

IoT based Advanced Accident Monitoring System using ThingSpeak Web Server

Shruthi V Pai, Nagalakshmi N, Santhrupthi K, Raksha R
Dept. of ECE ,GSSSIETW,Mysuru,India

Abstract— In this country a lot of precious lives are being lost in daily basis because of road accidents. This can be reduced by providing necessary facilities like alerting driver during drowsiness, by stopping drivers from consuming alcohol during rides, providing emergency facilities, responding to accidents without any delay and providing emergency medical facilities as early as possible. There is a need to have such systems to save injured victims. A system that is able to send information through message to nearby emergency services about the accident and the location for timely response is absolutely very much in need. The system is able to detect accidents using Arduino mega, ADXL335 sensor, GPS module, GSM module. Additional to this, the patient monitoring system is able to check victim's health condition using heart rate sensor and temperature sensor i.e. LM35 and send information to hospital using ThingSpeak web server. Thus, this system aim to save injured victim without any delay.

Keywords—Accident, sensor, GPS, GSM, ThingSpeak web server

I. INTRODUCTION

As we know road accidents are increasing and it has become one of the major problems in cities. This is due to the maximum usage of vehicles like cars, bikes accidents are increased, and also due to drivers over speeding nature which is very risky. Also the reason lies in unavailability of advanced techniques, the rate of accidents are being painstaking to decrease. To reduce the accident rate in the country the introduction of a proper, effective, standard solution is required. Currently there are no advanced, effective technologies for reducing accidents and for accident detection. Also, due to the delay in reaching of the ambulance to the accident location and also delay in conveying information to the hospital about the victim's health condition increases the chances of the death of victim. The existing system was able to detect accidents and track the vehicle which takes more time to reach the hospital thus, this system results in delay in the treatment of victim. In the proposed system, the time delay between the accident occurrence and providing necessary facilities is eliminated and also the victim is treated with the necessary medical facilities without any delay.

II. RELATED WORKS

According to this paper the author proposed an accident detection system using MSP430 and Accelerometer. In this system if a vehicle is detected with an accident, the system immediately alerts the control center by sending message with the location of coordinates. This accident

detection system has two main modules. The first module detects if the vehicle has undergone any vibration or shock. It is fixed on the vehicle itself. Once the vehicle fallen/vibration more than the threshold limit is detected the information is sent to the second module. Then, heartbeat of the driver is checked and if found any abnormality or any variation, the decision of serious accident is considered else the driver can withdraw the command. [1]

Here author described vehicle tracking and accident detection system using Microcontroller, Raspberry Pi and Accelerometer. In this system the vehicle is tracked using GPS and GSM. The aim of this paper is to provide a system which can help in tracking vehicles and detect if any vehicle has met with any accidents. This vehicle accident detection system is cable of tracking the location of the accidents automatically and send an alert message with an information about location of accident. This system is very useful for the automotive industry and help the victim to reach hospital as soon as possible. [2]

This proposed system focused on alerting drivers during the state of drowsiness by providing Eye Blink Monitoring system (EBM). In this system the implementation of EBM is done to detect drowsiness while travelling in night and prevent accidents using NXP RD25 technique. In case if the accident occurs the designed system is equipped with the capability of sending alert message to the android device by means of an IoT enabled application and save the victim's life from danger. [3]

In this paper, the author explained how we can reduce the human death rate in road accident. This system design for accident monitoring and detailing is based on ARM, accelerometer and GPS. If any vehicle meets with an accident, which will be detected using accelerometer. This system will save victim by providing decisive information to emergency control centers as early as possible. [4]

In this paper author described how Indian traffic is narrow and disordered, hence it requires traffic control solutions. To overcome the traffic related problems, whenever vehicle meets with any accident, immediate alert message with the location coordinates is sent to the hospital. [8]

This paper conveys the cause for accidents that is over speeding, drink and drive, distracted minds, over stress, tensions and due to mobile phones. The proposed system deals with the accident detection and alerting using arduino and sends location of the accident to the concerned authorities, thus helps to save precious lives. [13]

Here the author has tried to explain the appearance of technology which has also led to the traffic problems and the

road accidents taking place habitually which give rise to huge loss of life and property because of the poor emergency facilities. Thus, it can be overcome by a system which can locate the accident spot accurately and convey the information through text message. [11]

This paper justified the aim of this project is to build a smart vehicle accident detection system with minimizing the limitations of existing methods such as increasing the security of human beings and vehicles and also by reducing the accidental injuries by alerting the driver about drowsiness or by providing emergency medical facilities to save precious life after occurrence of accidents. [14]

III.SYSTEM DESIGN

Aim: The primary aim of this proposed project is to rescue the victim by providing necessary facilities using IoT based ThingSpeak web server.

