REAL TIME GPS AND GSM BASED AUTOMATIC AMBULANCE RESCUE SYSTEM WITH IOT

Mr. K. Sathyamoorthy[1], T. Ajay Kumaar[2], S. Giftson Singh[3], R. Hariharan[4]

[1-4]*Department of Computer Science and Engineering, PIT, Chennai, Tamil Nadu, India*

Abstract- *In emergency condition, each and every second is important in saving a human's life. The theme of this project is to use the each second efficiently to save person. Now a day's many lives are being expired before the person reaches the hospital in ambulance. The rapid growth of technology and infrastructure has made our lives easier. The advent of technology has also increased the traffic hazards and the road accidents take place frequently which causes huge loss of life and property because of the poor emergency facilities. Our project will provide an optimum solution to this draw back. In this system vibration sensor and GPS tracking system are used for accident detection. According to this project when a vehicle meets with an accident immediately Vibration sensor will detect the signal and sends it to Microcontroller. Microcontroller find the location coordinates of accident spot using GPS and sends the alert message including location through the GSM/GPRS Module to rescue team's in all nearby hospitals(using Nearby Algorithm) and relatives too. If any of the rescue team in hospital (client) will accept the alert message, gives an acknowledgement to server further, the server won't send any messages to hospital (client) and gives route map from hospital to accident spot. After conforming the location of accident spot the ambulance unit will starts its rescue operation.*

KEY WORDS: Accident Detection, Route Maps, SMS, clients, GPS and GSM.

I. INTRODUCTION

Road accidents are a human tragedy. They involve high human suffering and monetary costs in terms of untimely death, injuries. Unfortunately, more than half victims are in the economically active age group of 25-65 years. Advanced life saving measures, such as electronic stability control, also show significant promise for reducing injuries. By observing previous accident history chart we are able to conclude that there are more number of people dies in each country. Moreover, each minute that an injured crash victim does not receive emergency medical care can make a large difference in their survival rate, e.g., analysis shows that reducing accident response time by one minute correlates to a six present difference in the number of lives saved. This paper shows how the sensors and processing capabilities of GPS and GSM can be used to overcome the challenges of detecting traffic accidents without direct interaction with a vehicle's on-board sensors. This system finds its application in real time traffic surveillance. It could be used as a valuable tool for real time traveler. The current system can be able to provide monitoring process from anywhere. The purpose of this system is to design and integrate a new system which is integrated with GPS- GSM to provide following feature:

a) Location information
b) Real time tracking using SMS
c)Track bus driver activity
d) Communication is instantaneous therefore we can receive running report quickly.

II. LITERATURE SURVEY

M. Fogue says that, new communication technologies integrated into modern vehicles has a better chance in assisting injured people in traffic accidents. Nowadays AI systems are capable of taking many emergency decisions. In this approach an intelligent system which is capable of automatically detecting road accidents, and notifying them through vehicular networks and estimating their severity through data mining technique's is used. The system considers the most relevant variables for characterizing the severity of accidents. Results show a complete KDD process.

B. Devikiruba says that the speed of a vehicle can be controlled with the help of computer software to enable the third party or owner to get location, speed, and activity of driver. The system can achieve this by transmitting the information in real time. GSM/GPRS technologies are used to track and provide up to date information. The information is authorized to only specific users over the internet and server gets the information. It uses tele monitoring system to transmit data to remote user. Thus the applications of this system can be used in real time traffic surveillance. This system is very useful to control speeds at specific traffic roads.

V. Alwarswamy says, using only the inbuilt GPS receiver, GSM modems and microcontroller inside a vehicle, that vehicle can be monitored geographically using Google Earth. The microcontroller is a 40 pin, 8 bit microcontroller. The GSM is industrial grade and uses 4G technology to transfer data. Th vibration sensor is used to detect accidents in the vehicle and acts as a accident sensor. The LCD is used to display GPS

location, time and information about the accident. The vibrating level on the sensor is used for estimating the severity.

H. Shin says that a driver's drowsiness and fatigue is a major reason for road accidents and this also makes it an area of great socioeconomic concern. This describes the design of ECG sensor with conductive fabric electrodes and PPG sensor to obtain physiological signals from the driver. ECG and PPG signals are transmitted to a base station connected to a server. Intelligent health conditioning monitoring system is designed at the server to analyze the ECG and PPG signals. The intelligent health conditioning monitoring system is managed to process HRV signals derived from physiological signals in time and frequency domain and to evaluate driver's drowsiness status.

