Cost Effective Real-Time Ambulance Tracking System Prototype

[1]Jogender Singh, [2]Rajendra B.R, [3]Asst. Prof. Swetha K.S

[1,2]Student, B.E (Information Science Engineering), NHCE, Bangalore, India
[3]Jr. Assistant Professor, Information Science & Engineering Department, NHCE, Bangalore, India

Abstract: Since there is an ever increasing in the transportation and number of vehicles, it leads to the increase in the rate of accidents. Due to the immense traffic in the city, the ambulances do not reach the hospital at an appropriate time, which in turn leads to loss of life. Therefore keeping these in mind, we implement our idea of tracking the ambulance through the GPS and tackle the problem of traffic and reach the hospital before the expected time. The use of the Global Positioning System (GPS) continues to revolutionize surveying.

Keywords: transportation, traffic, ambulances, hospital, Global Positioning System (GPS)

I. INTRODUCTION

When large object or vehicles were spread out over ground, the owner corporations often found it difficult to keep track of what was happening. They required some type of system to determine where each object was at any given time and for how long it travelled. Also the need of tracking in consumer's vehicle use to prevent any kind of theft because police can use tracking reports to locate stolen vehicle.

GSM and GPS based tracking system will provide effective, real time vehicle location, and reporting. A GPS- GSM based tracking system will inform where your vehicle is and where it has been, how long it has been. The system uses geographic position and time information from the Global Positioning Satellites. The system has an "On-Board Module" which resides in the vehicle to be tracked.

In our project we use a traffic density controller which tells us the density of the traffic on the road. We then do communication using network protocols and also use the shortest path algorithm. This project reduces the time taken by directing the ambulance by choosing appropriate path based traffic density and controlling traffic signal.

II. ISSUES IN AMBULANCE TRACKING

In tracking the ambulances, we encounter some of the issues that emerge with the components that we applied here in our project.

The GPS device's mainly occurring issues are**:**

- *Inaccuracy in pin pointing the location*: This happens due to the device's antenna which is struggling to acquire or maintain the satellite signal.

- *Difficulty in downloading data***:** A simple and popular tracker currently on the market, records driving activity, but requires manual download to review/access this information. The data is clear, bold and consistent, but on some rare occasions some people have difficulty accessing the driving activity on their personal tracker because of downloading errors. The good news is that any computer issues can be easily resolved with the help of a technical support agent.
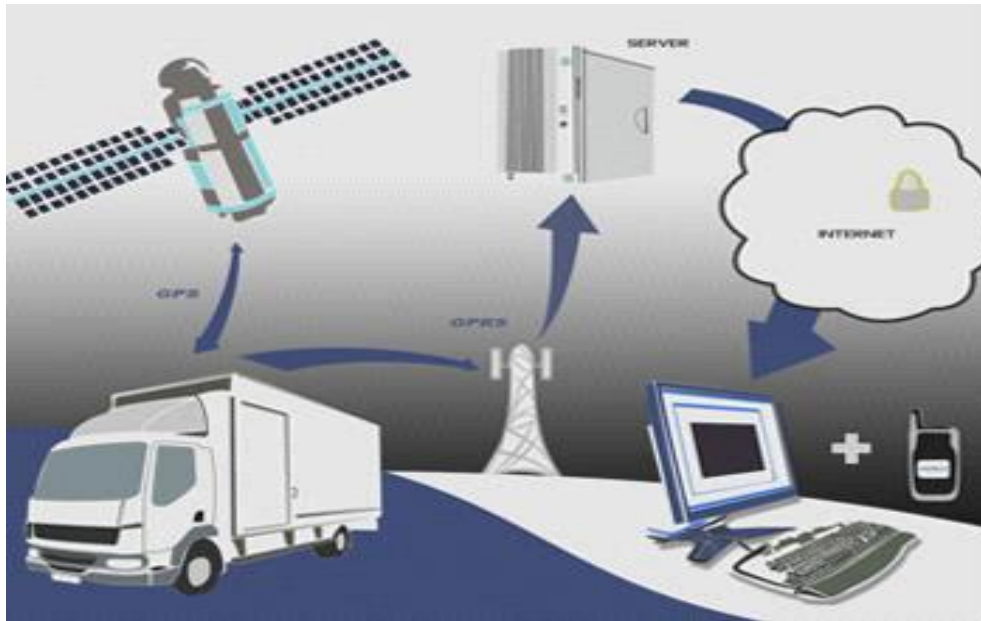
Figure.1

