Intelligence Transportation System based on IoT

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Abstract — *Over the last decades, we have seen an exponential growth in number of vehicles on the road. As the number increases, chances of accidents also increase. If a vehicle is met with an accident, say in a remote place, then chances of emergency services reaching on time is less. So longer the paramedics take to reach the accident site, lesser is the chance of survival of the passenger. This problem can be solved by our Intelligent Transportation System where accident is detected automatically and an instant notification is sent to the ambulance which will be on its way immediately. We also have implemented a traffic control system that will allow emergency vehicles to pass through the signals more efficiently. Our proposed system is found to save crucial time which is very critical for an injured person. This system is definitely helpful in current scenarios where accidents are occurring more frequently than it used to be.*

***Key Words*: Accident detection, Emergency Services, Intelligent Transportation System, Ambulance, Traffic Control**

1. INTRODUCTION

In Today's era, growth of population occurs to increase in usage of transportation vehicles which also increases road mishaps day by day. To decrease the road accidents and no of deaths Vehicular systems will play a very cumulative role in Transportation Systems. Most of the Transport system applications such as fleet management, road safety management, and intelligent navigations systems, these systems depend on the data exchanged between vehicles and roadside infrastructures termed (V2I), or even among vehicles termed (V2V). The addition of sensors in vehicles besides with peer-to-peer

(P2P) mobile communications estimates the substantial improvements in terms of safety in the future [1]. Gsm stands for global system of mobile communication. It is used in almost all mobiles used in whole world. If you have a mobile, you are also using gsm module. Microcontroller based, the communication is through TTL pins RX and TX by using sim900 TTL.

Before arriving to accident zone, a quality measure setup such as fast and effective rescue operations in the time this will increase the chances of survival of the injured persons. Hence, to maximize the benefits of using communication systems between vehicles, this infrastructure should be maintained by intelligence systems. Those systems should be efficient in approximating the accidents and automatically deploy the actions required, thereby decreasing the time required to assist injured persons. Therefore a vehicular accident network along with traffic accidents assistance is built by forming an Intelligence Transportation System (ITS). The idea of developing this work comes from our social responsibility towards society.

In many accidents that occur around us, there is a huge loss of life. According to the survey, around "1, 47,913" people die on accidents per year due to drink and drive, adequate ability to drive, rash driving, over speeding, distractions and bad weather [2]. The main reason was no precaution was taken to before driving vehicles. Therefore it is very important there should be some measures to minimize the later effects of the accidents.

The main idea of this paper is to find the location of the incident. That incident is notified by sensors fitted in the vehicle sends the static location of incident to the mobile sms and updated in the cloud server.

This paper is organized as follows: section 2 consists of methodology, system architecture in 3, and section 4 describes the flowchart and work process of the system. In section 5 we have conclusion. Finally, future work and references are described.

2. METHODOLOGY

Various embedded systems have distinctive designs just as their functions and utilities. In this project design, structured modular design concept is adopted and the system is mainly composed of microcontroller, GSM, accelerometer, temperature sensor, switch and LCD. Accident is detected by accelerometer ADXL335 if there is any change in the axis of it. If the passenger has no casualties then he can turn the switch on which will indicate that there is no need of any emergency services, else if the switch is off a message will be sent to the server and the android application with the help of our GPRS/GSM module connected to our Renesas Microcontroller. The message will contain the location of the accident and also our JHD162A LCD will display the message of accident. As the message is received by the ambulance driver who is having the application, he will be on his way to the crash site. On his way he might face traffic signal, so as to pass the signal without any delay Traffic Control System has

been implemented. Now when the driver approaches the signal, he can indicate which road he wants to select by pressing the corresponding button in the application. This will send a message to the Renesas Microcontroller with the help of GPRS/GSM module which is eventually controlling the traffic lights. So, as the ambulance reaches the site the injured person can be transported to the hospital by the ambulance. A live update of events containing patient condition like temperature is sensed by LM35 sensors and updated to hospital webpage frequently. This will help the doctors waiting at the hospital to prepare for the patient in advance and treat him accordingly.

