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Intelligent Accident Detection System Using IOT and Cloud Computing

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Abstract - *We all well aware of the fact that since from the days of early men humans have gained remarkable development in each and every aspect for making his life easier. One of the main concerns of the modern world is about safety and accessibility. As the usage of vehicles increases drastically,the possibility of accidents also increases. Some of reasons for road accidents are high speed driving,drunk and drive diversion of minds over stress or due to use of electronic gadgets while driving. In order to overcome this we have proposed a solution Intelligent Accident detection system which is smart and deals with accident detection that occurs in area where the rescue source is unavailable. By sending an alert message to the rescue system through IOT and cloud computing. Hence this project deals with high speed health care of a victim without any public knowledge and can be implemented in almost any kind of automobiles.*

***Key Words*: GPS, GSM, MEMS, NodeMCU, Cloud, Rescue system.**

1. INTRODUCTION

Nowadays, accidents are becoming more common. According to an WHO report 1.35 million people die each year as a result of road traffic accidents. About 20 to 50 billion people suffer from non-fatal injuries. Alert system for vehicle accidents has been developed in various approaches, the main objective is to limit the occurrence of accidents by sending an alert message to the interfaced mobile number using wireless communication. Our proposed system delivers a cost and energy efficient solution for accident detection/rescue system by using IOT and cloud computing. When an accident is being occurred alert message is sent to the allocated Mobile number through GSM module in no time. Arduino plays a key role by collecting the data from the sensors and transferring the message to the interfaced devices in the system. Gyroscope module will be activated when an accident is occurred and an alert message is sent to the interfaced mobile with the help of the GSM module and GPS system helps in finding the location of the accident spot. The proposed system reaches out to the nearest rescue system with the location of the spot as a message when an accident is occurred. Thus the loss of life could be avoided.

2. LITERATURE SURVEY

In [1], the author uses an ARM based system, which alerts the rescue system by GPS GSM communication and by using sensors interfaced to the controller. When we encounter some deflections in any of the sensors it may remains unnoticed and data monitoring could be difficult, this may be avoided by interfacing it with cloud.

In [2] paper,the proposed system uses a PIC based system to communicate across sensors and has GPS,GSM modules to send alert messages to the rescue system. Possibilities of occurring accidents are not taken care of which plays a crucial role in avoiding the accident scenario.

In[3],the proposed system uses an IR based system to monitor the occurrence of accidents and sends an alert message to the rescue system via GSM,GPS modules. Accidents may be detected if there is clash of vehicles or any deviation in the angle of the vehicle or may be a fire in the vehicle, this system may be inaccurate since it does not overcome various possibilities.

In[4],the proposed system uses Bluetooth based communication and an accident detection system which monitors the condition of the vehicle and alerts the rescue system when any deviation found by GPS,GSM modules. However the execution of this system may not be incorporated in any kind of automobiles and transmission of data cannot be efficiently monitored.

In [5], the proposed system use Arduino UNO as the micro-controller to communicate across various sensors connected to it. Any deviations found in the connected sensors alert message will be sent to the rescue system with the help of GSM,GPS module.This model is simple and cost efficient but any deviation in the sensors may be unnoticed . We can overcome this scenario by interfacing it with cloud.

In [6], the proposed system uses an accident detection system by interfacing accelerometer ,Ultrasonic sensors

with Arduino UNO as the micro-controller and detects the accidents by deviation found in any of those sensors and alerts the rescue system by GPS,GSM modules.This system may fail in certain scenario for say may be a fire in the vehicle and data from sensors may be varied since not being interfaced with cloud.

3. PROPOSED METHODOLOGY

In the proposed system we used the following hardware and software to meet our requirements.

3.1 Hardware Requirements

3.1.1 Arduino UNO

Every IOT module requires a microcontroller to collect and process the data across the sensors and actuators. In our system we use Arduino UNO for processing It is a commonly used open source controller platform based on atmega382p and developed by arduino.cc.

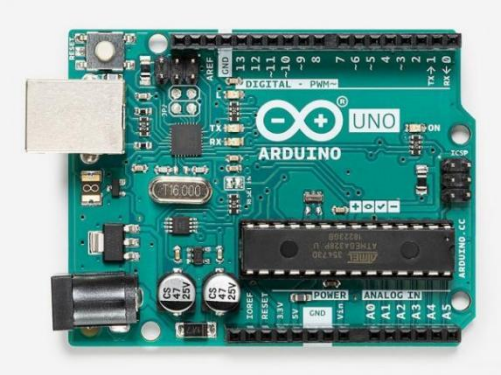

Fig-1: Arduino UNO

It collects the data from the sensors and GPS,GSM modules and reflects the output either in display system or through message.Arduino gathers the information from all other modules and sends the message to the receiver through GSM nodule.

3.1.2 NodeMCU ESP8266

NodeMCU is one of the most commonly used open source low cost IOT module. It is a combination of both hardware and software development environment which is built on the basis of an inexpensive system-on-a-chip(SoC) known as the ESP8266.It consists of ESP8266 chip which has an inbuilt Wi-fi in it, so it is widely used in application where there is need to connect to a Wi-fi network.