(Referred from 1, 8, 3)

The GSM device's mainly occurring issues**:**

- *SIM-Cloning-* SIM-Cloning is an attack, which is known for over 15years and which stands for copying a SIM-card to a blank card, where data, which are not directly necessary for authentication and services (like contacts, messages etc.) will be ignored.

- *Eavesdropping-* The authentication of the user happens only one-sided. So the user has no assurance, whether the used network is really the desired one. This enables an attacker to emulate a base station, which the user communicates with. In this attack it is not necessary to process calls for emulating the BS (bus station).

- *Disabling a GSM-cell with a DOS-attack-* It is feasible to attack a GSM-cell by sending Channel Request messages to the base station. The base station will handle the request, while the sender aborts it, while sending a new request for another sending-channel immediately. The number of sending-channels are restricted, therefore the attacker is able to blockade all of those channels in one cell. This attack is easy to realize, because the attacker only needs a mobile device for sending the request-messages
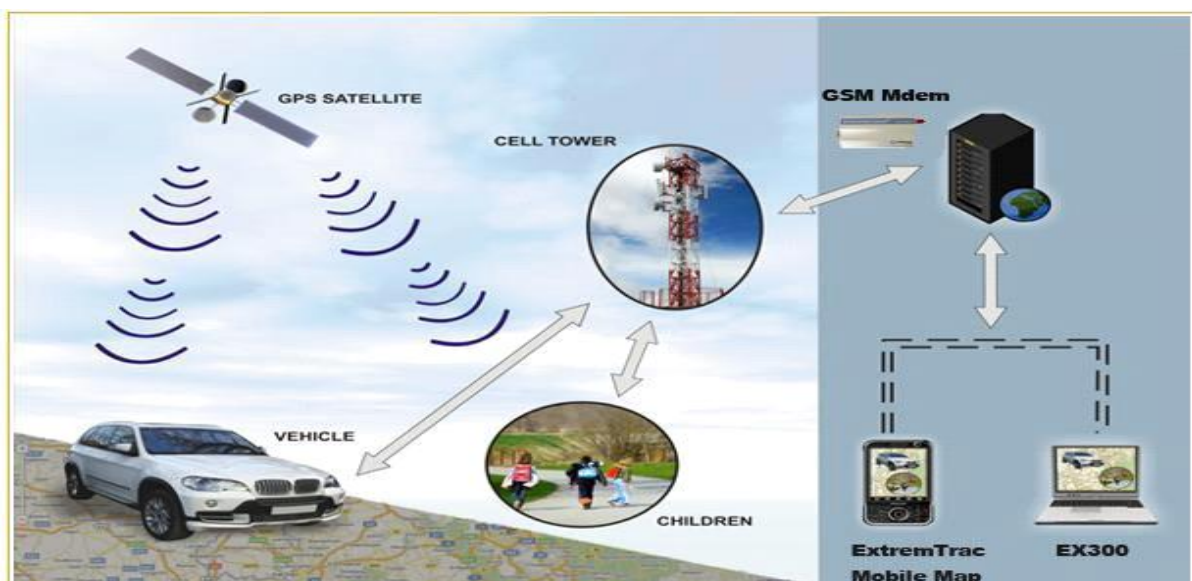

Figure.2

(Referred from 3, 6)

III. TECHNIQUES

It constitutes of GPS receiver and GSM modem and a micro controller which be attached to ambulance. And also the monitoring unit consists of a GSM mobile and computer with VB application. The GPS receiver can acquire the position of the vehicle (longitude and longitude). Thus these longitudinal and latitude values are read by micro controller and can be sent to the GSM Modem which is attached to same, and then this Modem sends it to GSM mobile phone which is attached to the computer with VB application.