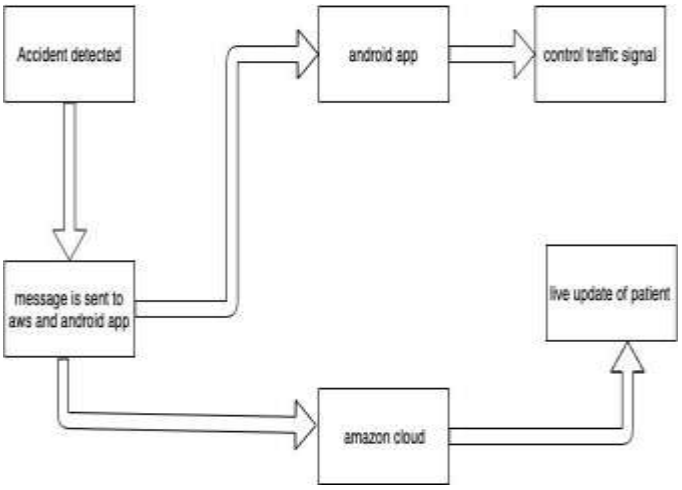

Fig -1: Flow of data in overall transport system

3. SYSTEM ARCHITECTURE

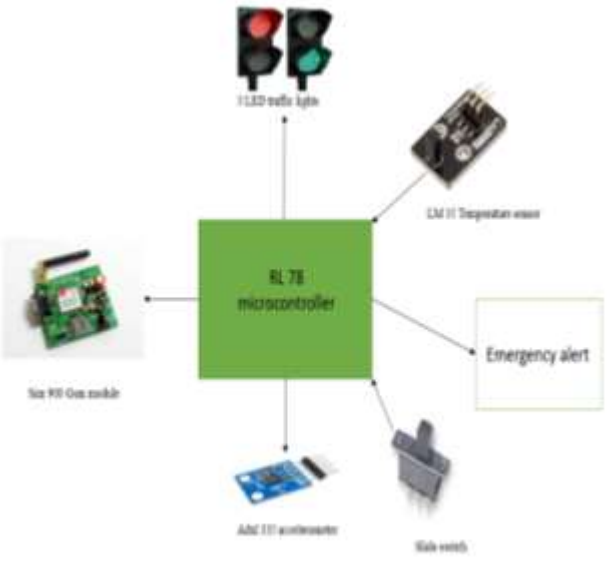

Fig -2: System Architecture

RL78 Renesas microcontroller: This microcontroller is a new age of power-efficient microcontrollers that bind the excellent CPU performance that possess 512 KB, RAM: 32 KB, Data flash memory: 8 KB.

Power supply: is used to Power up the whole module, we use a 12v 5A adapter to convert the 220v main supply. The power supply is connected to ARM board.

*LCD display (16*2):* We are using 16*2 LCD display as it is used to display the flow of the system, and displays the indicating of emergency, flow of traffic and temperature of the patient.

Temperature Sensor (LM35): We are interfacing temperature sensor with RL 78 microcontroller to measure the temperature of the patient.

ADXL335 Accelerometer: is a small, thin, low power, complete 3-axis accelerometer with signal conditioned voltage outputs. The product measures acceleration with a minimum full-scale range of ±3 g. It can measure the static acceleration of gravity in tilt-sensing applications, as well as dynamic acceleration resulting from motion, shock, or vibration.

GPRS and GSM: The GPRS is configured and controlled via its UART using simple AT commands. This board can be connected to PC via FT233RL or USB-to-Serial Bridge Controller.

Switch: we have used slide switch to avoid sending data to the server indicating no casualties.

Traffic Signal: Using Light-emitting diodes are used in applications as diverse as aviation lighting, automotive lighting, advertising, general lighting and traffic signals

Amazon Web Services (AWS): provides on-demand computing resources and services in the cloud, with pay-as-you-go pricing. We have used one instance for developing web page and to receive inputs from the hardware.

Cube suite ++: this is basically a text editor tool where we type the programs using embedded C language.

Eclipse IDE: this IDE provides various library files and function to develop android app.

Android apk: It is used to control the traffic.

