boundary

conditions for steps applied previously to constant microscale parameters.

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