A place name is assigned for each longitude & latitude and the GSM receiver receives   this data and sends it to the PC through the serial port. This data is checked with the database and displayed by the Visual basic application, hence location of ambulance can be tracked.

We can also track the distance of ambulance from traffic signal as the location of these two will be available, so when ambulance approaches the signal on its way we can send an alert message to the signal controller through GSM module and ask him to turn on green signal so that ambulance can reach hospital faster.

IV. FLOWCHARTS
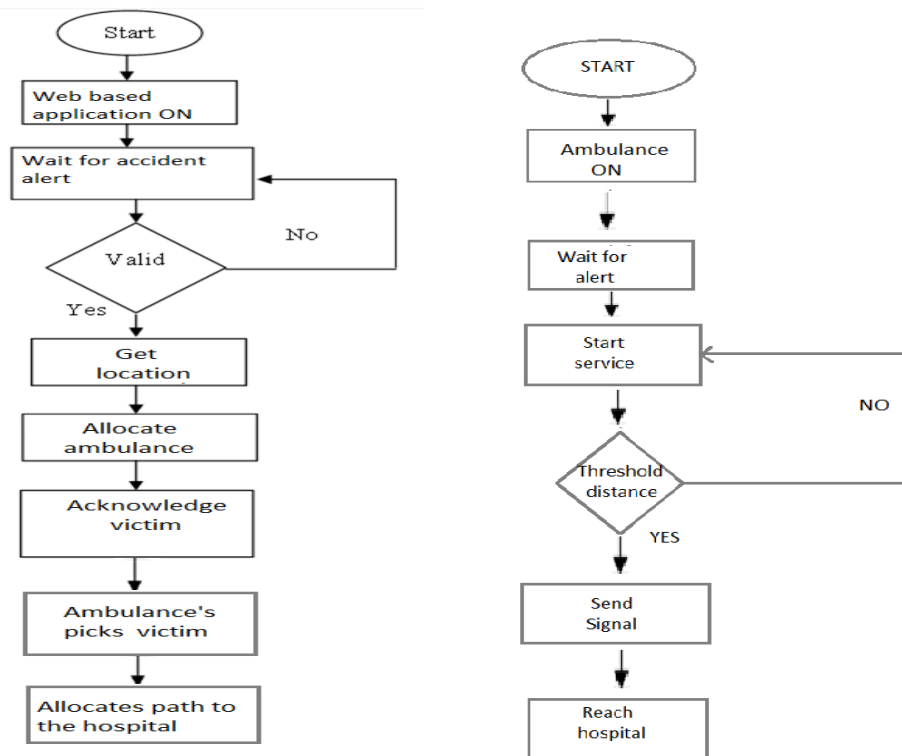
FLOW CHART ON WORKING OF PROTOTYPE   FLOW CHART ON AMBULANCE WORKING

According to the 1st flowchart:

Initially a system based application will be turned on which will manage multiple ambulances, and it will wait for any accident alert. Accident alert can be done through a phone call by a person who witnesses the accident or the victim himself in case of minor accidents. If it is a valid alert, accident location is taken by the person monitoring the system based application. Among the ambulances which are idle, the ambulance which is predicted to reach the accident location faster is chosen among other ambulances based on the algorithm as specified below:

step1> Location of each ambulance is compared with accident location and the relative distance is obtained.

step2> Traffic density on the way to the accident location from each of ambulances is collected from traffic density sensors. Now one of the ambulance is selected based on these two values, which can reach faster to the accident location. After the ambulance is chosen an alert is sent to the ambulance to pick the victim, and the accident location is

Page | 60

sent to ambulance through the GSM module. And also an acknowledge message is sent to the victim, saying ambulance is allocated and appropriate time to reach is sent. And once ambulance picks the victim the appropriate path to nearby hospital is allocated by using the algorithm as said above.

