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Attendance Management by Using Barcode and Raspberry PI

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ABSTRACT

The main objective of this setup is to make a system that can count the attendance of the gathering present at a given place. For this only the attendants have to carry a barcoded ID which has to be scanned. As counting of attendance especially when the number is greater than a hundred is usually cumbersome and time consuming. The ID issued to the attendants will be scanned by a barcode reader installed at the entrance of the hall where the attendance has to be counted. A microcomputer attached to this reader will maintain a list of all the scanned specimens and will store the data in its memory. Also the microcomputer can be programmed to mail this list to a server so that a record can be maintained if the attendance is taken on a regular basis, along with the duration of the lecture. This process will eliminate the case of fake attendances and will give the time of class only for studying rather than wasting it for attendance.

Keywords: Raspberry Pi, MATLAB, ASCII, GPIO

I. INTRODUCTION

In many institutions and organization the attendance is very important factor for keeping track of the regularity of people in the institution. Earlier used method of attendance took a lot of time and effort just to report a few people. Now if we imagine there is a large crowd then this old process of manually taking attendance would waste a significant amount of time and human effort. Due to these issues we develop an automatic attendance system which automates the whole process of taking attendance and maintaining it. Usually biometric techniques for verification are used to record attendance like retina scan, fingerprint, DNA recognition etc. However these techniques prove to have a very high installation cost which could not be afforded by all organizations. So we must develop a system which could at a small cost, will be able to do the same function. So this function can be optimally performed using Barcode Scanning. A barcode is an optical, machine-readable, representation of data; the data usually describes something about the object that carries the barcode. A barcode essentially is a way to encode information in a visual pattern that a machine can read. The combination of black and white bars (elements) represents different text characters which follows a set algorithm for that barcode type. If you change the sequence of elements you get different text. A barcode scanner reads this pattern of black and white that is then turned into a line of text your computer can understand. Originally barcode systematically represent data by varying the widths and spacings of parallel lines, and may be referred to as linear or one-dimensional (1D). So if barcode is given to each employee of the organization then the attendance of the people entering the institution can be taken very easily. Also barcode system of Identification could not only register the Name and ID of the person but also the entry and exit time of the employee in the organization which would lead to a very accurate calculation of attendance and working hours of the employees. The microcomputer attached with the system will do all the required calculations. The Barcode recognition would involve 2 techniques: One would be to scan it using the barcode scanner, which flashes the Class II-LASER light on barcode and reads it. It is an efficient way of reading the barcode but is a little costly. For cheaper purposes we can also use a camera which would take a picture and by image processing algorithm would be able to read the numbers in the barcode. The information contained in the

barcode would include the Identification number of the student which would be compared by the microcomputer to match the name which is registered against it. So as an ideal sized barcode can store upto 20-25 ASCII characters, these much characters can be sufficient for storing of ID and other necessary information if required by the institution. If the requirement of information is still greater we can also use the QR code or 2-D barcode which can contain upto 2000 ASCII characters. So once the ID card is scanner by our scanner then this would feed the information to the microcomputer (Raspberry Pi) which would process it and store a list of those, which could further be printed or mailed to a server after meeting/discussion/lecture is over.

II. METHODS AND MATERIAL

A. Barcode Scanning

Barcode scanner converts barcodes on ID into digital codes or numerical data that can be recorded in a database. The numerical data obtained from the barcode is fed in a document and the ID no. present on the barcode is compared with an existing database to get the name of person with that ID. Before scanning the barcode everyone has to fill the registration form. These form have some of the basic details of the individual such as Name, Father's name, Mother's name, Date of Birth and so on which would be fed in the database.

Editor - C:\Users\RDr\Documents\MATLAB\writedata.m

deletedata.m | search.m | writedata.m

```
function writedata()
file='data.xlsx';
ID=input('Enter ID');
Name=input('Enter Name');
cell={ID Name};
t=cell2table(cell,'VariableNames',{'ID','Name'});
global T;
T=vertcat(T,t);
writetable(T,file,'Sheet',1,'Range','A1')
e=input('Want to enter more data(Y/N)?');
if(e=='Y')
    writedata();
elseif(e=='N')
    return;
    T={' ' ' '};
else
    fprintf('Wrong Input');
end
```

Figure 1 : Script to store details of employees in database

B. Barcode Recognition:

The scanned barcode data will now be compared with existing data on the computer, thus giving the names of the registered employees and entering them in a file for further use. The barcode recognition will be done by the microcomputer connected to the scanner. The Raspberry Pi will take data from the scanner through its USB port or through the GPIO pins and the script burned into its memory will do the processing task and will store the data in a file. As the Pi can also be connected to the internet (directly in Pi3 and by a Wi-Fi detector in other versions) so the attendance log could also be simultaneously emailed to the server.

