Jeevan Jyoti Mobile Application for Ambulance Service

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ABSTRACT

In these modern times where the technologies is evolving every day. In order to cope up with the need of proper ambulance services during medical emergency situation, an android mobile application named Jeevan Jyoti is introduced which will aim successful booking of ambulance with required medical support both in the ambulance and from the hospital. Mobile application is a growing and in-demand technology because of its easier accessibility and feasibility to remind users about the upcoming updates with the help of push notification. This idea approaches a system where whenever a request for ambulance is raised, it sends that request to all the nearby hospital(s) along with the parameters such as ambulance type, number of casualties, symptoms, medical report, etc. To expand this system, IoT is added which will help the doctor monitor the vital stats such as pulse rate and temperature of the patient continuously while the ambulance is en-route to the hospital.

I. INTRODUCTION

Heart attacks, road safety and accidents is a major cause of death around the world and India. Statistical data from Indian Council of Medical Research (ICMR) indicates that it takes about 400 minutes to reach a hospital for every second heart attack patient. This is almost 13 times more than the ideal window of 30 minutes which is the 'golden hour' according to government data. At some places it even takes upto 900 minutes for a heart attack patient. A two-year data from the ongoing Management of Acute Coronary Event (MACE) Registry of the ICMR shows that a lot of time is wasted in transportation. The heart muscles suffer irreversible damage due to lack of blood supply beyond 180 minutes. According to Dr.

Thomas Alexander, Kovai Medical Center and Hospital, Coimbatore, ideally, it shouldn't take more than 30 minutes from symptoms to the door of a hospital equipped to treat heart attack cases [1]. According to a report released by India's Ministry of road transport more than 146,133 people were killed in road accidents in India in 2015, up from 139,671 in 2014. Thus about 400 road deaths take place every day on roads in India [2]. World Health Organization (WHO) recommends that an ambulance should arrive within 8-10 mins. It must reach the location of the patient within under 10 minutes of time, once the request has been made. But due to the failure in current system, the response time is far from ideal. As per the data given by All India Institute of Medical Sciences (AIIMS), as many as 28% of the patients lose out due to non-availability of ambulance and efficient and reliable emergency medical services [3]. Thus it is required that the patients suffering from heart attack or the victims of road accident or any other casualty needs to be guided by an ambulance service to a nearby hospital immediately. Currently system exits that sends the information of patient and their location through a hotline number or telephone service. The efficient and effective ambulance service can be utilized where the communication with the paramedic staff and doctor can be done to provide requisite care and prescribed drugs to the patient. It would be better and more beneficial for the patient if there is proper working relationship between pre-hospital, treatment given en-route hospital and attending doctors at the hospital. This needs to be established so that each group becomes familiar with the responsibilities and capabilities of the other [4]. The aim of this paper is establish and ease the communication and coordination between the patient in trauma, ambulance service, medical facility in the ambulance and doctors in the hospital through android based application. This app will provide a common interface between patient and hospital.

II. RELATED WORK

P. Iyappan, B. Nanthini Devi, P. Nivedha and V. Sayoojya proposed a method in "Lisa-life saver" where a web application system named LISA which passes the accidental spot and information to nearby ambulance, police station and to the person's relatives and casualty blood group donors are also spotted [5]. The main concern with this system is the web application are more prone to security breaches, it is also known to operate at a slightly slower speed and moreover problems arising because of different browsers one needs to ensure that app supports all variety of browsers.

TV Sethuraman, Kartik Singh Rathore, Amritha G, Kanimozhi G proposed a method "IoT based system for Heart Rate Monitoring and Heart Attack Detection" where an IoT based system has been implemented which monitors the heartbeat by a hardware system comprising of a Node MCU and pulse sensor. An alert system is also added which goes off if the heartbeat shoots up and goes down a particular permissible level given in the formulated algorithm. This alert message is received by the doctor through a mobile phone application. Doctors can access the heartbeat data of the patient from any location with the help of this system [6].

Rashmi A. Nimbalkar and R.A. Fadnavis proposed a system in "Domain Specific Search of Nearest Hospital and Healthcare Management System" which helps in locating the nearest hospital available, contacts their ambulance emergency system then accesses the health record of emergency patient that can critically assist in prehospital treatments [7].