M. Desai says that, the use of technologies like IOT can ease the process of data collection and analysis. The main objective here is to describe a system which can monitor or track the location and vehicle parameters from a centralized place for research and development purposes and to store data for testing parameters of those vehicles on the server for further analysis and records. System design will be generalized for monitoring different parameters like Location, Vehicle speed, Engine compartment temperature, Fuel consumption and many more. Proposed system uses Open source controller and GPS/GSM/GPRS module for data transfer application.

M. Fogue says that communication technologies integrated into automotive sector offer an opportunity for better assistance to injured people in traffic accidents. This will drastically reduce the response time and increase the information regarding the accident. This requires each vehicle to be endowed with an on-board unit responsible for detecting and reporting accident situations to an external control unit that estimates its severity, allocating the necessary resources for assistance.

B. Kathikga says, communication capabilities should be supported by AI systems. To improve the overall rescue process, a fast and accurate estimation of the severity of the accident represent a key point to help emergency services better estimate the required resources. This system proposes a novel intelligent system which is able to automatically detect road accidents, notify them through vehicular networks, and estimate their severity based on the concept of data mining and knowledge inference. The system considers the most relevant variables that can characterize the severity of the accidents (variables such as the vehicle speed, the type of vehicles involved, the impact speed). Results show that a complete Knowledge Discovery in Databases (KDD) process, with an adequate selection of relevant features, allows generating estimation models that can predict the severity of new accidents. This system can notably reduce the time needed to alert and deploy emergency services after an accident takes place.

H. Teshome says that, road accidents are the leading cause for death and injuries. Here factors for the relationship between drivers training and road traffic accident are identified using data mining classification technique Using WEKA as a tool, different rules are generated so that different domain experts get new insights related to road traffic accidents.

J. Miller says, V2V2I architecture leverages the benefits of fast queries and responses from the V2I architecture, but with the advantage of a distributed architecture not having a single point-of-failure from the V2V architecture. In the V2V2I architecture, the transportation network is broken into zones in which a single vehicle is known as the Super Vehicle. Only Super Vehicles are able to communicate with the central infrastructure or with other Super Vehicles, and all other vehicles can only communicate with the Super Vehicle responsible for the zone in which they are currently traversing.

It describes the Super Vehicle Detection (SVD) algorithm for how a vehicle can find or become a Super Vehicle of a zone and how Super Vehicles can aggregate the speed and location data from all of the vehicles within their zone to still ensure an accurate representation of the network.

M. Chong says that, patterns involved in dangerous crashes could be detected if we develop accurate prediction models capable of automatic classification of type of injury severity of various traffic accidents. These behavioral and roadway accident patterns can be useful to develop traffic safety control policies. To obtain the greatest possible accident reduction effects with limited budgetary resources, it is important that measures be based on scientific and objective surveys of the causes of accidents and severity of injuries. This paper summarizes the performance of four machine learning paradigms applied to modeling the severity of injury that occurred during traffic accidents. Considering the neural networks trained using hybrid learning approaches, support vector machines, decision trees and a concurrent hybrid model involving decision trees and neural networks. Experiment results reveal that among the machine learning paradigms considered the hybrid decision tree-neural network approach outperformed the individual approaches.

III. EXISTING SYSTEM

The new communication technologies integrated into the automotive sector offer an opportunity for better assistance to people injured in traffic accidents, reducing the response time of emergency services, and increasing the information they have about the incident. Determining more accurately the human and material resources required for each particular accident could significantly reduce the number of

victims. The proposed system requires each vehicle to be endowed with an On-Board Unit responsible for detecting and reporting accident situations to an external Control unit that estimates its severity, allocating the necessary resources for its assistance

IV. PROPOSED SYSTEM

The proposed system consists of two main units, which coordinates with each other and makes sure that ambulance reaches the hospital without any time lag. One is vehicle unit and server. Whenever accident is occur, it will detect with help of vibration sensor. Then vibration sensor sends signal to microcontroller. Micro controller sends an alert message along with latitude and longitude using GPS and GPRS then further, it will send it to server and the data will be stored in cloud as well as concern person's relatives too. Server sends an alert message along with accident location spot to nearby all hospitals (client) and If anyone of rescue team in hospital (client) will accept the alert message, gives an acknowledgement to server further, the server won't send any messages to hospital (client) and gives route map from hospital to accident spot. After conforming the location of accident spot the ambulance unit will starts its rescue operation.

