

An Intelligent Accident Detection Information System using IoT

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Abstract: In the current technology development IOT plays a vital role. By using IOT in this work, the accidents occurring in the roads are detected and the information is passed. As the number of vehicles in road increases the chances of accident also increases gradually. According to WHO (“World Health Organization’s”) for every 4 minutes one person dies in the road accident. The main aim of this work is to save of the life of the persons who are dying in accidents because of not alerting anyone about the accident at the correct time. With help of the arduino uno device in the vehicle the accident is detected. The emergency contact person will be receiving the co-ordinates of the place of the accident occurred and the information is sent to the emergency contact person from the arduino uno using the Ethernet adapter in the device. This device sends message to the respective number which is predefined in the arduino board. By sending the message in right time, the billions of people life is saved.

Keywords : MEMS, Arduino, Thingspeak, Ethernet

I. INTRODUCTION

In the modern world of science and technology, Transportation system is as important as breathing air. Due to this we are having a sense of having the highest civilization of the planet. Automobiles play a vital role in our daily life but as it is said, with some good aspects there comes bad one too. Road accidents are a major threat to human life. In the real-world scenario, there is no automated solution for detecting and reporting about the accident. Generally, when an accident is occurred, the people who are nearby will be seeing the accident and report it to someone. In some cases when there is no one to report about the accident the injured person is even dead without any notice. There are many accidents which are occurring in the road and people are dying because of it, as it is not reported to someone at the correct time. If the accident is been detected and reported at the correct time life of many people can be saved. This system would save the life of several persons who are using the proposed model.

In this paper, we configured the Arduino device first. Configuring the Arduino UNO involves installing the

Arduino which is necessary for this work. The software components that are necessary for this work are COM6 drives and the CH341SER. After installing the necessary software components and getting ready the arduino. We have to create a thing speak cloud platform for saving and getting the sensor values. After creating the thingspeak platform in the cloud we have to connect all the components we have to type the code send message to the nearby health center. After

connecting all the components and making everything ready just check whether the message is been sent to the respective number stored in the arduino. If the message is been sent properly to the number fed in the arduino. The system is working fine. If Not there are some errors in the system which been to be taken care of. After correcting all the errors, just check once again for the message to be delivered.

Arduino: Arduino board is one of the free ware electronic kit which works according to the user-friendly hardware and the software. It is also in the position to make any one co-operative product. It is also sensing the environment by receiving the necessary inputs from various sensor devices and also affects its environments by controlling the electronic devices such as lights, motors and all other actuators. Moreover, it contains a microcontroller which has program memory, various interfaces and the various connectors for the external devices.

Smoke sensor: A smoke detector device is a device which is useful for sensing the smoke, typically as an indicator of fire. Moreover, the commercial security devices provide a signal that also used to fire an alarm control panel that act as part of a fire alarm system during household smoke detection process and it also known as smoke alarms. Generally, provide a local audible or visual alarm from the detector itself. In addition, the smoke detectors are placed in plastic enclosures that are shaped typically like a disk about 150 millimeters (6 in) in diameter and 25 millimeters (1 in) thick, but shape and size vary. Smoke can be detected either optically (photoelectric) or by physical process (ionization), detectors may use either, or both, methods.

MEMS: MEMS (Micro-Electro Mechanical System)-based accelerometers are devices that measure the proper acceleration. In relativity theory, proper acceleration is the physical acceleration experienced by an object. The physical acceleration is measurable by sensors. These sensors are part of the sensing cluster of ubiquitous technologies. Sensing technologies make use of physical parameters from the environment, such as temperature, pressure, force and light. An accelerometer measures weight per unit of mass, a quantity also known as specific force, or g-force. Measuring g-forces allows users to for instance interact with products by means of gesture recognition.

II. LITERATURE SURVEY

Many researchers carried out their work on accident detection system. Aishwarya et al [3] explained in detail about an IoT based accident prevention and tracking system that is very useful for night drivers mainly.

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They also provide an eye blink monitoring system which alerts the subject while state of drowsiness. Sadhana [4] explained that a smart helmet and intelligent safety mechanism for motorcyclist by using the raspberry pi and an open CV. The major idea has been obtained after knowing that there is increased number of fatal road accidents over the years. Their work has been designed and introduced as safety mechanisms for the motorcyclist to wear the helmet properly.

