IoT Based Accident Identification and Alert System

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Abstract - *An accident is an unpredicted and unintentional event. Considering the alarming increase in the number of motor bike riders and the number of accidents happening in our country, this system ensures to make the vehicle driving safer than before for the rider. The lack of treatment in proper time is the major reason for half of the deaths in road accidents. This system aims at providing early detection of accidents and communicating the information immediately to the emergency responses on time to provide quick assistance for the injured person. When the vehicle met with an accident, the vibration sensor or MEMS sensor which is embedded in the vehicle senses the vibration frequency and transfers the value to the raspberry pi module that is interfaced to it. While vibration threshold frequency exceeds the programmed maximum limit, the raspberry pi board extracts GPS data from the GPS module and the message with all the necessary information is sent quickly to the registered emergency contacts of the rider. This system assures to provide immediate assistance to the victim of the accident. The results give the exact locations of the accident.*
***Keywords:** IoT, MEMS, GPS.*

I INTRODUCTION

The Internet of Things (IoT) is the interconnection of uniquely identifiable embedded computing devices within the existing Internet infrastructure. IoT offers advanced connectivity of devices, systems, and services that goes beyond machine-to- machine communications and covers a variety of protocols, domains, and applications. The term things in the IoT refers to a wide variety of devices such as electric clams in coastal waters, heart monitoring implants, thermostat systems and washer or dryers that utilize Wi-Fi for remote monitoring.

This paper works on a Quad core Raspberry pi processor. When the system is switched on, LED will be ON indicating that power is supplied to the circuit. The twin sensor i.e. vibration sensor and MEMS sensor using in this paper sense the obstacle, send analog inputs to the ADC. The ADC converts them into digital signals and sends them to the raspberry pi. It then fetches the exact location of the spot at that particular instance using GPS module and sends it to the emergency contacts of the victim in the form of email and message alert. When the vehicle exceeds the fixed speed limit, the vibration sensor detects the increase in speed and sends it to processor. Thereby processor sends the over speed alert to the emergency contacts along with alerting the driver.

GPS stands for Global Positioning System by which anyone can always obtain the position information anywhere in the world. The Global Positioning System is a space-based

radio navigation system owned by the United States Government (USG) and operated by United States Air Force (USAF). GPS navigation device or GPS receiver is a device that is capable of receiving information from GPS satellites and then to accurately calculate its geographical location. It is made up of a network of a minimum of 24, but currently 30, satellites placed into orbit by U.S. Department of Defence. This device can retrieve from the GPS system location and time information in all weather conditions, anywhere on or near the Earth.

GSM is a mobile communication modem, it stands for global system for mobile communication (GSM). It is widely used mobile communication system in the world. GSM is an open and digital cellular technology used for transmitting mobile voice and data services operates at the 850MHz, 900MHz, 1800MHz and 1900MHz frequency bands. This system was developed as a digital system using Time Division Multiple Access (TDMA) technique for communication purpose. A GSM digitizes and reduces the date, then sends it down through a channel with two different streams of client data, each in its own particular time slot. The digital system has an ability to carry 64 kbps to 120 Mbps of data rates. There are various cell sizes in a GSM system where each cell varies as per the implementation domain. There are five different cell sizes in a GSM network macro, micro, pico and umbrella cells. The coverage area of each cell varies according to the implementation environment.

II LITERATURE SURVEY

Many researches carried out their studies on accident detection system. Swetha Bergonda explained an IoT based vehicle accident detection and tracking system. In this paper provides accident detection and location identification by alarming the authorities regarding accidents [1].

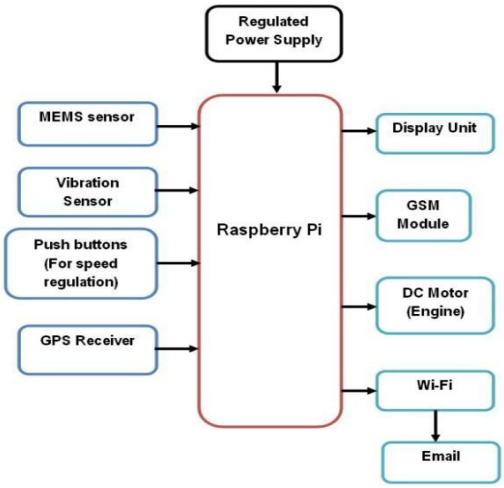
Bhavthankar explained Wireless System for Vehicle Accident Detection and Reporting using Accelerometer and GPS. In this paper accelerometer sensor is used to detect crash and GPS give location of vehicle. In case of any accident, the system send automated message to the programmed number such as family member or emergency medical services Via GSM [2].

