

# Intelligent Accident Detection System

<sup>1</sup>Anitt Tony <sup>2</sup>Athul Krishna P Suresh <sup>3</sup>Minnu Mariya Joy <sup>4</sup>Neethu K.R <sup>5</sup>Tony Thomas

<sup>1,2,3,4,5</sup>Department of Electrical and Electronics Engineering

<sup>1,2,3,4,5</sup>Sahrdaya college of Engineering and Technology, Kodakara, University of Calicut, Kerala, India

## Abstract

Recently technological and population development, the usage of vehicles are rapidly increasing and at the same time the occurrence accident is also increased. Hence, the value of human life is ignored. No one can prevent the accident, but can save their life by expediting the ambulance to the hospital in time. A new vivid scheme called Intelligent Accident detection system is introduced. The objective of this scheme is to minimize the delay caused by traffic congestion and to provide the smooth flow of emergency vehicles. The concept of this scheme is to green the traffic signal in the path of ambulance automatically with the help of RF module. So that the ambulance can reach the spot in time and human life can be saved and the accident location is identified sends the accident location immediately to the main server. The main server finds the nearest ambulance to the accident zone and sends the exact accident location to the emergency vehicle. The control unit monitors the ambulance and provides the shortest path to the ambulance at the same time it controls the traffic light according to the ambulance location and thus arriving at the hospital safely. This scheme is fully automated, thus it locates the accident spot accurately, controls the traffic lights, provide the shortest path to reach the location and to the hospital in time.

**Keyword-** Global System for Mobile Communications (GSM), Global Positioning System (GPS), Global Packet Radio Service (GPRS), Short Message Service (SMS), Radio Frequency (RF)

## I. INTRODUCTION

India ranks worst when it comes to road accidents. A supportive legal framework is the need of the hour for good Samaritans who provide emergency medical care to road accident victims in order to shield them from unnecessary legal complications. Every year nearly 150,000 people die in road accidents in India, which is the highest number in the world. The first hour of such an emergency, called the “golden hour” is widely regarded as the most precious time for saving lives. The 201 Law of Commission had stated, “Doctors point out that at least fifty per cent of the fatalities can be averted if victims are admitted to a hospital within the first one hour”. According to organizations working in the sphere of trauma care, “If the victim can be displaced to a hospital in time frame, his or her chances of survival increase significantly.” Unfortunately, however, such prompt care is generally not available in India. According to a study by the Indian Journal of Surgery in 2006, 80 percent of road accident victims in India do not receive any emergency medical care within this “golden hour”. According to a survey conducted for Save Life Foundation (SLF), an organization that works in the sector, among 1,027 road-users in Hyderabad, Kanpur, Delhi, Ludhiana, Mumbai, Kolkata and Indore, 74 per cent of the bystanders are unlikely to assist a victim of serious injury. When asked the reasons behind it, 88 per cent of the respondents said that they were unwilling to help because of fear of legal complications, including continual police questioning and court appearances, 77 per cent said that hospitals unnecessarily detain helpful persons and refuse treatment if payment is not made promptly. The primary step to correct this deficiency is to develop a system which detects accident automatically and inform to emergency care centre to take proper action within a time frame. According to recent World Health Organization (WHO) India has the highest number of road deaths in 2012 in the world.

Worldwide, 1.3 million lives were lost. Road accidents also create enormous losses to the exchequer. India loses \$20 billion due to road accidents annually which is enough to feed 50% of the nation’s malnourished children. Among the states, Maharashtra topped the list with the highest number of road accidents at 68,438, Tamil Nadu (65,873), Madhya Pradesh (49,406), Karnataka (44,731) and Andhra Pradesh (44,165). Mumbai topped the list of cities with 25,471 road accidents, Delhi is in second with 7281 road accidents followed by Bangalore (6031), Indore (4995) and Bhopal (3459). In another disturbing trend, of the total number of road accidents, 53.5 per cent were reported from rural areas, reflecting a rising tide of motorization in rural India.

COUNTRY	NO.OF ROAD DEATHS
INDIA	105,725
CHINA	96,611
US	42,642
RUSSIA	35,972
UK	3,298

Table 1.1: NO. of road accident death in each country

In recent years, accidents due to dense fog also increasing. A vehicle fire is an undesired conflagration (uncontrolled burning) involving a motor vehicle. Also termed auto fire or car fire, it is one of the most common causes of fire related property damage. A motor vehicle contains many types of flammable materials, including flammable liquids like oil and gasoline as well as solid combustibles. Seat belts save lives. While seat belt use has been increasing and averages 88 % nationally, there are still groups less likely to wear seat belts: commercial drivers, teens, males in rural areas, people driving at night, pick-up truck drivers and people who have been drinking. The above information causes to develop this system.

