

Accident Detection and Notification System using GPS and GSM navigation technology

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Abstract - In the present day, the rate of accidents can be increased rapidly. Due to employment the usage of vehicles like cars, bikes can be increased, because of this reason the accidents can be happened due to over speed. , because of this reason, the accidents can be happened due to over speed. Not only the demand for performance and quality of automobiles increases rapidly but there is also demand for an anti-accident system for vehicles. The main cause of accidents is a high speed, drink and drive, diverting minds, over stress, and due to electronic gadgets. This project deals with accident detection that occurs due to the carelessness of the person who is driving the vehicle. This introduces accident detection and notification system which helps the person who is driving the vehicle. If the person is not in a position to control the vehicle then the accident occurs. Once the accident occurs to the vehicle this system will send information to the registered mobile number. GPS and GSM based accident identification and information system are focusing on accident happened during traveling especially to save the life of many people's by reporting to hospitals and owners of the system.

Key Words: Vehicle, Gyro sensor, GSM module, GPS module, Smart phone, SMS notification

1. INTRODUCTION

Internet of Things is a domain of interrelated computing devices, digital and mechanical machines, objects, animals, or people that are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human interaction. It is a computing concept that describes the idea of everyday physical objects being connected to the Internet to enable communication between things and people. IoT describes a world where we connect and communicate in an intelligent fashion. The devices can be any objects like sensors, electronic devices, smart-phones, Internet TVs, etc. For the objects to collect and exchange data electronics, software, sensors, and network connectivity are embedded into them. With an increased level of sophistication in basic appliances and increasing concerns for environmental sustenance demands for the development of a smart system that is self-aware of its surroundings and can analyze and respond with its own discretion without needing the aid of a human factor, called Automated systems. The proposed system focuses on the development of a home automation system based on the internet of things which

allows the user to automate all the devices and appliances of home and merge them to provide seamless control over every side of their home. The data can be used to predict the user's behavior custom with the development of a machine learning algorithm, and then the prediction results can be employed to enhance the intelligence of a smart home system. The designed system not only gives the sensor data but also processes it according to the requirement, for example switching on the light when it gets dark and it allows the user to control the household devices from anywhere. The cloud is used to send the sensor data through Wi-Fi module and then Machine Learning Algorithm is implemented which decides the output of the electronic devices also, it is used to achieve the power control and local data exchanging which provide the user interface, stores all the information corresponding to the specific house, and query the function information of an individual home appliance.

1.1 Related work

In this paper survey, IoT based vehicle accident detection and rescue in order system is developed. This discovers the fault of the vehicle and sends out the place in a rank of the calamity residence to the vehicle owner, nearby hospital, and police force located by the use of a network service. The announcement between the web server and hardware trick is customary by way of GSM/GPRS shield, and the place is located by means of the GPS shield. In this thesis manufactured a novel factor-based vehicle tracking algorithm, accordingly make something stand out and footprint a hardly any poignant articles. The hardware ruse by means of sensors and mass in the mesh server, and fire notification to diverse users by means of network application [1]. Integrating the various embedded devices and systems in our environment enables an Internet of Things (IoT) for a smart city. The IoT will generate a tremendous amount of data that can be leveraged for safety, efficiency, and infotainment applications, and services for city residents. The management of this voluminous data through its lifecycle is fundamental to the realization of smart cities. Therefore, in contrast to existing surveys on smart cities we provide a data-centric perspective, describing the fundamental data management techniques employed to ensure consistency, interoperability, granularity, and reusability of the data generated by the underlying IoT for smart cities. Essentially, the data lifecycle

in a smart city is dependent on tightly coupled data management with cross-cutting layers of data security and privacy and supporting infrastructure. Therefore, we further identify techniques employed for data security and privacy and discuss the networking and computing technologies that enable smart cities. We highlight the achievements in realizing various aspects of smart cities, present the lessons learned, and identify limitations and research challenges [2]. Human life is extremely important than anything else, timely help is more important than lending a helping hand. So, I have proposed and designed the project in such a way that it saves human life during an emergency state of accidents. Today road accidents are increasing abruptly and it is one of the major causes of the death of humans. The time between the accident and when the ambulance reaches the location of the accident plays an important role in saving human lives. If we decrease the time between when an accident occurs and when the medical emergency is dispatched to the location decreases mortality rates, we can save human lives. The main motto of the project is accident location intimation through SMS by using the GSM module. Keywords – Sensors, Traffic Accidents, GPS, GSM, Zigbee [3].