Patel 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 [3].

Varma proposed an Automatic Vehicle Accident Detection and Messaging System Using GPS and GSM Modems. AT89C52 microcontroller is used in the system. When the system is switched on, LED is ON indicating that power is supplied to the circuit. When IR sensors that are used sense any obstacle, they send interrupt to microcontroller. The GPS receives the location of the vehicle that met with an accident and gives the information back. This information is sent to a mobile number as a message. This message is received using GSM modem present in the circuit. The message gives the information of longitude and latitude values. Using these values the position of the vehicle can be estimated [4].

Bhagya Lakshmi proposed a FPGA Bases Vehicle Tracking and Accident Warning system using GPS, FPGA, is mainly used to track position of any vehicle and send automated message to pre programmed number. The owner of vehicle, police to clear traffic, ambulance to save people can be informed by this device. FPGA controls and co-ordinate all parts used in system. With the help of accelerometer sensor, the exact position of the vehicle can be detected. It can also be predicted whether the vehicle is in normal position or upside down [5].

III SYSTEM ARCHITECTURE



Raspberry Pi Processor

The Raspberry Pi Processor is a low cost, credit-card sized computer that runs Raspbian (Version of Linux).It provides a set of GPIO (General Purpose Input/Output) pins that allow you to control electronic components for computing and explore the Internet of Things.

Sensors:

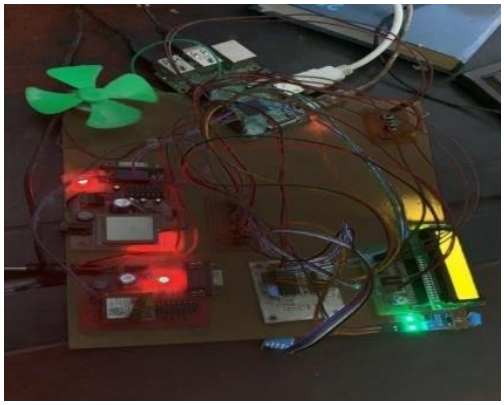
ADXL 320 (MEMS):

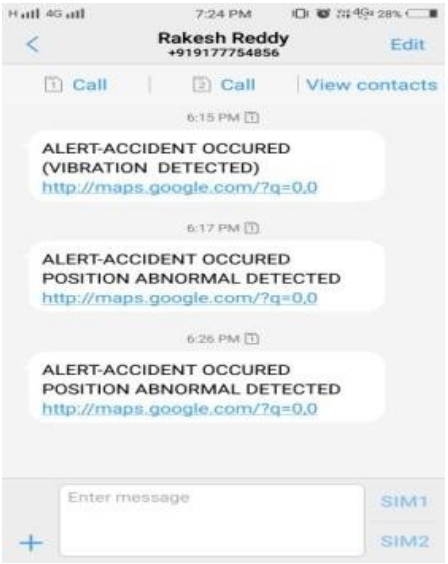
This sensor is used for motor sensing and tilt sensing applications.

Vibration Sensor:

This sensor is used to measure and analyse linear velocity or acceleration.

IV RESULT





When an accident occurs, the two sensors get activated and generate analog signals. These analog signals are converted into digital signals by ADC and are sent to the Raspberry Pi. The Raspberry Pi then gets the exact location of the spot using GPS module and sends it in the form of messages to the emergency contacts for the rescue. In the absence of internet connectivity, the message alert and email will be sent via text messages using a GSM module as shown in the above images.

V CONCLUSION

The paper "IoT Based Accident Identification and Alert System" has been successfully designed and tested. It has been developed by integrating features of all the hardware components used. Presence of every module has been reasoned out and placed carefully thus contributing to the best working of the unit. Secondly, using highly advanced IC's and with the help of growing technology the paper has been successfully implemented.

In recent days, there is a rapid increase of road accidents. This alarming rise in the accidents leads to loss of many lives. The lack of treatment in the proper time is the major reason for many deaths. The major causes may be the late arrival of ambulance or no person at the place of accident to give information to the ambulance or family members. The proposed work offers a solution to this problem by introducing accident detection and reporting system aiming to save the lives. In future, this system could be implemented for lock protection and for other safety purposes. It could also be implemented to control the speed of the vehicle and to prevent the rider from over speeding by passing the information to the victim's family. The early detection and reporting will account to the responsibility of saving many lives.

VI REFERENCES

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