CLIENT SIDE:

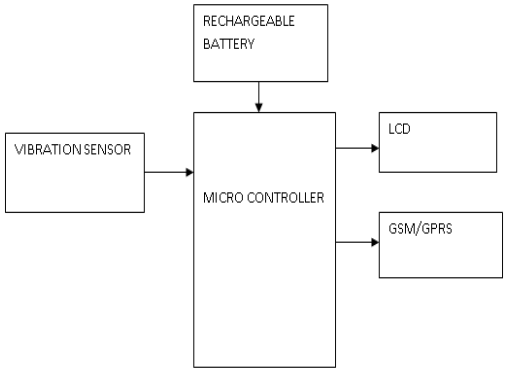

Fig 1: Client Side (Vehicular) On-board Unit

SERVER SIDE:

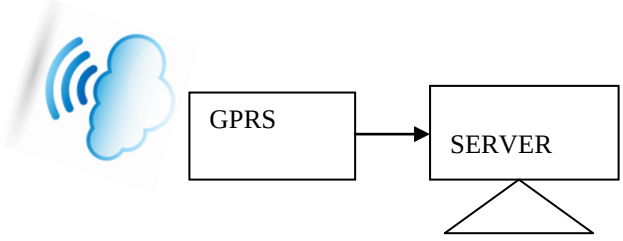

Fig 2: Server-Side Unit

ARCHITECTURE:

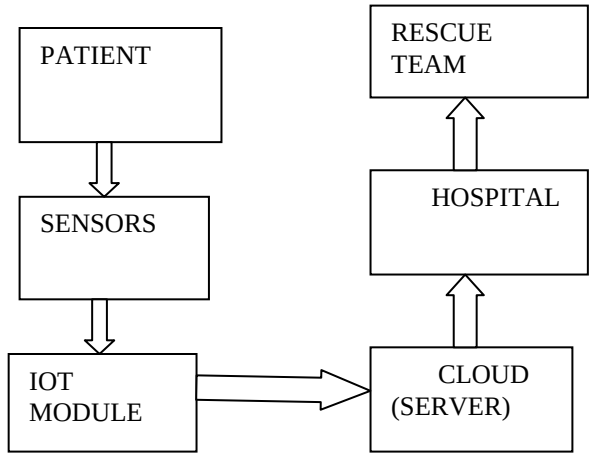

Fig 3: System Architecture

V. MODULES

The Modules are:

1. Obtaining the accident location
2. Transmission of coordinates to server
3. Transferring data to webpage
4. Registration and Login
5. Clients Accessibility
6. Route map creation

MODULE 1: OBTAINING THE ACCIDENT LOCATION:

As soon as an accident occurs the location is obtained using the GPS module and the co-ordinates(latitude and longitude) are sent to the PIC microcontroller.

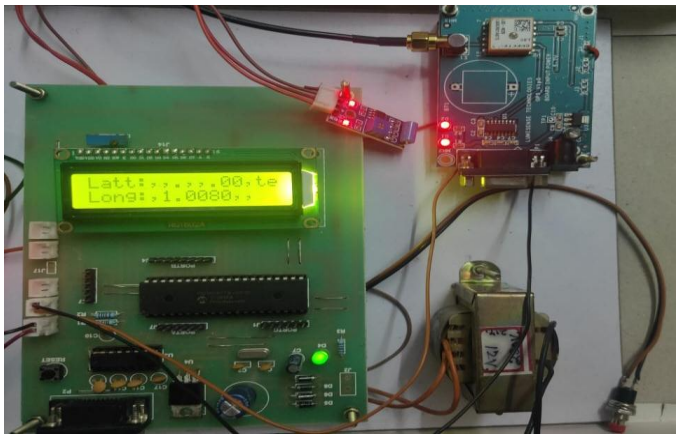

Fig 4: Obtaining Accident Location

MODULE 2: TRANSMISSION OF COORDINATES TO SERVER:

The obtained co-ordinates are to the server, which is basically a IOT cloud database. The values are transferred/sent to the server using the GPRS IOT module.

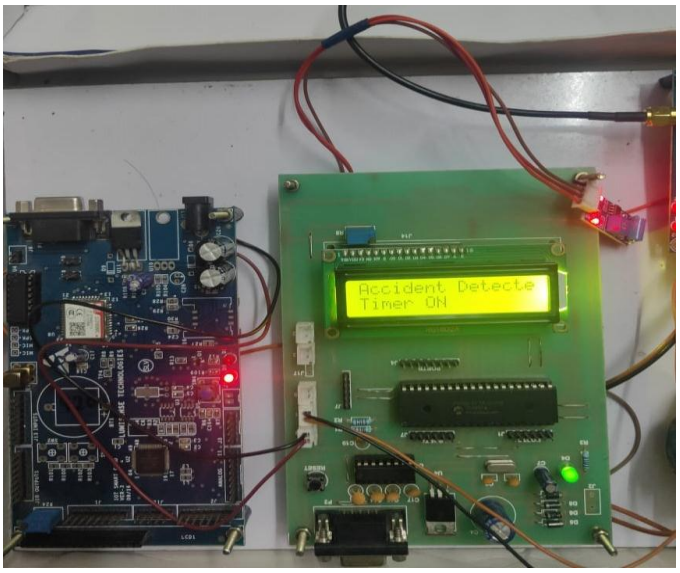

Fig 5: Transmitting Co-ordinates

MODULE 3: TRANSMITTING DATA TO WEBPAGE:

