A SURVEY ON INTEGRATED SYSTEMS TO PROVIDE HEALTHCARE FOR EMERGENCY PATIENT

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ABSTRACT: In India getting healthcare facilities on time and in a proper way is a big issue. Asking questions to many people, by going through surveys and newspapers cutting, we analyze that emergency patient suffers a lot right from getting ambulance service till the proper healthcare facility at hospital and police station too if needed. All these problems are faced by people because there is no system that keeps track of these situations and records all data. To give a solution to all these problems, we designed an integrated system that helps the emergency patient to get ambulance services on time by tracking all ambulances. Also, patients get facilitate at the nearest hospital and police station too if required. Common people can call ambulance according to location when needed. All this data get recorded digitally and the system will help the community.

Keywords – **Healthcare System, GPS, Haversine Formula**

I. INTRODUCTION

Every day in the world, so many people die in various accidents like heart fail, sever burn, road injuries, etc. In the world population, India shares the 17.9% of the total population with second ranked and this population is facing the sever causes of the most deaths in India such as heart attack, pulmonary disease, road injury and so on[6]. India has the 145th rank among 195 countries in healthcare systems accessibility and quality.

In India, every hour 17 people die in road accidents and Uttar Pradesh is at 1st position [7]. According to Report of 2017 of Ministry of Road Transport & Highways, 1.47 lakhs people died on Indian roads in 4.64 lakhs accident, remaining injured people not get emergency care properly [8]. Not only road accidents but the heart attack/fails, brain stroke, lungs diseases like chronic obstructive pulmonary disease, lower respiratory infection, tuberculosis are also requires the immediate healthcare system. But because of unavailability and inaccessible services people die before reaching to hospital.

Reasons behind the unavailable and inaccessible facilities and services of the healthcare system in India are too different. As the technology developed, government adapt the change and gives the facility of the centralized control of the government ambulance for the help of the community. But the people are not respond such calls, sometimes message delivered late to those ambulance drivers and they may get late to reach at patient's place, government ambulance driver takes patient to only government hospital and this is the troublesome for the patient to survive. In such emergency situations, a single minute counts so automated application must be used. Conventional method used by the people in India to provide the healthcare system as soon as possible is calling to the number 108 which is the centralized helpline number given by the government. Another method is took the patient to the hospital in private transport by the road siders or by the family members.

II. LITERATURE SURVEY

Rapid change in the technology eventually changing the world and making the things automated. Technology helps human in almost every field to do task with ease. Thus, such innovation also made in the public health and healthcare systems to overcome the obstacles and increased the probability of the accessibility of the healthcare systems. Hence technology contributed in this field by using the hardware and software systems.

1. **Smart Road Accident Detection and communication System[1]**

   This paper presents a hardware system which is fixed in car to automatically detect the accident of the car. To detect the accident vibration and the gyroscope sensors are used. Gyroscope sensors are used to check the angle of the car. As soon as the accident happen, the values of the gyroscope sensors and vibration which are generated are communicated with the arduino microcontroller and after processing these values message is sent to the emergency contact numbers using the GSM module.

2. **Automatic Accident Detection and Notification System[2]**

   In this paper, accident of the car is detected automatically with help of the different module such as embedded processor, accelerometer, gyroscope, bluetooth module and smart phone. Here android application is provided to do the registration of the driver/owner of the car with his/her basic information like blood group, name along with his photograph. When the accident happens the values taken from the gyroscope and accelerometer are processed. If the values are more or equal to the threshold values then accident is detected and the information is send to the bluetooth of the smart phone from the arduino's bluetooth module. And then the information is send to the hospital, blood bank and police station for the help.

3. **An Android-Based Emergency Alarm and Healthcare Management System[3]**

   In this paper, the author proposes the methodology with the help of the GPS and GSM modules. The location information of the user is shared by this system during an emergency and press the emergency alarm. When the doctor or family members receives the alarm notification, they will able to immediately take the user to the hospital. In this system, the health record of the user can also be managed. An emergency alarm system can be pressed manually during an unexpected event or emergency situation. The notification in the form of emergency messages and calls will send to the user's family and the hospital. And the emergency message can include the user's location information to locate the user. The limitations that we found is that the user needs to install this application always to perform the task throughout. This emergency healthcare alarm system can be used manually when an emergency situation occurs and no emergency message is given to the police station.

