Automatic Detection of Accidents and Rescue System Based on IoT

T. Sandhya, N. Siva Rama Lingham, S. Sundari

Abstract: *The improvement in infrastructure and technology has made lives easier and has lead to high demand of automobiles. This increase in demand of automobiles has led to huge traffic hazards and road accidents where the lives of people are under huge risk. When the accidents occur, there is a delay in ambulance arriving to the accident location due to congestion in traffic which increases the chances of death of the victim. Hence, to overcome this problem the proposed system makes use of IOT to detect accident and helps the ambulance rescue system to reach the location for rescue of the victim within less time. This system helps in reducing the loss of life due to fatal accidents. The system makes use of accelerometer sensor signal which is used to detect severe accidents due to some obstacle. Then with the help of micro controller used the system immediately sends an alert message through the GSM module to the concerned guardian and to all the possible nearby rescue team along with the location. when an rescue team arrives at the earliest an notification is sent to the other rescue team which received the message of the accident. As the number of fatal accidents has increased at a large rate this automatic detection of accidents and the rescue system is very useful in the current scenario to rescue the victim as soon as possible.*

Index Terms: *Internet of things, accident detection, rescue, accelerometer, GSM module*

I. INTRODUCTION

In this highly populated mechanical world people have started depending on automobiles at a large rate on a daily basis. There are billions of vehicles on roads across the world which has increased the traffic congestion and accidents. The road traffic injuries and the lack of immediate medical attention leads to fatal deaths. Even after the advancement in technology the mechanisms used to prevent road accidents are still the same that was implemented decades ago like road signs, speed breakers etc. The usage of digital and electronic devices has increased at a wider range. Internet of things makes use of this technology development. It makes use of smart devices and helps to build an automated system with programmable and remote-controlled appliances. Hence the components are combined with internet connectivity and data analyzing capabilities which changed the way we work and live. The proposed system helps in providing faster communication to the guardians of the victim in accidents or to any rescue team which helps in providing medical aids to the victim as soon as possible. when the accident occurs, the system analyzes the severity of the accident and sends the message to the guardian or the rescue team along with the location which helps the rescue team to arrive to the spot as early as possible and provide medical aid to the victim.

II. OBJECTIVE

The detection of accidents and the reporting system has the following objectives,
i) Detects and reports the accidents that occurs in vehicles
ii) This helps in identifying and analyzing the accident spots which helps in rescuing the victim at a faster rate

III. LITERATURE REVIEW

There are several proposed work in literature to detect driver's drowsiness, speed of the vehicle, vehicle detection and so on. Sarath Chandran.P, Karthika M proposed a method to prevent accidents in railways. This system continuously monitors the railway infrastructure like railway tracks, track beds etc. Monitoring the tracks helps in reducing the human intervention and detects the faults at ease[1]. Matthew sacco, Reuben A. Farrugia proposed a method a system to monitor accidents caused by the drowsiness of the driver. They introduced a system to detect the drowsiness of the driver through support vector machines and send an alert to driver in order to prevent accidents [2]. S. Kumar Reddy Mallidi,V.V.Vineela proposed a smart vehicle monitoring system based on IOT. This system is used to detect accidents and also in the detection of vehicle theft. This method makes use of SVMs through IOT technology [3]. Poorani. K et al proposed a method which uses image processing technique that helps in detecting driver's drowsiness to prevent accidents. This system developed an application to detect the present condition of the vehicle when an accident occurs[4].

IV. PROPOSED SYSTEM

The proposed system can be used for detecting the accidents which helps in reducing the loss of life due to fatal accidents and it also helps in reducing the time taken for the ambulance to reach the accidental spot.

T. Sandhya*, Computer Science and Engineering, Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and technology, Avadi, Chennai, India.
**N. Siva Rama Lingham**, Computer Science and Engineering, Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and technology, Avadi, Chennai, India.
S. Sundari, Computer Science and Engineering, Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and technology, Avadi, Chennai, India.

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The system makes use of accelerometer sensor to detect the severity of the accidents which is present in the rescue system and with the help of GSM module the messages about the location of accident and its severity is sent to all the nearby rescue team in that specific location and also to the guardian of the victim. This helps the emergency help team to immediately track the location with the help of GSM module. once the accident location information is received it will help the rescue team to take action immediately. The rescue team that arrives on spot as early as possible provides the first aid to the victim and an alert is sent to all the other rescue team that received the SMS stating that the victim has been rescued. This system helps in the rescue of the victim as early as possible since the rescue team that reaches at the earliest helps in rescuing the victim. This detection of accidents makes use of microcontroller which consists of accelerometer sensor, display, GSM module and alarm. Hence the proposed system can be widely used as automatic rescue system in detecting accidents and reducing the rate of deaths to a greater extent.
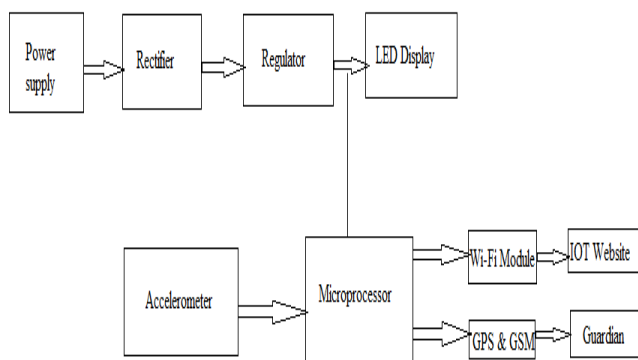
Fig 1: System Architecture

A. Detection of Accidents

This system utilizes the accelerometer sensor which detects the accidents based on the severity of the accident. The severity is determined based on the vibration frequency of the accident. The readings are monitored continuously by the accelerometer. If the deceleration or acceleration increases above some threshold value or if there is any change in the angle of the sensor then the sensor detects it as accident.