Namrata H. Sane et al [15] explained that an advanced Embedded System of Vehicle Accident Detection and Tracking System. The main objective of their system is to first detect the accident location and call for the emergency services. Vehicle accident detection is possible with the help of sensors. A GPS and GSM module helps to trace the vehicle. Shailesh Bhavthankar and Sayyed [14] explained Wireless System for Vehicle Accident Detection and reporting using GSM. Jagdish A.Patel [5] explained Raspberry Pi based smart home. This paper aims at designing a basic home automation application on Raspberry Pi through Interfacing camera as security purpose and the algorithm for the same is implemented in developed in python environment which is the default programming environment provided by Raspberry Pi.

Intelligent agents are used to take effective decision over the datasets and the observed environments happenings. Intelligent agents use the effective rules for making effective decision over the critical situations. In addition, many intelligent systems have been proposed by many researchers in the past for detecting intruders [8][14], secure routing processes [9][10][16], predicting the cancer disease [11] and analysing the social network users [13]. The various intelligent agents are explained in detail with their functionalities, roles and responsibilities over the detection process [8].

An IoT based vehicle tracking and accident detection system has been introduced in [17] for avoiding the road accidents. In [18], an IoT based accident identification and alerting system has been proposed for alerting the drivers. In [19], an accident detection and an intelligent agent-based navigation system for avoiding accident by using IoT. In [20], a new tracking system for avoiding the vehicle collision detection and messaging system by using the devices such as GPS and GSM.

III. OBJECTIVE

A. Motivation

Tamil Nadu records the highest road accidents for a decade and its capital Chennai has more accidents than any other city in India. In New Delhi, the capital of India, the frequency of traffic collisions is 40 times higher than the rate in London, the capital of the United kingdom. According to road traffic safety experts, the actual number of casualties may be higher than what is documented, as many traffic accidents go unreported. Moreover, victims who die sometime after the accident, a span of time which may vary from a few hours to several days, are not counted as car accident victims. In 2015, one person dies every 4 minutes in roads accidents in India, according to NGO 'Indians for Road Safety'. India stands out

miserably in the latest Organization's (WHO) "Global Road Safety Report-2015" with an estimated 207,551 deaths on roads. After seeing these kinds of issues in the society, we have decided to do something which can be used to save the life of the people who are dying in the road.

B. Problem Description

There are many accidents which are occurring in the road and people are dying because of it, as it is not reported to someone at the correct time. If the accident is been detected and reported at the correct time life of many people can be saved. This system would save the life of several persons who are using the proposed model.

IV. PROPOSED WORK

A. Proposed System

In this proposed system, we will be just detecting the accident using some sensors like crash sensor, roll back sensor, etc. If the accident is being detected using the sensor, an alerting message which contains accident's time and location will be sent automatically by the device embedded in the vehicle to emergency and relief agencies. Then the person in danger would get the help in correct time and his life could be saved. Initially when the accident is detected by the MEMS sensor it triggers the arduino uno board and it sends the message to the emergency contact. The Ethernet is connected with the arduino where it shares the sensor values and location with the Thingspeak cloud, where the personal message can login to Thingspeak and make a contact with the nearby hospital with the location account is created for that certain arduino uno board.

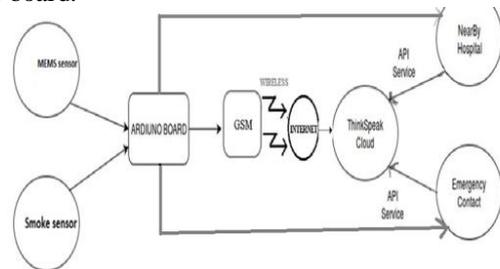


Fig 1: A Proposed Model

The Above Fig 1 Shows the proposed model for Accident detection information system using IoT where the model exhibit all the sensors and GSM, Thingspeak cloud are interfaced with one another using the arduino IDE software-platform.