Objective: To provide the necessary treatment by monitoring victim’s health condition such as heart rate and body temperature simultaneously with the help of heart rate sensor and temperature sensor i.e., LM35 while taking victim to the hospital.

To send Victim’s “real time data” to the hospital through ThingSpeak web server to treat victim as soon as he/she arrives to the hospital which doesn’t incur any delay.

To alert victim’s relative via calling them using GSM module to avoid delay in reading text message.

Mechanism: When an accident occurs to the vehicle by crashing another vehicle or by hitting a pedestrian, the ADXL335 sensors placed in the front and back of vehicle detects the accident. After detection, using GPS tracker, the exact location of the accident spot is sent to ambulance unit.

The message to the victim’s family member is sent through blynk app so that they can get to know about the incident at an early stage and location is also sent through blynk app. Once the ambulance arrives at the accident spot, simultaneously heart rate and body temperature of the victim is checked using heart rate sensor and infrared temperature sensor-LM35 respectively.

This information is sent to the hospital through ThingSpeak web server so that the required treatment can be started at its early stage. Thus, time taken for arrangement of setup is reduced and victim is treated as soon as possible.

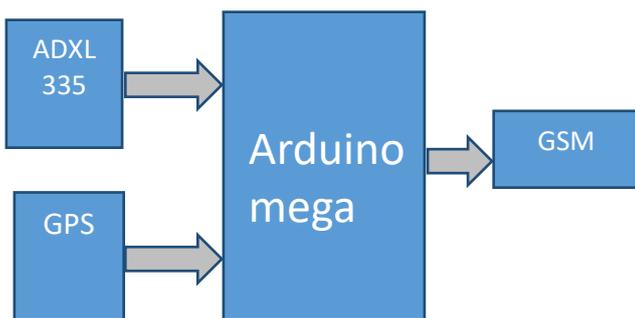


Figure 1: Block diagram of the vehicle unit.

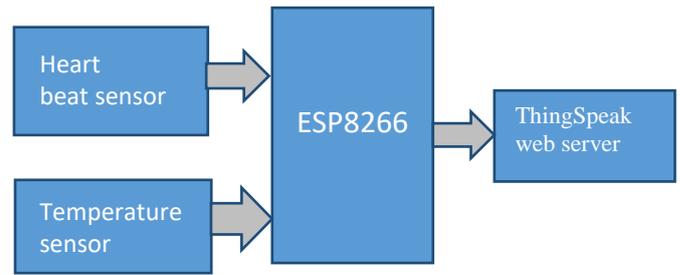


Figure 2: Block diagram of Ambulance unit.

Here we use some hardware and software requirements like Arduino mega 2560, ADXL335, ESP8266, LM35, Heart Rate Sensor, GPS module, GSM module, Blynk app, Arduino IDE and ThingSpeak web server. The Arduino MEGA 2560 is a board that is developed for projects which need more input and output pins, more sketch memory and maximum RAM. It is recommended board for projects which require more input and output pins as it consists 54 digital I/O pins, 16 analog inputs and a larger space for the sketch. This gives projects a plenty of opportunities by maintaining the simplicity of the Arduino platform. The ADXL335 is an accelerometer which uses MEMS technology. It is small, low power and a 3-axis accelerometer with voltage outputs which are signal conditioned. The product is used measure acceleration with a full-scale range of ±3g. It can measure the static acceleration as well as dynamic acceleration of gravity in tilt-sensing applications, and motion or vibration. ESP8266 module is a low cost nodeMCU module that can be used for IoT project development. A set of AT commands are used in order to communicate with ESP8266 module. The LM35 sensors are IC temperature sensors, the output voltage of LM35 sensor is linearly proportional to the Centigrade temperature. Heart Rate Sensor is used for projects which are properly designed plug and play heart rate sensor for Arduino, Arduino mega, etc. The sensor can be plugged into arduino with some jumper wires and it clips onto a fingertip or earlobe thus, we can measure heart rate of the victim. Arduino IDE is a software which is available for free, that is mainly utilized for writing, editing and compiling the code into the Arduino Module. ThingSpeak web server is an open source platform that provides different kinds of services mainly earmarked for building and developing IoT applications for various projects. It provides the ability to collect and visualize the real-time data in the form of charts or graphs.