B. Detection of severity and rescue

The vibration sensors are equipped with the Raspberry pi system which is used to sense the vibration frequency of the accidents. A maximum vibration frequency limit is set in the Raspberry Pi model and when the frequency exceeds the limit means the accident has occurred. The location is tracked by the GPS system and a SMS is sent to all the possible nearby rescue team and also to the guardian. The rescue team that arrives at the earliest will rescue the victim at the earliest and a alert will be sent to the other nearby rescue teams that the victim has been rescued.

V.   HARDWARE DESCRIPTION

The main hardware specifications that are used in building this system is as follows,

i) Accelerometer sensor:

It is a device that is used to measure the acceleration of a body. It is used for many applications. In this system this sensor is used to monitor and detect the vibration of a rotating machine. This sensor is also capable of detecting the direction and magnitude of the acceleration which is used to sense the vibration or shock in a medium since the acceleration starts at zero and it increases gradually. Hence this system makes use of this sensor to detect the severity of the accidents.

ii) Microcontroller:

Microcontroller consists of the programmable information of the peripherals. It consists of CPUs along with the memory to store the programmable information.

iii) Crystal Oscillator:

The oscillator is used to maintain frequency by creating electrical signal. This frequency helps in keeping tracking of time similar to the wrist watches. In this system crystal oscillators are helpful in tracking the time when an accident occurs.

iv) Storage in cloud:

This distributed storage helps in continuously piling all the information to the cloud and retrives the information when required.

v) Wi-fi Module:

Wi-fi module helps the microcontrollers to connect to a wi-fi network. This system makes use of Wi-fi module to continuously stay connected to a network.

vi) GSM Module:

In this system GSM module is used to track the location when the accident occurs. Hence with the help of this module when the accident occurs the message is been sent to the nearby rescue team by tracking the location.

VI.   WORKING PRINCIPLE

This paper describes about the detection of accidents using accelerometer and GSM. This enables in faster rescue of the victim. When there is a tilt in the car based on the vibrating frequency the sensor will detect that the accident has occurred. The sensor then communicates to the microcontroller. The GPS in the device identifies the location of the spot that accident has occurred. Based on the position of the vehicle the system detects that accident has occurred and with the help of GSM module the message will be sent to the rescue team and the guardian of the victim since GSM module acts as a mobile phone which is capable of making calls and sending messages.
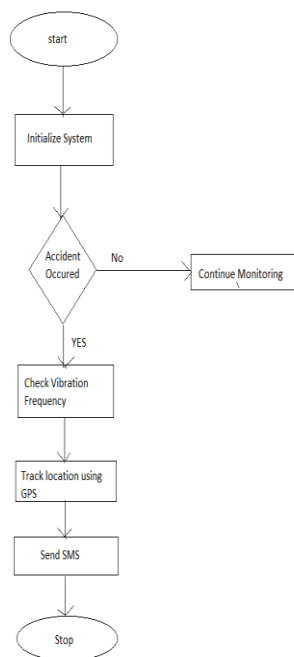
Fig 2: Flow chart on the working of the detection system

VII. RESULTS AND DISCUSSION

The system helps in detecting the severity of the accident based on the accelerometer sensor that is connected and send message with the help of GSM module. The GPS module tracks the location in which the accident has occurred and helps communicate to the rescue system using GSM module. The system is more efficient and is very much helpful in detecting the accidents at the earliest and reduce the rate of deaths that occurs due to accident.
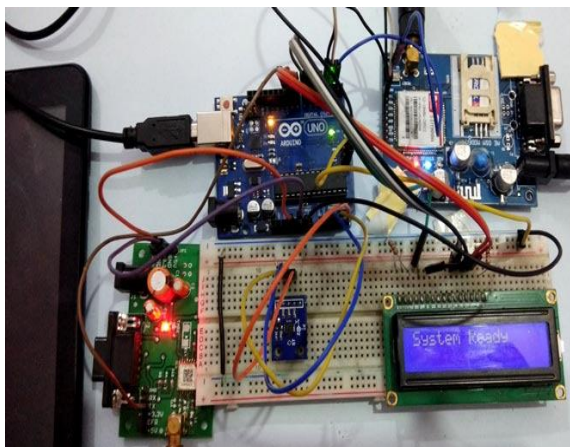

Fig 3: Hardware Implementation of the system

VIII. CONCLUSION

The internet of things is being developed at a faster rate which leads to the growth in the life of human beings. The proposed system makes use of IOT along with the sensor that detects the severity of the accidents and reports the same to the rescue system. Since the severity is measured the rescue team can arrive to the accident spot with all medical aid and rescue the victim at the earliest. Thus, this system rescues the victim at the earliest and help in reducing the rate of deaths to a greater extent.

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AUTHORS PROFILE

T. Sandhya Completed my Master of Engineering in the field of Computer Science and Engineering and currently working as Assistant Professor. My area of research includes wireless sensor networks and Internet. of things.

N. Siva Rama Lingham completed my Master of Engineering in the field of Computer Science and Engineering and currently working as Assistant Professor. My Research area includes Wireless Sensor Network using Internet of Things. I have a membership in ACM.

S. Sundari completed my Master of Engineering in Embedded system Technologies and currently working as Assistant Professor. My area of research includes Network Security.