The main objectives of this system are:

- 1) Detect the accident when it occur
- 2) Inform the latitude and longitude of the place where the accident occurs to the predefined number.
- 3) A message will send to the nearby ambulance driver.
- 4) The vehicles in the route at which ambulance arrives will be cleared.
- 5) So the patient can be reach in the nearby hospital with in the “golden hour”.

In briefly we can say that, automatic accident detection system is used to recognize the location of the accident and easily to reach the location. Every second is valuable for the ambulance vehicle. There is loss of life due to the delay in the arrival of the ambulance to the hospital in the golden hours. This delay is mainly caused by the waiting of ambulance in the traffic signals. So time places an important role in this task. The traffic signals are also controlled automatically by using a Radio Frequency module (RF module). An ambulance will reach the nearest hospital at the exact time to save the human life. This paper is fully automated and thus it locates the accident spot exactly.

## II. SYSTEM DESCRIPTION

### A. Vehicle Unit

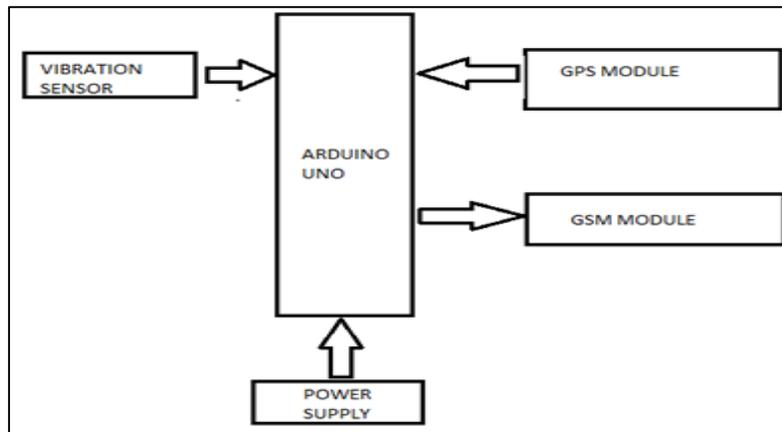


Fig. 1: Block diagram of vehicle unit

Every vehicle should have vehicle unit. The vehicle unit consists of a vibration sensor, GPS system, GSM module. The vehicle unit installed in the vehicle senses the accident and sends the location of the accident the main server. The vibration sensor used in the vehicle will continuously sense for any large scale vibration in the vehicle. The sensed data is given to the controller. GPS module finds out the current position of the vehicle which is the location of the accident and gives that data to the GSM module. The GSM module sends this data to the control unit whose GSM number is already there in the module as an emergency number.

### B. Control Unit

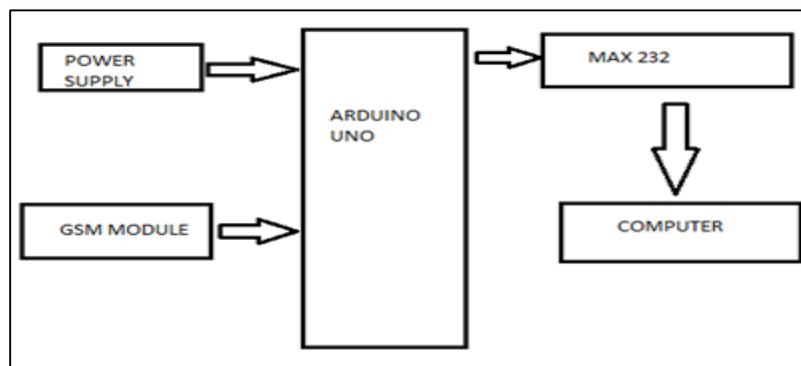


Fig. 2: Block diagram of control unit

When the control unit receives the sms from the vehicle unit, it will search for the most nearby available ambulance and it sent the latitude and longitude of the accident spot to the ambulance driver through GSM. Max232 is used for the serial data communication between microcontroller and computer .Message to the ambulance driver is sent by the computer.