4. **Pre-hospital Emergency Notification System[4]**

   Here, the author proposes a mobile application and a web-based system. A mobile application allows notifying the hospital about the incoming accident victim's personal information and medical condition. A web-based system is used by hospital staff to view the incoming patients' details.

   This system is built using the Rapid Application Development Model. The prototype has been developed using App Inventor 2, MYSQL, and PHP. A mock-up database of the patient's details is stored in MYSQL. The limitations in this system that we found are there is no location-based search to locate the nearest hospital in an emergency situation. Also, ambulance and police station modules are not included for road accident cases.

5. **Domain Specific Search of Nearest Hospital and Healthcare Management System[5]**

   In this paper, author proposes the software system which locates the nearest hospital, contact to the emergency services, accessibility to the electronic health data of the patient which is used to assist the person in future. The system also includes the data of the several clinics and blood banks which gives the extra services to the people.

Research Gap:

After going through all these papers, we find that some things are missing in these systems.

- System stated in papers 1, 2 are purely for the car accident cases and for those only who have that system installed in their vehicle. But the accident may happen with person who is walking along roadside (hit and run), also with the person who is on bike or bicycle.

- System mentioned in papers 3, 4, 5 are for only the emergencies which other than the road accident.

  These systems are not raking the ambulance location and also the ambulance giving the services or not. Likewise also not taking the ambulance information and driver information which is very useful in patient death case before reaching to hospital. Analytical report of the cases are also not generated.

III. PROPOSED SYSTEM

Nowadays there are a lot of road accidents happen, where it takes a long time to get injured patient to the hospital from the accident location. From the accident place, there is a long distance between the hospital and the place of an accident so that the patient does not get medical facilities earlier. This may lead to the death of the patient or can harm his/ her body. Private hospitals do not take that accident patient to the hospitals early. An ambulance takes the victim to a government hospital; though to any nearest hospital. No notification is given while reaching to concern hospitals. No primary things are ready to get the patient admitted like a stretcher, vacancy in the ICU in case of a major accident. In the case of pregnant women, heart attack patients or any emergency situation also have an issue of ambulance delay or delay in healthcare assistance. To avoid these problems we designed a web-based system for emergency patients to provide immediate healthcare.
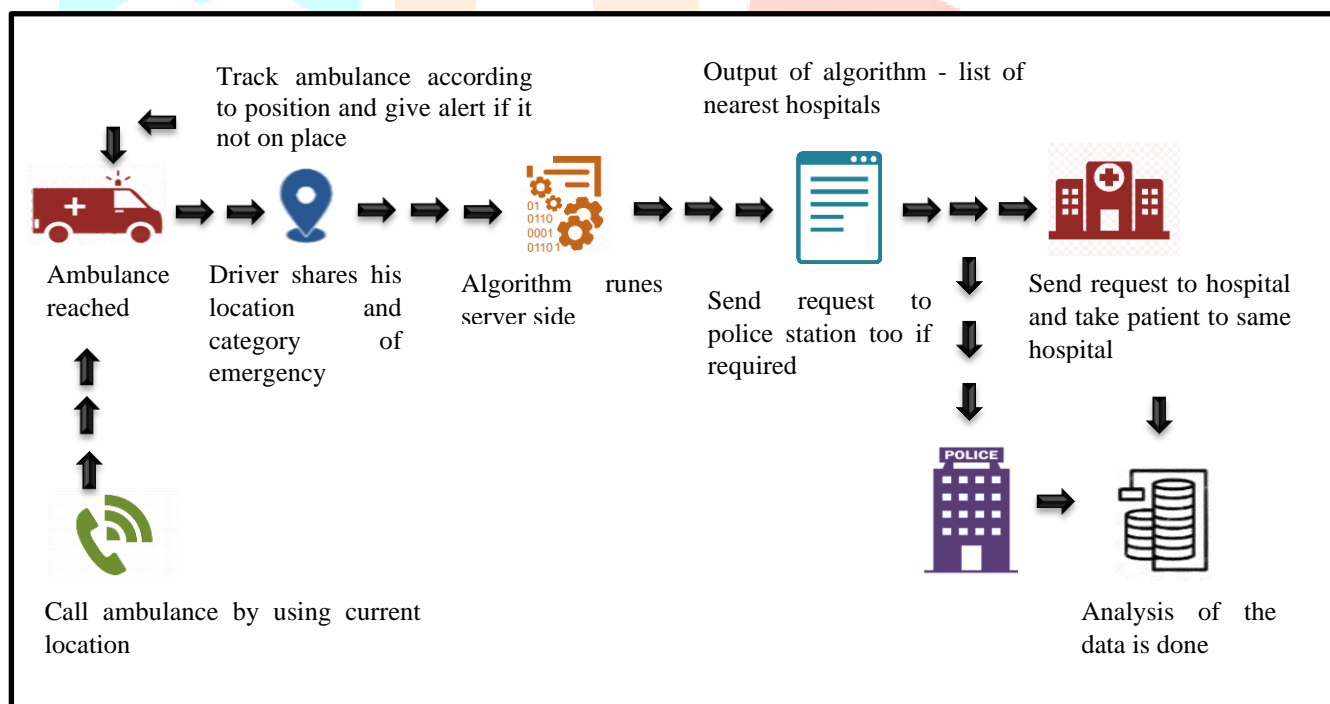