R. Vithiya, S. Karthika and G. Sharmila proposed a method in "Detection, Monitoring and Tracking of Survivors under Critical Condition Using Raspberry-Pi" which consists of a portable and miniaturized framework of sensors and other transmission units that are integrated using GPS and attached on the war

zone soldiers. This system continuously monitors their health and all the data obtained are transmitted using IOT to central base system. So, with the available information the survivors can be tracked during conflict and their safety can be ensured [8].

Yuanyuan Du, Yu Chen, Dan Wang, Jinzhao Liu and Yongqiang Lu proposed a method in "An Android-Based Emergency Alarm and Healthcare Management System" which is emergency alarm and healthcare management system and is mainly deployed in an android-based phone. The proposed system can detect the location of the users when they are in trouble and trigger the alarm with the help of the GPS and GSM network. Immediate measures can be taken manually when the alarm is received. It also manages the health record of the user [9].

III. EXISTING SYSTEM AND ITS ISSUES

For emergency service providers, giving their service in least time shows their best performance. Emergency hospitals will be at their best if the ambulance reaches the site in Golden hour where life of injured persons can be saved [10].

In the current system which is calling ambulance through a hotline number, accidental information is not passes effectively due to issues such as human errors like pronunciation, inadequate address representations, misunderstanding by the ambulance driver and so on.

Even though ambulance can be called via mobile phones directly, it will problematic for a person to direct the ambulance to the exact spot. In few cases, the third person may pronounce it incorrectly or might not be even familiar with the exact address or location of the accident. Even due to some network error the ambulance driver might misunderstood the address and redirected to some other location.

IV. PROPOSED SYSTEM

This proposed system aims successful booking of ambulance with required medical support both in the ambulance and from the hospital. This system enables to overcome the disadvantages in the existing system by providing the exact location of the patient through google maps along with patient's vital information. In the present scenario sometimes the ambulance with better equipments and medical support system is booked for non-emergency cases such as shifting patient to home without knowing the requestor's requirement. On the contrary in case of emergency, wherein ambulance with medical support is required a non-emergency type. Prior booking of ambulances can done for pregnant women, senior citizens or disabled patients, to help them reach the hospital conveniently. According to World Health Organization (WHO), in any city, there must be at least 1 ambulance on 80,000 people. However, when we speak of the national capital Delhi, the ratio is appalling. Currently, only 1 ambulance for every 1,50,000 people is at work [3].

Needless to say, this further puts a dent in the ambulance - people ratio when there is need of emergency type ambulance. Many times the patients lose life because of lack of efficient and reliable emergency medical services and due to non-availability of ambulances. The existing system does not provide the patient's medical history and continuous update to the doctor en-route to the hospital. Thus on reaching the hospital patient's condition deteriorates further. Another major issue is the refusal of ambulance driver to attend the request or behavioural issues or unfamiliarity of destined location.

The proposed app is designed to overcome these issues. First of all on the 'User side' while booking there is an option whether emergency or nonemergency ambulance is required. Further on the 'Hospital side' they will manage the ambulance

requirement and with good driver. Here in the proposed system driver has no authority to refuse once he is deputed by the hospital for duty.

A. User Side

✓ Booking an ambulance for emergency services and non-emergency services.
✓ Sending request all nearby hospitals.
✓ Receiving the information and contact details of the driver from the hospital.
✓ The IoT based sensors will keep updating the pulse rate and temperature of the patient whenever there is a variation to the doctor until the patient reaches the hospital and also help doctors monitor the patient status continuously.
✓ Tracking of the ambulance

B. Hospital Side

✓ Receive requests for ambulance booking.
✓ If anyone hospital accepts the user's request, the same request will be removed for other hospitals.
✓ Depending on patient's condition, allocate a suitable ambulance with the requisite features.
✓ Send user location to ambulance driver and also driver's information and contact details to the patient.
✓ Depending on patient's condition which will be given by user as an image and symptoms, designate a paramedic and/or a doctor to be sent with the ambulance for basic or advanced life support, as required.
✓ Medical Report (if given by user) providing accurate, up-to-date, and complete information about patients at the point of care, enabling quick access to patient records for more coordinated, efficient care, reduced duplication of premedical tests of the patients that help the doctor for handling the patient as soon as possible.
✓ When the patient reaches the hospital, the hospital can complete the ride for the user after reaching there.

