IOT Based Accident Care and Traffic Management System

Mangala Gowri M[1], Lata Naik[2], Praveen A[3], Prajwal S[4], Dr. Padmashree T[5]

[1,2,3,4] *Student, Dept. of Information Science and Engineering, RV College of Engineering, Bangalore, Karnataka, India*
[5] *Assistant Professor, Dept. of Information Science, R.V. College of Engineering, Bangalore, Karnataka, India*
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Abstract - *Nowadays, we faced the lot of accidents and even many people are losing their lives because of accident and the delay in moving the patient to nearby hospital is mainly due to traffic congestion that leads to death. This project explores the utilization of new technology and Renesas microcontroller to overcome this problem. This project presents an accident detection, collecting information of accident location through GPS and sends alert message to ambulance through GSM network. In this project, we implement a system for detecting and transmitting an alert message to nearest Ambulance. In this proposed system, IOT and Android are integrated to obtain the expected result. This project can be divided into three units Vehicle Unit, Control Unit and Ambulance and traffic Unit.*

***Key words*: Renesas microcontroller, GSM, GPS, IR sensors, RFID**

1. Introduction

Increase in the population has led to increase of vehicles on the road, because of more number of vehicles on the road accidents are increasing in a wide number. Approximately 80 per cent of accidents contributes in many lives being lost. The developing countries are mostly focused on the day-to-day road accident. The fundamental purpose behind this is absence of framework, absence of traffic control and overseeing mishaps. Most elevated number of mishaps happen in India among all the developing countries. The primary purpose behind a real existence misfortune during a mishap is the absence of quick assistance to spare an individual's life by a couple of moments.

The purpose of this project is to identify the incidence of any accident and report the location of the accident to the ambulance nearby, so that the ambulance can provide immediate assistance and monitor the traffic signal for the benefit of ambulances during the accidents.

2. Literature Survey

The author's approach in this paper is to automatically detect accident using sensors, tracking of location using GPS, sending latitude and longitude values to ambulance, GPS viewer application is used to find exact location of the accident, Beginning the rescue operation and monitoring of the traffic signals using the RFID technology, all these steps are carried out according to the response of the circuit. This device is more reliable with no Time Loss. But there may be a delay due to GSM messaging, because it is a queue-based technique that can be minimized by giving more priority to the controller-communication oriented messaging. [1]

Another paper highlights to set up a fully automated system architecture that minimizes the time difference between an incident happening and the emergency response implementation. This can be done by the integration of accident detection and emergency medical services programs. The proposed design uses an accelerometer and a piezoelectric sensor to activate the microcontroller, retrieving the user's position via the GPS. Communication is through a GSM / GPRS module between the IOT system and the database. An Android app is designed to collect relevant user health information, emergency contact information and hospital details during the initial phase of the application. [2]

A simple approach to detect an accident and use sensors and microprocessor to send the position to the Cloud. The message is sent from the Cloud to hospital, ambulance, and emergency contacts. The device is intended to save lives by allowing emergency responders to give response more quickly to accidents, as well as monitoring the felons who attempt to leave the location of an incident they were involved. [3]

The authors in this paper suggested that, without delay in the ambulance, the patient can take the hospital easily by controlling the traffic signal on the road. In the suggested technique, the person's intoxicated state can also be identified at engine startup if the person is in alcoholic condition the sensors sense alcoholic behavior and the vehicle is not switched on. [4]

3. System Architecture

The system mainly consists of identifying the occurrence of any accident and reporting the location of accident to the nearest ambulance and controlling the traffic signal in favor of ambulances during the accidents. The server, Renesas microcontroller is responsible for controlling all the activities in the system. The LCD is used to display the data about the present activities going through the hardware components. The IR sensor has been used to monitor the density of the traffic, the toggle switch is used to represent the occurrence of the accident. RFID is a method used for capturing of data and automatic identification of the vehicles. The GPS is used to send the data from hardware component to the server through the internet using the IP address.
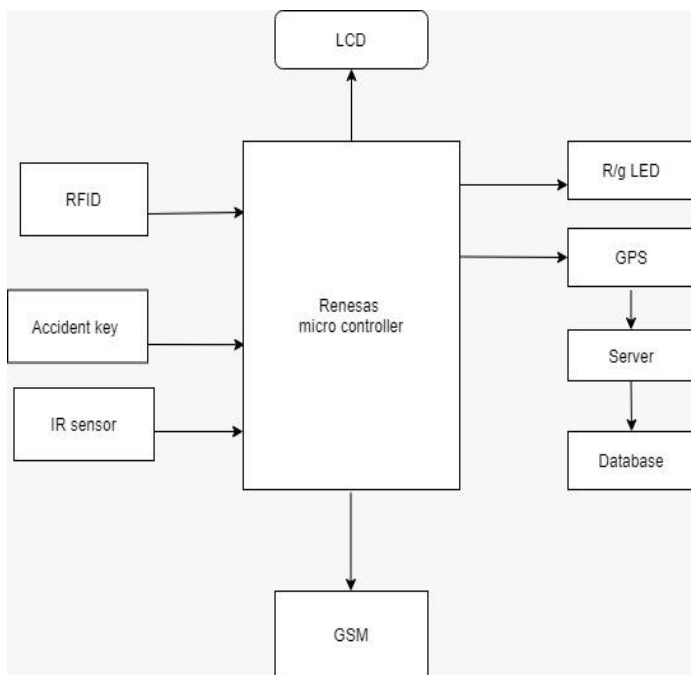