The data that is present in the IOT cloud server is sent to our webpage by the use of a Php code running in the background of the webpage.

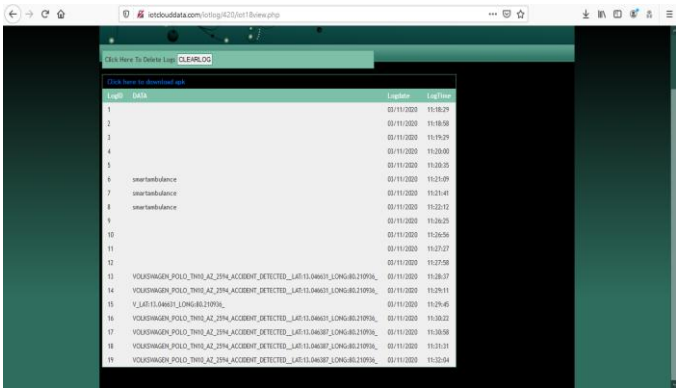

Fig 6: Transferring data to webpage

MODULE 4: REGISTRATION AND LOGIN:

Only the Admin has the rights to add or remove clients(Hospitals), and only when the clients are register they are allowed to access the webpage.

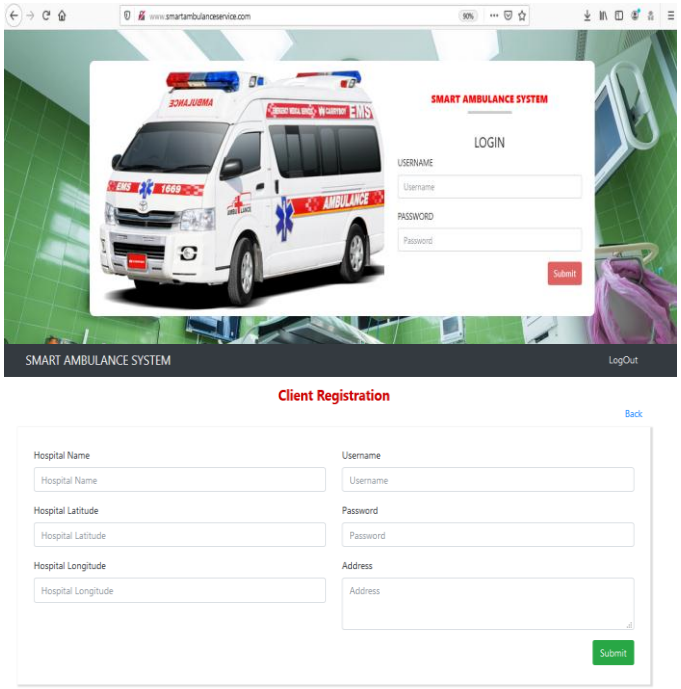

Fig 7: Login and Registration Page

MODULE 5: CLIENTS ACCESSIBILITY:

When the clients are logged in, they will be alerted of the accidents that have occurred near them. A notification will be sent to them, asking them if they are going to aid the patients by going to the accident zone. If they fail to accept or another client accepts the request, then the notification sent to the first client will be nulled automatically.

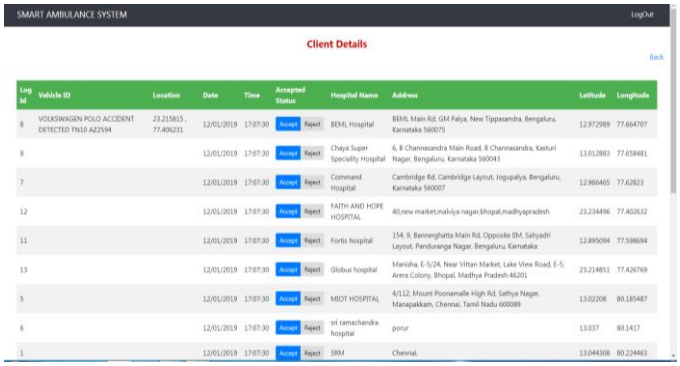

Fig 8: Clients Webpage

MODULE 6 : ROUTE MAP CREATION:

When the clients accept the request, a route map is created from the clients location to the accident zone/location. The route map created will give the shortest possible route with minimum traffic present. Route maps are created using Google API's.