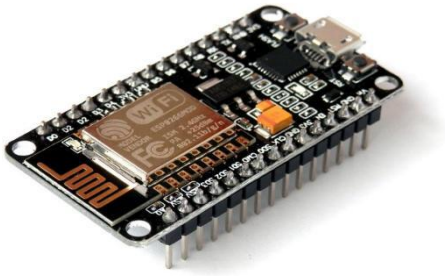

Fig-2: NodeMCU ESP8266

3.1.3 Gyroscope Module

Gyroscope sensor comprises of MPU 6050 break out board which has a series of GY 521 which is also known as MEMS sensor.This sensor is well known for angular measurement of the object and it also has temperature sensor interfaced in it.It has three axes (x,y,z) angular

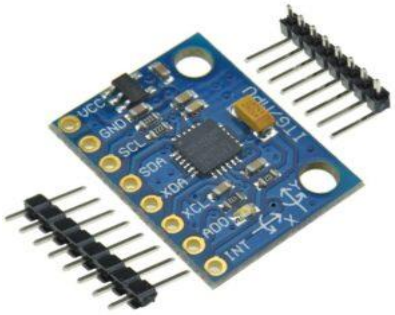

Fig-3: MPU 6050

Sensor, when the deviation found in the angle of the object exceeds the threshold limit it senses the deviation and indicates it.ADXL 345 is a three axis accelerometer sensor which helps in measuring the acceleration of the vehicle by means of any tilt.It also helps to monitor any deviation in the axes of acceleration.

Fig-4: ADXL 345

3.1.4 GSM/GPS Module

For providing communication between GSM and GPS module and the allocated mobile number we use GSM SIM

808 module is preferred. It is a triband working frequency module which helps in communicating between the module and the registered mobile number. GPS module helps in locating the exact position of the vehicle and the data collected by the GPS receiver is send to the arduino and the information is transmitted to the allocated mobile number by the GSM module.

Fig-5: GSM/GPS SIM808

3.1.5 Crash sensor

Crash sensor is a commonly used sensor which helps in detection of any crash in the vehicle due to collision.

Fig-6: Crash sensor

This sensor is fitted in the vehicle where we expect collision to happen and sends signal if any collision occurs in any part of the vehicle.

3.2 Software Requirements

3.2.1 Connected to IOT

Adafruit open source cloud platform is chosen for it's implementation. It has IO stream network which includes special keys with cloud access. This platform is chosen because it has greater number of feeds and consists of dashboards which helps us to differentiate the output. The output can be viewed in terms of graphs, status indicators, tables and so on. GPS gets turned on as soon as the tragedy occurs, and the location of the accident vehicle is sent through GSM to the rescue system.

Fig-7: Adafruit Accident detection service

4. SYSTEM ARCHITECTURE

The gyroscope module is connected, this module consists of MEMS and ADXL 345 which is a angle detecting and accelerometer sensors respectively. By setting the threshold to the vehicle (45-135)degree, the sensor monitors the angle of the vehicle and indicates when any deviation is found in all the three axes of the vehicle at the same time. Accelerometer sensor checks for any vibration or deviation in accceleration of the vehicle in the axes(x,y,z). When any deviation or retardation is found in all the three axes it helps to identify it. Here the deviation in above sensors means, change in value of angle or acceleration in all the three axes. The change indicates sudden increase or decrease of the values. Crash sensors checks for any collision in the vehicle and indicates it. After such detection found above, we use GPS/GSM module to find location of the vehicle and send message to the rescue system.

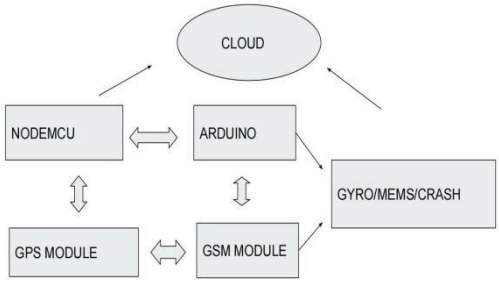

Fig-8: Block diagram

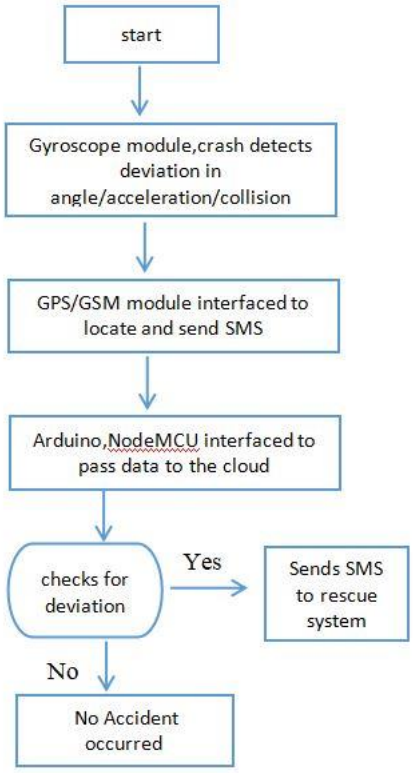

Fig-9: Flow chart for the proposed system

GPS helps in locating the position of the vehicle and GSM helps to send alert message to the rescue system.These deviations are send to cloud by NodeMCU to provide clear implementation.The deviations can be listed in the cloud by variety of templates which helps to monitor clearly. As soon as the GPS gets on after tragedy it sends location through GSM to the rescue system.

5. CONCLUSION AND FUTURE WORK

One of the main advantages of using cloud for accident detection is when the requirements is large it helps to meet out those. The proposed system deals with detection of accident it can also be extended by means of providing some kind of medication to the victim in the spot .Our proposed solution is both cost as well as energy efficient model and can be executed in any kind of automobiles. By increasing the requirements backed up by the technology we may avoid tragedy by providing alerts that can stop the vehicles from accident. Use of this may help save lives.In order to execute this system in real time we need to overcome the effect of interference(EMI) of the vehicle. As we know that the Electromagnetic Interference is directly proportional to the atomic number of the vehicle (z),we can overcome this by using Lead(pb) box with spotted holes which could counter the effects.

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