### C. Ambulance Unit

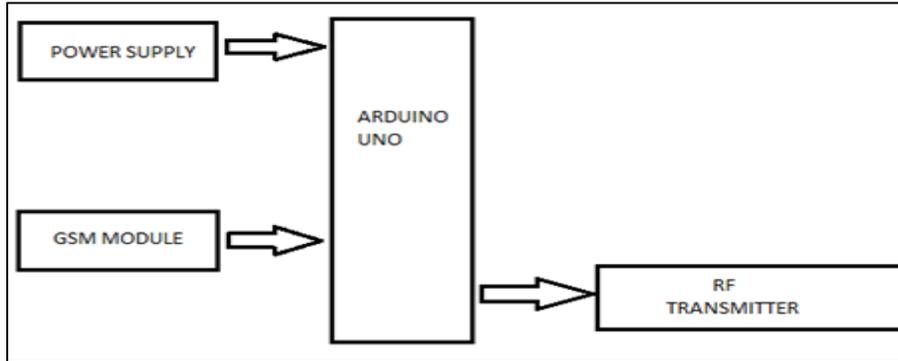


Fig. 3: Block diagram of ambulance unit

The main server discovers the nearest ambulance to the accident place and also the shortest route between the accident spot, ambulance and the nearby hospital. Then the server sends this path to the emergency vehicle. Ambulance unit also using this information the controller controls all the traffic signals in the path of emergency vehicles and makes it ready to provide a free path to the ambulance, which ensures that the ambulance reaches the hospital without delay. At the same time, the ambulance section turns ON the RF transmitter. This is used to communicate with the traffic department.

### D. Traffic Unit

Whenever a traffic signal section receives the information about the accident, the RF receiver in this section is turned ON to search for ambulance nearing the traffic signal. Control the traffic signal automatically with the help of RF module. Whenever the emergency vehicle reaches near to the traffic signal (approximately 100m), the traffic signal will be made of green via RF communication. Thereby the ambulance is recommended to attain the hospital without delay. This will permit the emergency vehicle to reach the hospital on time.

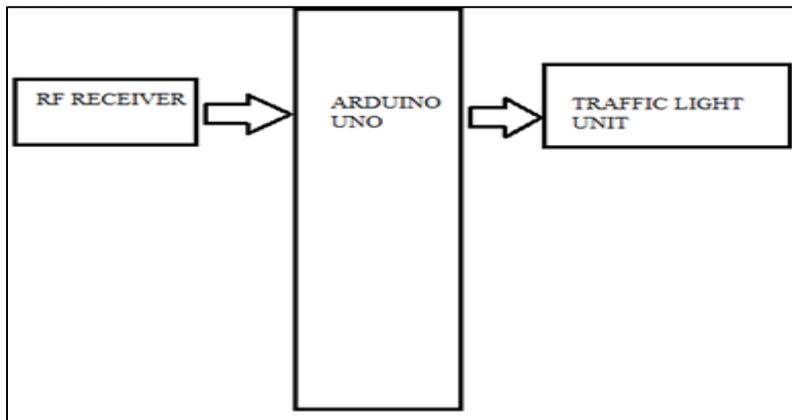


Fig. 4: Block diagram of traffic unit

## III. SIMULATION RESULTS

The performance of the proposed control strategy was evaluated by computer simulation using proteus software. Simulation of different units of the proposed system is as follows.

### A. Vehicle Unit

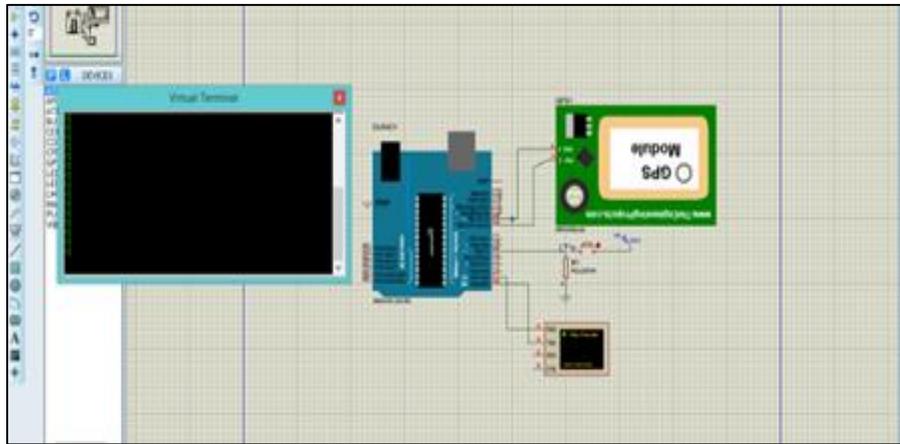


Fig. 5: Vehicle unit simulation result

This consist of GPS module, GSM module and vibration sensor. Instead of GSM we have a virtual terminal. Virtual terminals are mainly used in the situations which require serial data transfer. Instead of vibration sensor a switch is connected. When an accident occurs, it is represented by the ON position of switch. When the switch is ON, the data from the GPS can be observed on the virtual terminal. This is analogous to the actual GPS position.