According to the 2nd flow chart:

Initially all ambulances will be idle, and they will be waiting for the alert from the system based application.

Once they receive an alert to pick an accident victim they will start moving in the path provided by the system based application. Meanwhile system based ambulances will be tracking the ambulance's movement and when the ambulance is about to reach a traffic signal, and if there are vehicle's on its way it would be tedious task for ambulance to move. So to make it easier for ambulance to move faster, a message will be sent to the traffic signal controller from system based application through GSM module and the traffic controller can turn signal to green, and hence the ambulance can move easily and reach hospital faster.

V.   CONCLUSION

In this paper a real time tracking system based on Global System for Mobile (GSM), Global Positioning system (GPS) is introduced. This system is suitable for a real time monitoring in ambulance and avoiding the delay to reach hospital. In this proposed system, GSM/GPS has been used for sending SMS and knowing current location of the vehicle.

This system makes easy to track ambulance and also help ambulance to reach hospital faster by clearing the traffic. With the adoption of standards and community awareness, this technology will become more acceptable to reduce travel time for ambulance and increase the chances of survivability for time critical patients.

REFERENCES

[1]   Elia Nadira Sabudin, Siti Zarina Mohd Muji, Mohd. Helmy Abd Wahab, Ayob Johari, Norazman Bin Ghani, "GSM-based Notification Speed Detection for Monitoring Purposes", IEEE, Department of Computer Engineering, University Tun Hussein Onn Malaysia in 2008.

[2]   M. AL-Rousan, A. R. AI-Ali and K. Darwish "GSM-Based Mobile Tele- Monitoring and Management System for Inter-Cities Public Transportations", International Conference on Industrial Technology (ICIT), Computer Engineering Dept., American University of Sharjah, UAE in 2004, pages 859-862.

[3]   Stephen Teang Soo Thong, Chua Tien Han and Tharek Abdul Rahman "Intelligent Fleet Management System with Concurrent GPS & GSM Real- Time Positioning Technology", IEEE, Wireless Communication Centre(WCC), Universiti Teknologi Malaysia (UTM), Malaysia in 2007.

[4]   Hui Hu, Lian Fang "Design and Implementation of Vehicle Monitoring System Based on GPS/GSM/GIS" Third International Symposium on Intelligent Information Technology Application, School of Information Engineering, East China Jiao Tong University, Nanchang, Jiangxi, China in 2009. Pages 278-279.

[5]   Thuong Le-Tien, Vu Phung-The "Routing and Tracking System for Mobile Vehicles in Large Area", Fifth IEEE International Symposium on Electronic Design, Test & Applications Dept. of Electrical Electronics Engineering, HCM University of Technology, Vietnam in 2010.

[6]   Umar Farooq, Tanveer ul Haq, Muhammad Amar, Muhammad Usman Asad, Asim Iqbal "GPS-GSM Integration for Enhancing Public Transportation Management Services" Second International Conference on Computer Engineering and Applications, Department of Electrical, Engineering University of the Punjab Lahore-54590, in 2010.

[7]   T.Shyam Ramanath, A.Sudharsan, U.Pelix Udhayaraj, "Drunken Driving and Rash Driving Prevention System", International Conference on Mechanical and Electrical Technology (ICMET 2010), Sri Sai Ram Engineering College, Chennai, India in 2010, page 603.

[8]   Muruganandham, P.R.Mukesh "Real Time Web based Vehicle Tracking Using GPS", World Academy of Science, Engineering and Technology.