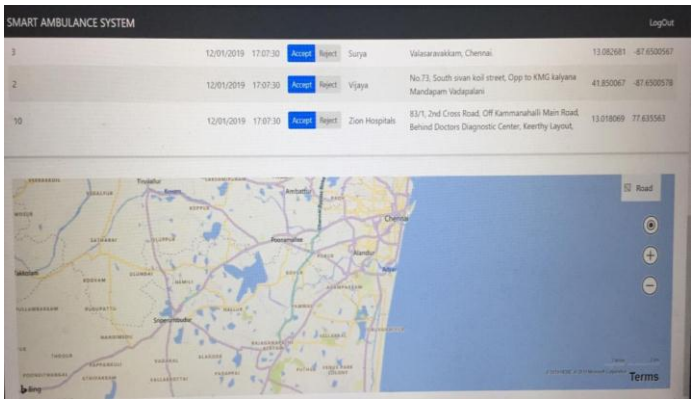

Fig 9: Route Map

VI. FUTURE ENHANCEMENT

Camera can be added to the vehicle to record the accident and save the footage and an audio recorder can also be fixed to record the driver's voice at emergency situations. This will give us more detailed idea of how the accident has occurred after the accident and the GPS and GSM sensors should be upgraded to military grade to have better range and successful recovery. In the on-board vehicular unit instead of GSM/GPRS module which uses a mobile SIM card for transferring data direct satellite uplink can be used, which is more reliable, fast, extremely accurate and can even work in locations where there is no network coverage. Instead of a having a single personnel data for each vehicle, it can be changed to collecting the information about whoever is driving the vehicle at that time and the data can be collected through the on-board car display which in turn can be connected to the projects on-board vehicular unit.

VI. CONCLUSION

The proposed system can track geographical information automatically and sends an alert message regarding accident. It provides the optimum resolution to poor emergency facilities provided to victims in road accidents within the most possible method. With the assistance of this technology immediate action are often taken once associate accident happens by alerting the various hospitals nearby and also the concerned personnel through messages.

VII. REFERENCES

[1]Dirección General de Tráfico (DGT), "The main statistics of road accidents. Spain," 2010, available at http://www.dgt.es/portal/es/seguridad_vial/estadistica.
[2]Eurostat: Statistical Office of the European Communities, "Transport statistics in the EU," 2012, available at http://epp.eurostat.ec.europa.eu/portal/page/portal/transport/data/main_tables.
[3]J. Miller, "Vehicle-to-vehicle-to-infrastructure (V2V2I) intelligent transportation system architecture," in 2008 IEEE Intelligent Vehicles Symposium, june 2008, pp. 715–720.
[4]F. Martinez, C.-K. Toh, J.-C. Cano, C. Calafate, and P. Manzoni, "Emergency services in future intelligent transportation systems based on vehicular communication networks," IEEE Intelligent Transportation Systems Magazine, vol. 2, no. 2, pp. 6–20, summer 2010.
[5]M. Fogue, P. Garrido, F. J. Martinez, J.-C. Cano, C. Calafate, and P. Manzoni, "Prototyping an automatic notification scheme for traffic accidents in vehicular networks," in 4th IFIP Wireless Days Conference, October 2011.
[6]M. Fogue, P. Garrido, F. J. Martinez, J.-C. Cano, C. T. Calafate, and P. Manzoni, "Evaluating the impact of a novel message dissemination scheme for vehicular networks using real maps," Transportation Research Part C: Emerging Technologies, vol. 25, pp. 61–80, December 2012, DOI: 10.1016/j.trc.2012.04.017.
[7]B&B Electronics, "The OBD-II Home Page," 2012, available at http://www.obdii.com.
[8]U. Fayyad, G. Piatetsky-Shapiro, and P. Smyth, "The KDD process for extracting useful knowledge from volumes of data," Communications of the ACM, vol. 39, pp. 27–34, November 1996.
[9]M. Hall, E. Frank, G. Holmes, B. Pfahringer, P. Reutemann, and I. H. Witten, "The WEKA data mining software: an update," SIGKDD Explorations, vol. 11, pp. 10–18, November 2009.
[10]European New Car Assessment Programme (Euro NCAP), "Test Procedures," 2012, available at http://www.euroncap.com/testprocedures.aspx.