Fig. 1 system architecture

As shown in figure 4.1, there are 3 main actors working in the system as an ambulance driver, hospital, and the police station. All these three actors have a web-based system to communicate with each other.

When accident viewers call the ambulance on 108 then the nearest ambulance will reach the accident location. After arriving at that location ambulance driver has to identify the accident type whether it is a vehicle accident case or any emergency such as a burning case, heart attack patient, or pregnant woman. After that ambulance driver will activate his location and he will be able to see the nearest specialized hospitals list according to the doctor's availability and accident type i.e. a cardiac hospital, accident hospital, surgical hospital, etc. and sends the request to the hospital. The distance between the current accident location and location of the nearest hospital is calculated by **Haversine Formula**. If there is a vehicle accident case, an alert is given to the hospital as well as the regional police station. And if there is any emergency case like a heart attack patient or pregnant women or

any other emergency, an alert is given to the hospital only. In this case, there is no need to give an alert to the regional police station. All the timestamps are recorded and updated into the logs .i.e. the time when the ambulance arrived at the emergency location or the time when the ambulance reach to hospital, etc.

In the proposed system, analysis of accident location takes place according to the accident category and their location. In addition to this, the ambulance driver is able to see daily running statistics of ambulance based on accident type. Police stations are also provided with daily and monthly statistics of handled cases and also able to generate respective case reports. In this system, general users can also search for the nearest hospitals to call for appointments.

IV. EXPECTED OUTCOME

We aim to design a system that helps in providing healthcare to any type of emergency patient in a proper way and in time by tracking all participants which actively contribute to the traditional healthcare system and also time-stamp of each case. This system connects all the hospitals, police stations, and ambulance drivers. The ambulance driver can see the nearest hospitals according to his location and also he can send the request to the nearest hospital. As well as hospitals and police stations get notified. Police station and ambulance driver will able to see statistics of cases handled according to accident type (e.g. road accident, burn injuries, etc.) and case report is generated at the police station side. These records will get maintained digitally.

V. CONCLUSION

Information of the emergency case/ patient would reached to healthcare system as ambulance, hospital, also provided to police station if required and fills the gap of the time which is required in traditional way. Eventually improves the healthcare system and lives of the people will be saved. Statics generated from the data will help government to check the percentage of the diseases and service of the healthcare systems area-wise.

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