Technology is growing rapidly and it made our life so easy but is also very hazardous to human life. By increasing the traffic is dangerous in one way it causes the destruction of property and also causes on the human life. An accident is such type of that occurs unexpectedly, the unusually external event it occurs in any particular time and a place, we permanently cannot stop the accidents but we can help that injured person .hence here is my paper provides the facility to avoid the huge accident and if any accident is detected then it tries to help that injured person as quickly as possible by using GPS and GSM.

2. PROPOSED WORK

The proposed system uses the Arduino Mega microcontroller as a processing unit that collects the data from different sensors and processes it. One GSM module is connected with the Arduino board to send the message notification to a particular contact number. Apart from all these we are using one GPS module to find the location of the device during the accident. This device is also connected with the Arduino mega board. 9-volt dc battery is used to provide power supply to the Arduino and GSM modules individually. All these devices are working continuously without any manual interference. When the vehicle encountered an accident. The vehicle will tilt with some axis. Since the device is fitted inside the vehicle on any flat surface, it will also tilt with the vehicle during the accident. At the same point of time the proximity sensor will recognize the change in the angular orientation of the axis, and it starts sending the data to the Arduino. The Arduino will process the new axis changed during the accident and if it found any changed in the original axis provided in the code then it will trigger the GSM and GPS Module for further action.

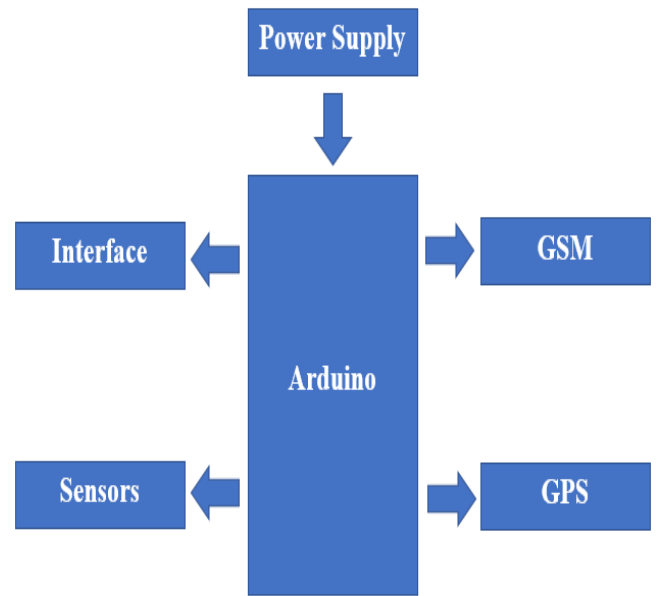


Fig -1: Block Diagram

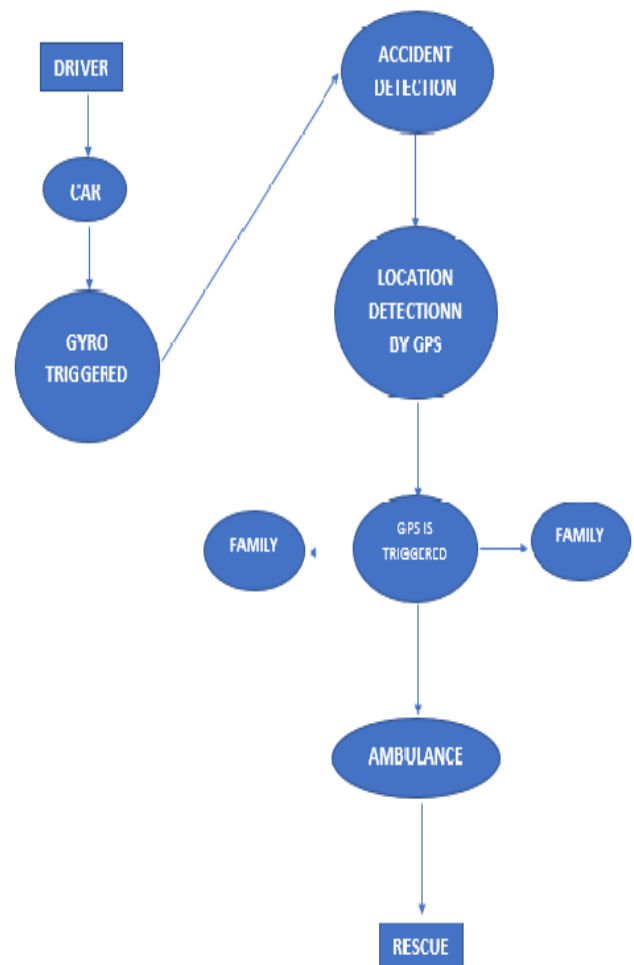


Fig -2: Use case diagram

3. HARDWARE COMPONENTS

3.1 Accelerometer ADXL335

Accelerometer module is based on the popular ADXL335 three-axis analog accelerometer IC, which reads off the X, Y and Z acceleration as analog voltages. By measuring the amount of acceleration due to gravity, an accelerometer can figure out the angle it is tilted at with respect to the earth. By sensing the amount of dynamic acceleration, the accelerometer can find out how fast and in what direction the device is moving. The accelerometer is very easy interface to an Arduino Micro-controller using 3 analog input pins, and can be used with most other micro controllers, such as the PIC or AVR.