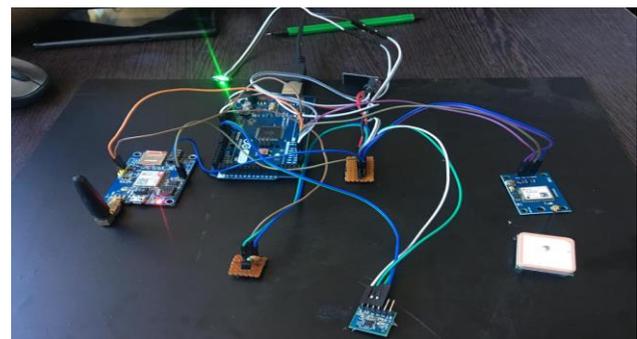


Figure 3: Circuit Diagram of the system.

IV. ADVANTAGES

- It provides the necessary treatment by monitoring victim’s health condition such as heart rate and temperature simultaneously with the help of heart rate sensor and LM35 while taking victim to the hospital.
- It sends Victim’s “real time data” to the hospital through ThingSpeak web server to treat victim as soon as he/she arrives to the hospital which doesn’t incur any delay.
- It alerts victim’s relative via sending notification to them using Blynk app to avoid delay in reading text message.

V. RESULTS

The proposed system is fully advanced, finds the accident spot and sends all the information through Thingspeak web server, checks the victim’s health condition before reaching hospital, helps the victim to reach hospital in time and start the required treatment as soon as possible.

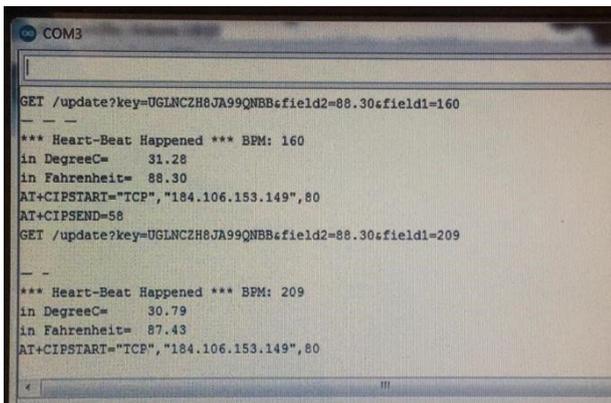


Figure 4: Values from heart beat sensor and temperature sensor.

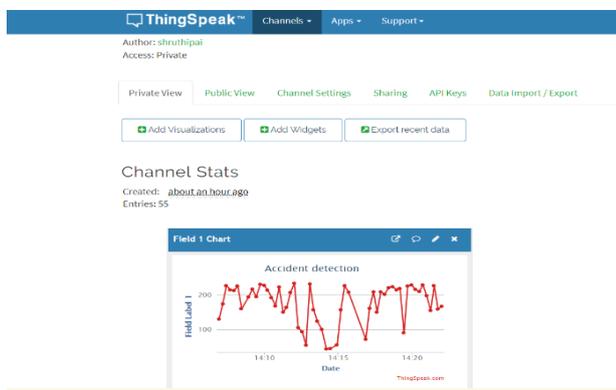


Figure 5: Graph showing the values of heart beat sensor.

VI. CONCLUSION

IoT based advanced accident monitoring system using ThingSpeak web server is developed. It is noticed that the system is working perfect as expected. This system is designed in such a way that it sends message to the stored

contact number successfully when the accident is detected. The heart rate values and body temperature values can be monitored through ThingSpeak web server.

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