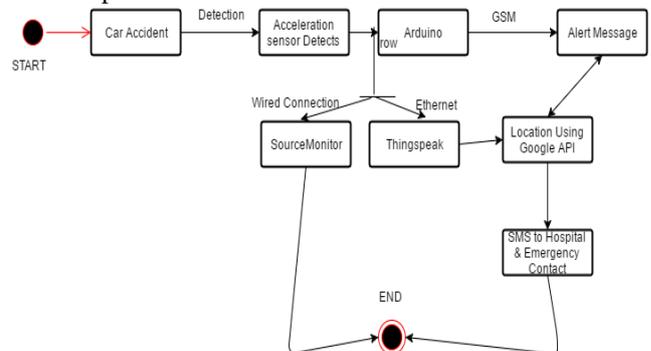


Fig 2: Activity Diagram

V. ANALYSIS AND DESIGN

This work helps to detect the accident by using sensors and alert the nearby health center about the accident. The person in danger is rescued by the health center. Alerting the nearby person or health center during correct time helps to save the life of people who are in danger. Delivering the message in the correct time can help the health centers to send the ambulance to the place where the accident occurred to save life of the injured person.

A. Functional requirements

- The user should be installing the system in the vehicle.
- The vehicle should be provided with the necessary internet connections.

B. Nonfunctional requirements

- Flexibility- Accident alert system using raspberry pi systems are very flexible to work which is easy to use.
- Availability- The system should provide high availability to the users. This system can made available for the all type of vehicles.
- Reliability- A system shall provide reliable services. The system sends the message at the correct time.

VI. METHODOLOGY

In this work, we configured the Arduino device first. Configuring the Arduino UNO involves installing the Arduino 1.6.8 which is necessary for this work. The software components that are necessary for this work are COM drives and the CH341SER. After installing the necessary software components and getting ready the arduino. We have to create a thing speak cloud platform for saving and getting the sensor values. After creating the thing speak platform in the cloud we have to connect all the components we have to type the code send message to the nearby health centre. The code is typed in C. After Connecting all the components and making everything ready just check whether the message is been sent to the respective number stored in the arduino.If the message is been sent properly to the number fed in the arduino. The system is working fine. If Not, there are some errors in the system which been to be taken care of. After correcting all the errors, just check once again for the message to be delivered.

Setup Arduino UNO involves installing the software's that are necessary for the Arduino Uno to run this work. Installing Arduino are the main configuration setups that is necessary for this work.

The Ethernet Board is connected with the Arduino and it gets all the values form the Arduino i.e., values from MEMS sensor and smoke sensor. After connecting the Ethernet will send the value to the respective IoT platform.

Setup a Thingspeak Framework step involves creating a Thingspeak account for accessing information from cloud. First create an account in the Thingspeak Framework. Subscribe real time cloud messaging service from the real time frame work subscriptions.

Connecting all the components that are used in the arduino which is shown in the diagram attached in the next page. Check whether the connected circuit is working fine or some changes are to be made.

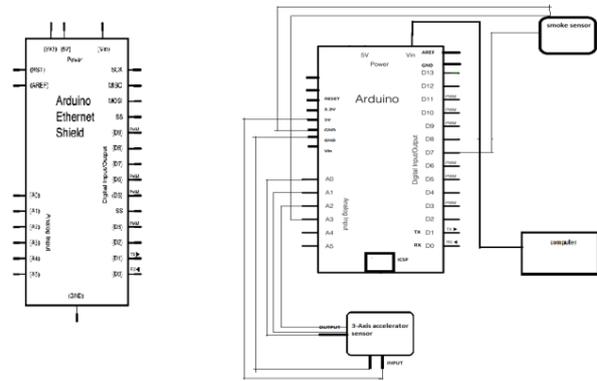


Fig 3: Component Block Connections

A. Advantages of the proposed system

- Get the exact location of the accident.
- Reporting about the accident in the correct time.
- Detecting the accident using the sensors.
- Rescuing the life of people who are in danger.

B. Disadvantages of the existing system

- Issues in detecting the occurrence of accident.
- Failed to get the exact location of the accident.
- Couldn't report about the accident in the correct time.