V. METHODOLODY

The technologies used to build the proposed system are Android Studio along with google map API, Parse Server, Blynk Cloud, ESP2866 NodeMCU, DHT11 Temperature Sensor and Pulse Sensor.

A. Authentication

Authentication is done by providing username and password for landing into app. User has to log in before using app and if user is not registered then he has to register first. He will have to fill all the details asked for first time and provide valid mobile number for verification. The registration form consists of user's name, username, password, blood group, date of birth, gender, unique identification number and so on. The user may have to submit a medical report at the time of registration but that is optional. If he has a medical report then he can upload it. After filling all the information of the registration, he will get an OTP on given mobile number, which he has to verify, only then the registration will be successful.

B. User Location

This module helps to provide current location, from where he is sending the request for ambulance.

C. Booking Request

This module carries the request which consists: Booking type (emergency or non- emergency), number of casualties, symptoms (for example: fever, cold, etc.), photo (user location's image for knowing the exact condition of the patient) and medical report (optional). If there exists a medical report which is not being provided at the time of the registration or there is a new medical report, then he can also upload it. It is necessary to take a photo for knowing what the condition of patient is plus it will also help in identifying the genuineness of the request. Later, he has to submit and his request that will go to all the

nearby hospital. User has to wait until getting an alert of sending his request to all nearby hospitals is successful. If any hospital accepts the user's request, the same request will be removed for other hospitals. All the user's details will be visible to the hospital. According to requested parameters, hospital will send the ambulance to the user along with the driver's name and contact number to the user.

D. Bio Stats

When the ambulance arrives at the location and the patient is being brought to the hospital in the ambulance, then along with the patient's bio stats i.e. temperature and pulse rate will be sent to the doctors. This information will keep updating on the hospital side so the paramedical staff in ambulance can communicate with doctor in hospital regarding the bio stats and provide the patient with requisite care and they can also prepare beforehand for the incoming patient in hospital also. When the patient reaches the hospital, the hospital administration completes the ride for the user.

E. Feedback

In this module, User can give the feedback to the hospital for helping others as a future reference.

VI. RESULTS

Fig. 1 gives the idea about parameters which are necessary during the booking time such as booking type (emergency or non-emergency), symptoms, photo of the casualty spot and medical report along with it.
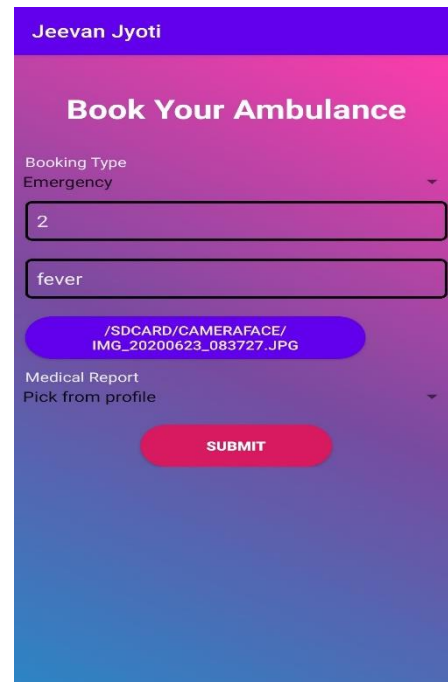