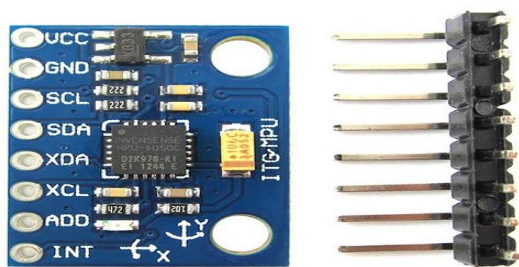


Fig -3: Accelerometer ADXL335

3.2 GSM module (sim900a)

In this project we use the GSM Module for sending messages during accident. This Module consist of a slot which is used for insert SIM and with commands of Arduino we can designed it send alert messages during accidents. Mobile phones have keyboard to send and receive SMS but a GSM modem doesn't have a keypad and it displays and send SMS at a very low power consumptions. It just accepts certain commands through a serial interface and acknowledges for those. These commands are called as AT commands. There is a list of AT commands to instruct the modem to perform its functions. Every command starts with "AT". That's why they are called as AT commands. AT stands for attention.



Fig -4: GSM module(SIM900A)

3.3 Arduino MEGA 2560

Arduino Mega 2560 is a Microcontroller board based on Atmega 2560. As compared to UNO it comes with more memory space and I/O pins. It is most important part of the project because it acts as an interface between GSM, GPS, interface and sensors and with the help of jumping wires it enables the connection with Arduino. It is the brain or backbone of our project. There are 54 digital I/O pins and 16 analog pins incorporated on the board that make this device unique and stand out from others. This board comes with USB cable port that is used to connect and transfer code from computer to the board. DC power jack is coupled with the board that is used to power the board.



Fig -5: Arduino mega 2560

3.4 GPS module (neo6m)

In this project we are using GPS module to track the location of the vehicle by via satellite. A satellite navigation system that displays the location and time information in all climate conditions. The GPS module which we are using in this project is NEO-6M GPS module. NEO-6M is a well-performing complete GPS receiver with a built-in 25 x 25 x 4mm ceramic antenna, which provides a strong satellite search capability. With the power and signal indicators, you can monitor the status of the module. GPS module sends the data related to tracking position in real time, and it sends so many data in NMEA format. NMEA format consists several sentences, in which we only need one sentence. This sentence starts from \$GPGGA and contains the coordinates, time and other useful information. This GPGGA is referred to Global Positioning System Fix Data.



Fig -6: GPS module(neo6m)

3.5 Connecting wires

We use jumper wires to interconnection between Arduino, GSM, GPS and Bread Board. The wires which we are using is of three types M-M, F-M and F-F.

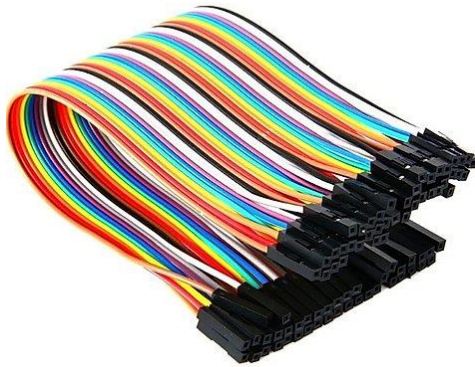


Fig -7: Connecting Wires

3.6 Battery

It supplies power to the hardware components. The nine-volt battery, or 9-volt battery is a common size of battery that was introduced for the early transistor radios. It has a rectangular shape with rounded edges and a polarized snap connector at the top.



Fig -8: Battery

3.7 LCD

A liquid-crystal display (LCD) is a flat panel display, electronic visual display, or video display that uses the light modulating properties of liquid crystals. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix.