VII. RESULTS AND DISCUSSION

Alerting the nearby person or health center during correct time helps to save the life of people who are in danger. Delivering the message in the correct time can help the health centers to send the ambulance to the place where the accident occurred to save life of the injured person. The result of this work is, when the push button which is placed in the front part of the car is pressed the message should be sent to the respective number that is stored in the cloud. The delivered message should contain the GPS coordinates of the place where the accident has occurred and the time of the occurrence of the accident. If the message is sent properly the system is working fine without any problems.

Fig.1 shows the arduino board along with necessary sensors that are useful for identifying the accidents.



Fig 1: Sensors along with Arduino

Fig.2 shows the complete connection of the proposed accident detection information system. It shows the entire system along with arduino board that has been used in the proposed system.

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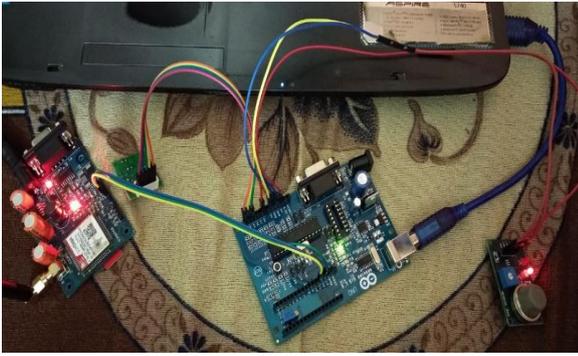


Fig 2: complete connection

Fig.3 shows the think speak data according to the various time duration.

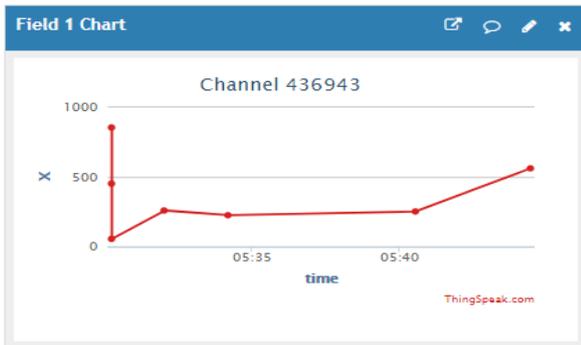


Fig 3:Thinkspeak Data

Fig.4 shows a map which used to show the accident location map.

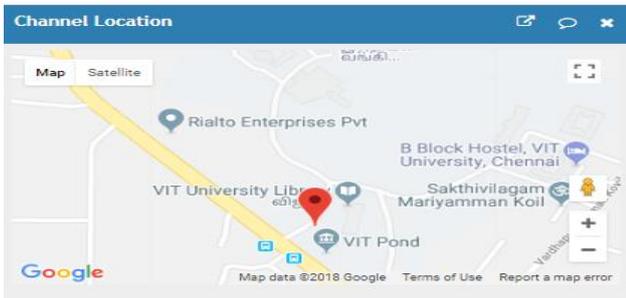


Fig 4: Accident detected location

Fig.5 display the source location where the accident detected by the system.

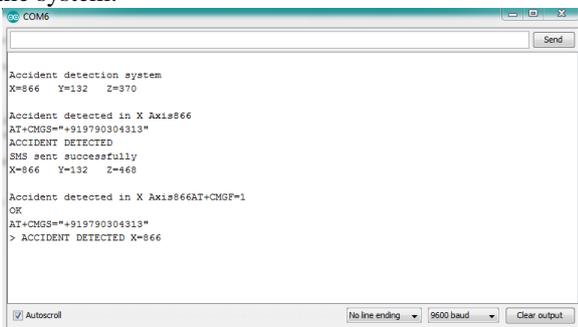


Fig 5: Source monitor

The proposed system has been implemented by using the GPS and arduino board for identifying the accident location. Moreover, the proposed accident detection system uses intelligent agents for effective detection. Here, the intelligent

agents used for making decision over the accident location identification process.

VIII. CONCLUSION

The main objective of this paper is to save of the life of the persons who are dying in accidents because of not alerting anyone about the accident at the correct time. We can't save all the people who are dying at the time of accident, but still we can save the life of many people by alerting the health center about the accident at the correct time. It is the only objective of this work. By implementing this works in the real time vehicles would ensure safety for people who are riding vehicles and save the life of many people who are in danger.

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