### B. Control Unit

Control unit consist of pc and a gsm module. These are serial transmitting devices. Hence instead of that, virtual terminals are used. One virtual terminal represents the PC and the other represents the GSM module. When simulation is done, both these terminals will appear on the screen. When an input is given to the GSM terminal it will appear instantly on the PC terminal.

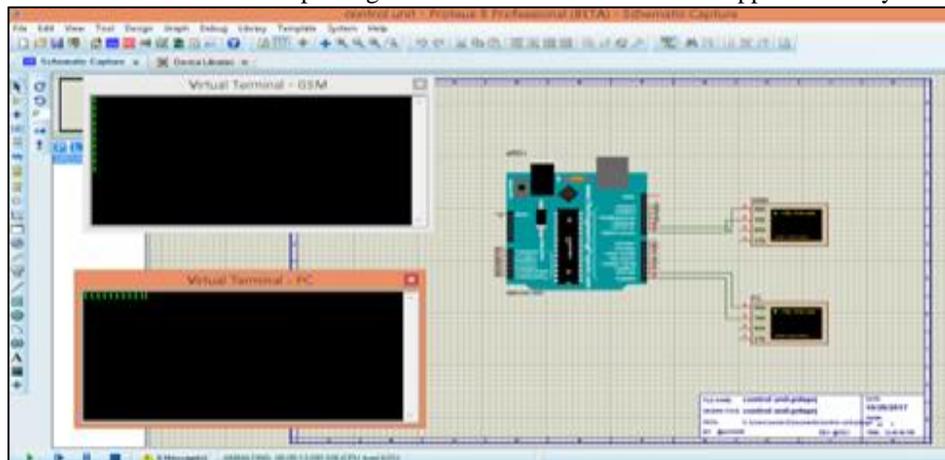


Fig. 6: Control unit simulation result

### C. Ambulance Unit

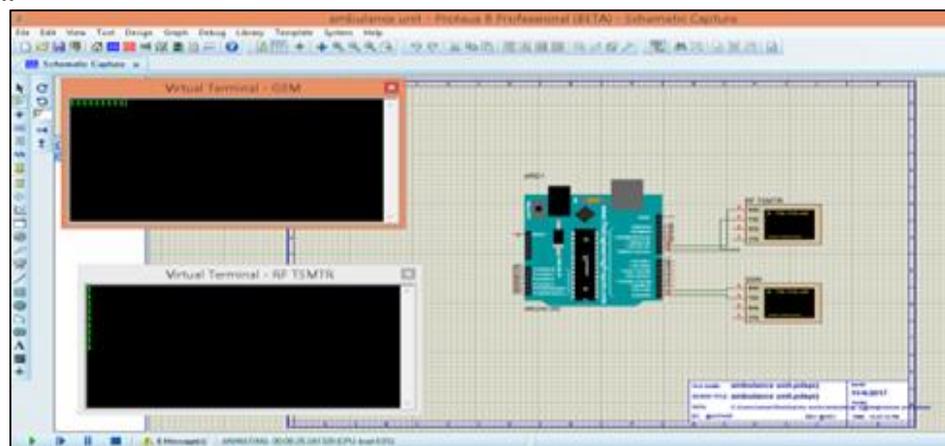


Fig. 7: Ambulance unit simulation result

Ambulance unit consist of GSM module and RF transmitter. Both RF transmitter and GSM are represented using a virtual terminal. When a data is given to the GSM terminal it will appear on the RF terminal.