Fig -3: Android App

4. ALGORITHM AND WORKFLOW OF THE SYSTEM

4.1Algorithm of system working

1. Start

2. Detect parameter from ADXL335 Accelerometer

3. If accident is detected by change of axis, then

   (1) Send alerts with location to web page and android app through GSM/GPRS

   (2) Control traffic unit through app

   (3) Send live update of patient to webpage

4. If accident is detected and no casualties occur, then

   (1) Alert the ambulance for no causalities

5. Stop

4.2 Workflow of the system

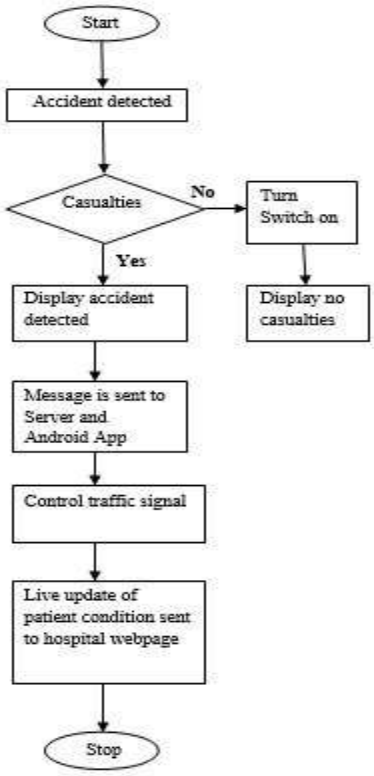

Fig -4: Flowchart of the system

5. CONCLUSION

The project is designed using a structured model and also been able to provide results accordingly the project can be implemented in real time system with certain modification for improvement. This paper provides solution for ambulance routing and accident detection, unlike other implementation it also provides traffic control with and android app which is developed for communication of ambulance and situation arise. This solution aims to provide traffic control during congestion which helps also in congestion control during emergencies situations. The android app also reduces the work of searching incident place, which automates to location by providing longitude and latitude. To make this application available for real time purposes the components which are compact need to be expanded with greater range for implementation.

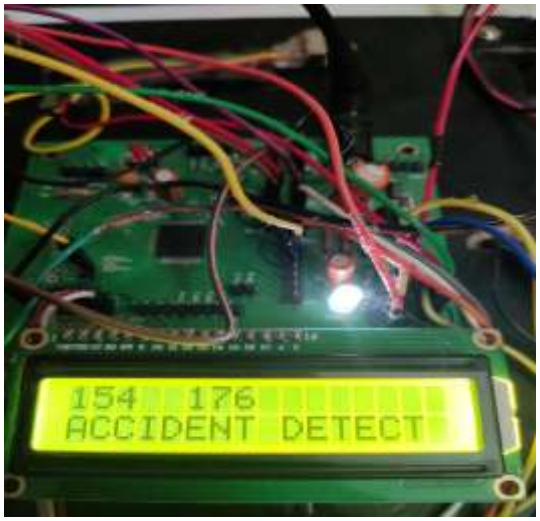

Fig -5: Accident detected

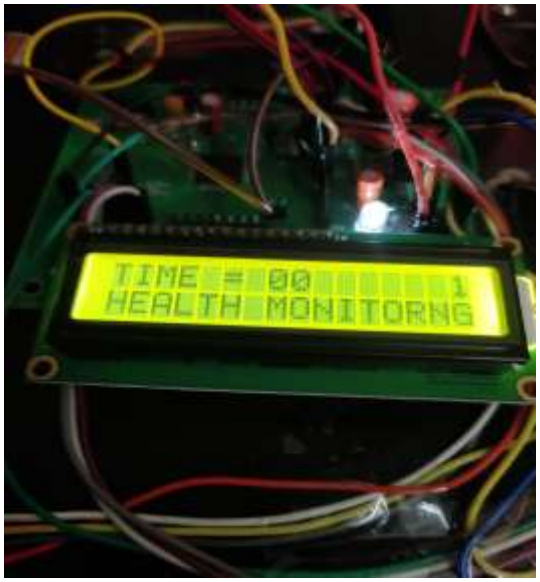

Fig -6: Health monitoring of patient

Fig -7: Webpage

6. FUTURE WORK

In future, this system can be taken to the product level. To make this project as user friendly and durable, we need to make it compact and cost effective. We can add the location of hospitals, so that the ambulance can reach the nearest hospital. Going further most of units can be embedded along with the controller on a single board with change in technology, thereby reducing the size of the system.

7. REFERENCES

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