Figure 1: System Architecture

4. Flow Chart

Figure 2 shows the flow of the project. The decision flow of the particular sensors is demonstrated and the level where microcontrollers and GSM Module are placed is displayed. Initially, the data is read from the sensors and are displayed on the LCD and data is processed through Microcontroller.
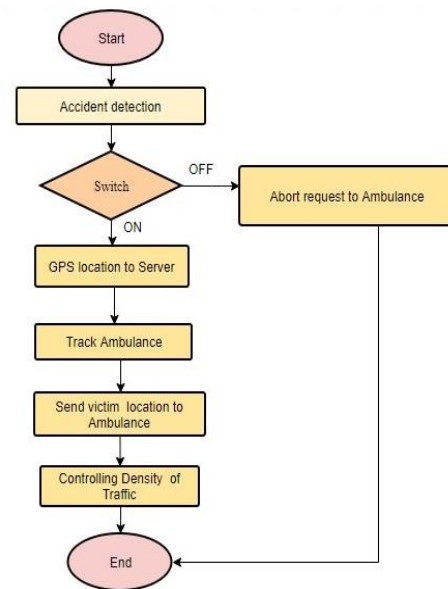

Figure 2: Schematic Flow Chart

5. Implementation

The entire project is divided into three units. They are as follows
- Accident unit
- Control unit
- Ambulance and vehicle unit

• Accident unit

A buzzer is connected to microcontroller to specify the accident has occurred. The buzzer when pressed, it alarms the system by displaying it in LCD connected and current GPS position values and current status of traffic are sent to the registered mobile number through GSM module. This is to indicate that accident has occurred and immediate response is required for victim.

• Control unit

The message pattern with GPS location and current status of the traffic is received to registered mobile number. The application named ICTMS is auto launched when the message is received. The application displays the GPS Position values, voice output alerting "accident detected" and accident location can be viewed in maps within the application. This indicates that ambulance has received the message and it has to perform immediate response to the alert.

• Ambulance and Vehicle unit

Vehicle unit indicates the normal flow of traffic. Each signal have 5 seconds delay i.e. every five seconds the signals will switch from one to another. There are two interruption for normal flow of traffic. They are

ambulance and high traffic density. To detect ambulance, RFID technology is used. When the RFID is scanned, the signals from RFID reader will be sent to the microcontroller which in turn communicates to the traffic signal system to change the signal lights accordingly. Once the ambulance with a RFID card crosses the traffic light signal, it gets back to its normal position. Specific lane's signal will turns green for 15 seconds to clear the ambulance from high traffic density. IR sensors are used to detect high traffic density in lanes. Obstacle of the sensors causes the traffic light of the specific lane to turn green for 20 seconds. This indicates there is high traffic density on roads and it has to be cleared.

6. Results

The results of receiving message of GPS position values from GSM module to registered mobile number is shown in figure 3.
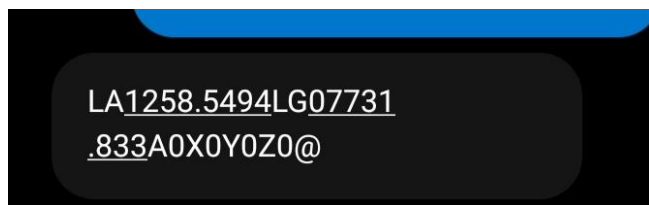

Figure 3: message received from GSM

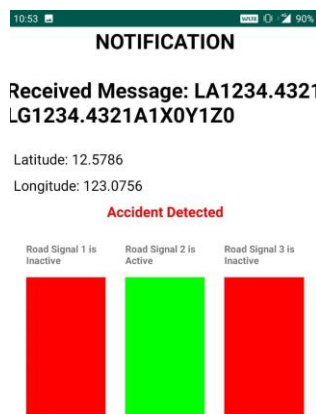The results of control unit and working of the application is shown in figure 4 and figure 5.

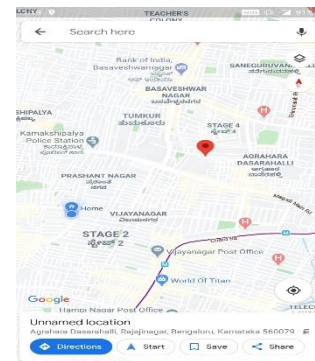**Figure 4:** GPS and traffic status

Figure 5: GPS location in maps

The results of the complete working project with all the components connected to microcontroller is shown in figure 6.
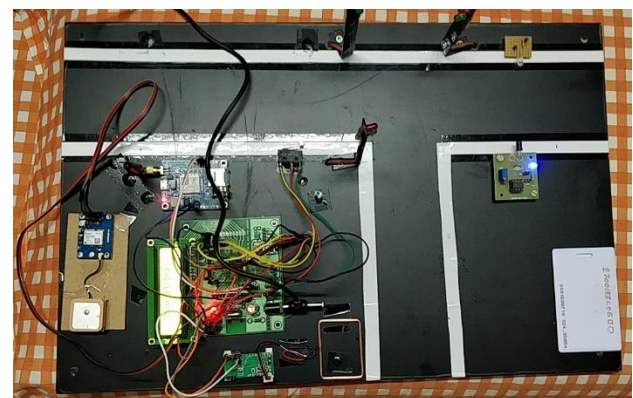

Figure 6: Result of the project

7. Conclusion

This project provides an effective, cost-friendly, integrated design gadget with many benefits. This system uses microcontroller interfaced with GPS-and GSM and sensors such as the IR sensor, with the goal of minimizing response time and accurately providing the accident location. Use of new technologies to improve driving safety, minimize injuries and increase road safety. The program has been proven successful and adapted to the social, political and economic circumstances in developed countries.

It can also solve the problem of lack of automated system for accident detection and accident spot location. As a result, the time taken to identify the site is that, and the individual can be handled as soon as possible, saving several lives.

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