#### D. Traffic Unit

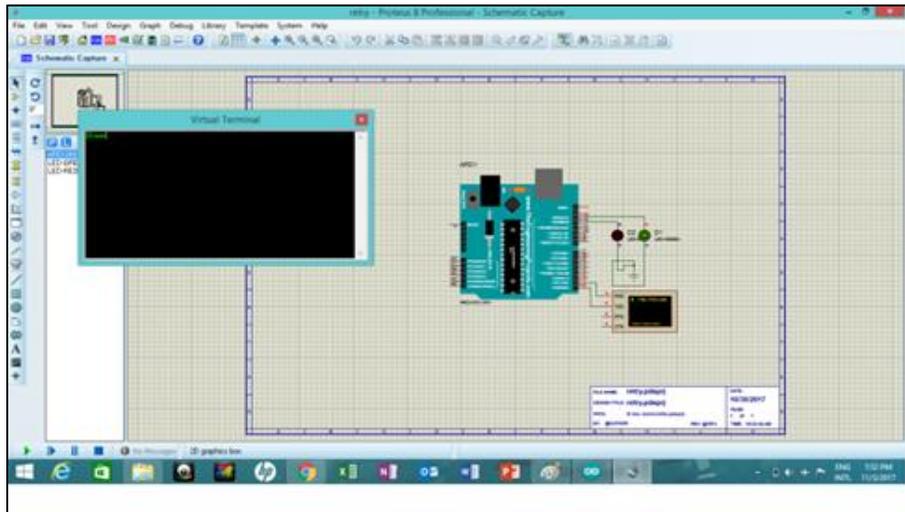


Fig. 8(a): Traffic unit output when an ambulance reach in the signal

Traffic unit comprises of traffic light unit and RF receiver module. RF receiver is represented with a virtual terminal. Traffic light unit consist of 2 LEDs. This two LEDs represents the traffic signals. These LEDs are red and green. Two cases in this unit are illustrated above. Usually there will be a predefined data is obtained from the RF transmitter. RF receiver will continuously check this data. In this simulation the data is '1'. As '1' is entering in the RF receiver terminal, the green light will remains ON for 5 sec. In all other situations this signal will glow alternatively.

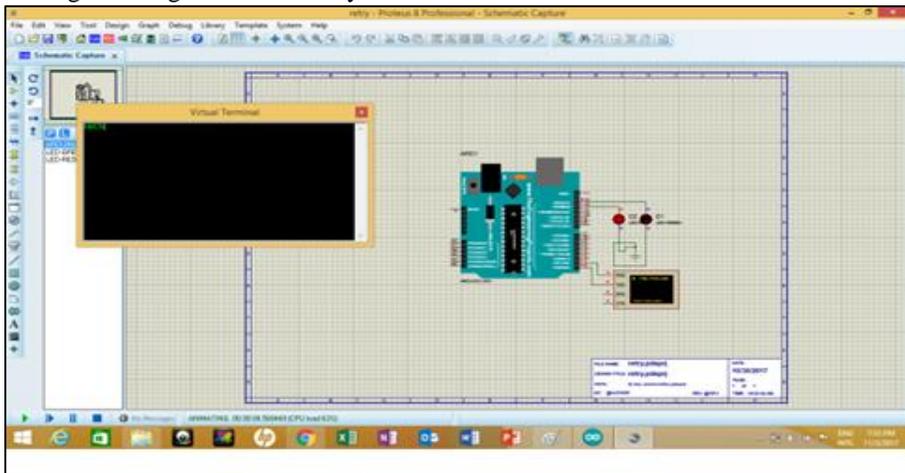


Fig. 8(b): Traffic unit output at normal condition

In fig.8 (a), the simulation of traffic unit at the time of ambulance passage is shown. That means, simulation of the circuit during the time when the RF receiver connected to the traffic unit receives signal from the RF transmitter connected to the ambulance unit. in fig.(b) ,the simulation of traffic unit when there is no ambulance in nearby area.

## IV. CONCLUSION

This project is to find the shortest path by controlling traffic signals in favor of ambulance. By this new system the time lag is reduced by applying the RF technologies that controls the traffic signals. The priority of service to the ambulance follows the queuing methodologies through server communication. This ensures the reduced time lag between the accident spot and hospital. This thesis provides emergency responders with crucial information at the earliest possible time. This reduces the time delay for reaching the patient to hospital once accident occurs. By this way we can reduce the death rate due to accidents that occur in our society by giving special care to the patients in their golden hours.

Vehicle unit, control unit, ambulance unit and traffic unit are the major units of the intelligent accident and detection system. Here once accident occurs it will locate the spot and a message will sent to the most nearest ambulance driver. Until now

we completed the simulation of all the units and the outputs are verified by using proteus software. We also started the hardware of vehicle unit and partial output is obtained.

Main advantage of this project is decision making is made simple in most accurate way. The vehicle which has undergone accident can be identify using tracking system without any delay. The proposed Vehicle accident detection system can track geographical information automatically and sends an alert SMS regarding accident. By this immediate medication is provided to the accident victim in the remote area. One of major problem we facing in project is that, the provision of GSM communication is limited in certain area.

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