Figure 1: Snapshot of Ambulance Booking Activity

Figure 2: Snapshot of Booking Requests Activity in User Side

Fig. 2 is representing the booking requests of the user of both pending and completed requests. Each accepted request contains the information of the hospital along with the ambulance driver. The accepted request will also the distance between the requester and the hospital.
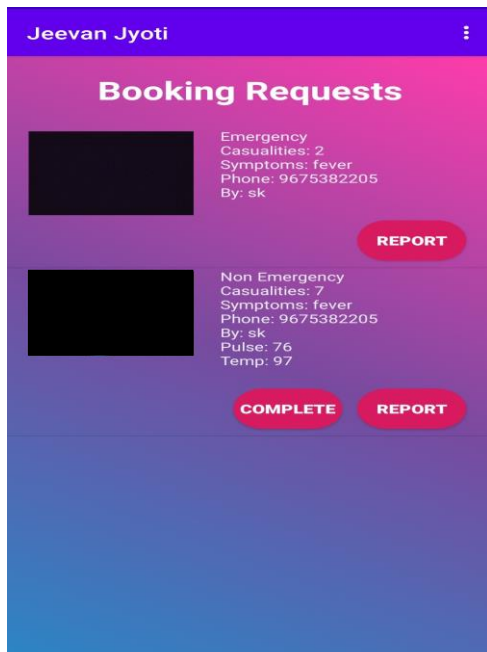
Figure 3: Snapshot of Booking Requests Activity in Hospital Side

Fig. 3 shows all the user request on the hospital page. Through this the hospital can accept the ambulance requests. All the information submitted by the requester will be shown here. Once the user request is accepted and patient is picked up and is en-route to the hospital the vital stats i.e., pulse rate and temperature is constantly updated on the hospital side.
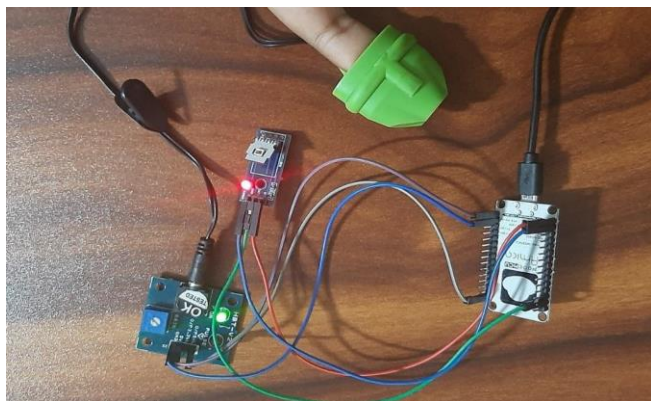

Figure 4: Circuit of Pulse Rate and Temperature Sensor

Fig. 4 represents hardware circuit of the IOT part along with the temperature and pulse sensor. In Fig. 5 the BYLNK app is showing the readings from both the sensors.
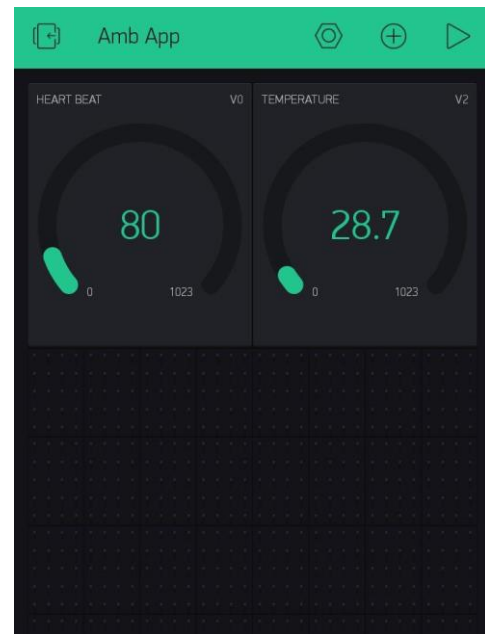

Figure 5: Snapshot of BYLNK App

VII. CONCLUSION

Nowadays mobile applications have a lot of advantages than any other system because everyone keeps the mobile application on their fingertip. Whenever any app is needed, people can open and access it, so mobile application is more advantageous today. So mobile application is good idea for ambulance booking for both emergency and non-emergency type services. This application much more beneficial in medical emergency services because with its help, whenever patient(s) are being brought to the hospital, then they can be given quick treatment or efficient Medical care in minimum time because of given symptoms and medical report while booking as well as their bio-stats such as heartbeat, pulse rate and body temperature rate will also be transferring to the hospital. So, Hospital/Doctor can prepare beforehand for the incoming patient with the help of these information.

VIII. ACKNOWLEGMENT

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