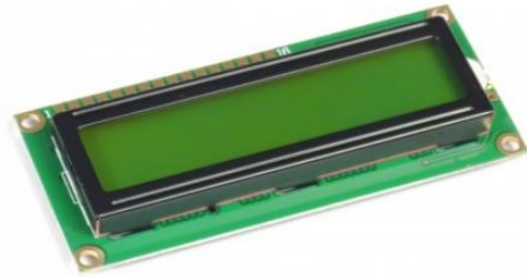


Fig -9: LCD

4. IMPLEMENTATION

In the system block diagram shown in figure.1, Arduino is used as main microcontroller. This system is made for accident alert, the whole system is to be implemented in the vehicle itself. So, when the accident happens, the GY521 sensor senses the changes in the range values and sends it to the Arduino microcontroller, at the same time, with the help of GPS the latitude and longitude of that particular location is obtained. GPS or Global Positioning System is a satellite navigation system that furnishes location and time information in all climate conditions to the user. With GPS the exact location of the accident site is determined. And here, GSM modem SIM900A is interfaced with microcontroller. The GSM module used in this project is SIM 900-A. So that, when accident happens, the SMS will be sent automatically to the particular numbers which would be entered in the code. When we are ready with our hardware after programming, we can install it in our vehicle and power it up. Now whenever there is an accident, the car gets tilted and gyro changes its axis values. These values read by Arduino and checks if any change occurs in any axis. If any change occurs then Arduino reads coordinates by extracting \$GPGGA String from GPS module data and send SMS to the predefined number to the police or ambulance or family member with the location coordinates of accident place. The message also contains a Google Map link to the accident location, so that location can be easily tracked. When we receive the message then we only need to click the link and we will redirect to the Google map and then we can see the exact location of the vehicle.

5. RESULT

The proposed system is developed to provide the information about the accident occur and the location of the accident. It helps to easily provide the assistant and help to the victim of the accident. This system uses GPS module to locate the vehicle. GSM is used to provide the information of accident. The results of the proposed systems are satisfactory.

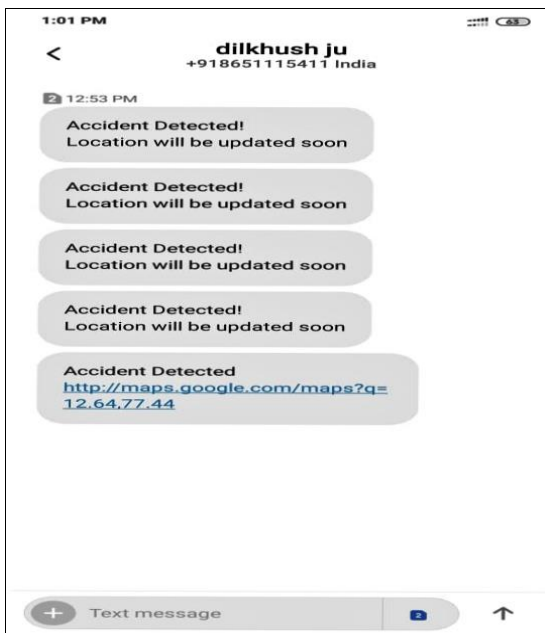


Fig -10: Accident alert message on the registered phone number.

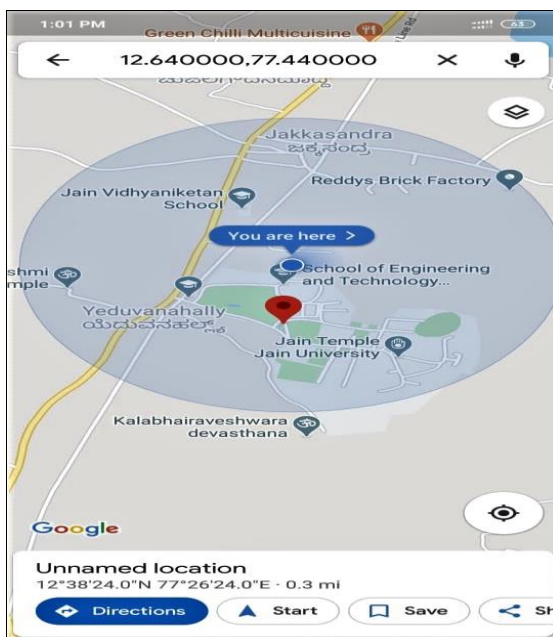


Fig -11: Location detected and being viewed on Google Maps.

6. CONCLUSIONS

The proposed system is developed to provide the information about the accident occur and the location of the accident. It helps to easily provide the assistant and help to the victim of the accident. This system uses GPS module to locate the vehicle. GSM is used to provide the information of accident. The results of the proposed systems are satisfactory. This system is implemented by using sound

sensor, in order to make it more accurate and efficient to detect an accident.

7. FUTURE SCOPE

Future scope 1:- This system can be interfaced with vehicle airbag system that prevent vehicle occupant from striking interior objects such as the steering wheel or window.

Future scope 2:- This can also be developed by interconnecting camera to controller module that takes the photographs of the accident spot that makes the tracking easier.

8. REFERENCES

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