Editor - C:\Users\RDr\Documents\MATLAB\search.m

deletedata.m | search.m

```
function search(y)
a=readtable('data.xlsx');
x=a(:,1);
x=table2array(x);
flag=0;
for i=1:length(x)
  if(any(x==y))
      flag=1;
  break;
 end
end
if(flag==1)
    fprintf('Search is successfull');
else
    fprintf('Search is unsuccessfull');
end
end
```

Figure 2 : Script to search input ID in existing database

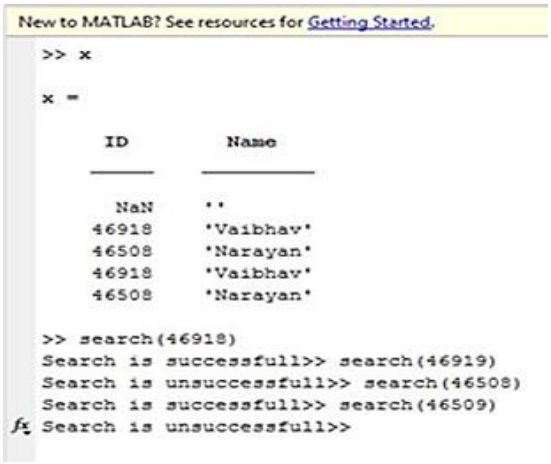

Figure 3: Results showing working of Search operation

C. Attendance Update:

The attendance recorded by the Raspberry Pi is saved to a either txt or xlsx file which could further be retrieved for use using appropriate MATLAB Syntax. There will also be a door installed at the gate which would only open after scanning of card, so that there is no case of two attendances marked by a single student by also scanning the other one's card. The process of next scanning will begin only after one student has gone into the class.

The attendance saved could be printed on a paper or could be mailed to the University or Organizations website from where everyone can take track of the attendance of employees of the particular place.

III. RESULTS AND DISCUSSION

The attendance system deployed above uses a microcomputer and barcode scanner for counting the attendance of a given gathering. Attendance can be easily recorded by this setup and will save a great amount of time for the people present there.

The automation for attendance using other ways was very expensive and not everyone could afford them and their maintenance.

To prevent the attendance of people who are not in a gathering there will be an automatic door, which will open for only one time a barcode, is scanned. However, a door is not even that necessary a rod that pulls up on scanning could do the job equally very well.

To prevent entrance of garbage value by scanning of any barcode other than that of the assigned codes an AI technique will be employed which will make the decision about barcode being correct or incorrect. For default a 10000 cases will be feeded in it and the rest it will learn from its daily use.

The proposed system will make way for perfect management of students and staff attendance. Future work on this project would include the creating of a matching algorithm and appropriate software that will have features to mention and maintain the different type of leave such as on duty leave, leave without pay, medical leave and soon.

Also timely update the leave of the each employee when it takes leave. The efficient matching algorithm have to be developed in theory and in code so that our goal of getting faster and more accurate matched image than with pre-existing software.

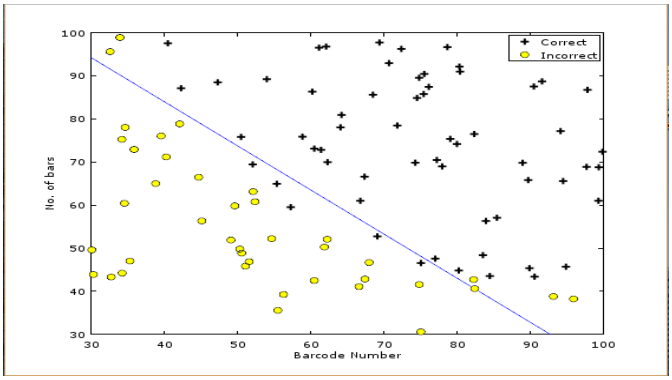

Figure 4: Hypothesis made to determine originality of barcode

IV. CONCLUSION

The conclusion that can be drawn from the above is that for attendance management barcode scanning can prove to be one of the most efficient and time saving with a very low cost. The Artificial Intelligence present in the system will make it an intelligent system as compared to the present ones.

V. REFERENCES

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