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IOT Based Vehicle Black Box for Vehicle Tracking and Accident Alert

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***Abstract*- Now day's most accidents happen on the roads due to increased traffic and also due to the driver's reckless driving or high speed. In that case ambulance and police are not kept informed on time. This result in delaying the assist provided to the injured person by accident. The system will then send the accident location acquired from the GPS along with the time by utilizing the GSM network. This will help to reach the rescue service in time and save the valuable human life.**

In this research paper we have discussed about accident spot at any place and intimating it through the GPS and GSM network.

***Keywords*: Raspberry Pi, Arduino, Vibration sensor (Piezoelectric Crystal), GPS, GSM**

I. INTRODUCTION

Frustration with the traffic lights results in an increase in accidents from cars moving when the traffic light, signals them to stop. The main intention of this project is to find the accident spot at any place and intimating it through the GPS and GSM network. Global System Mobile (GSM) technology is used to establish cellular connection.GPS is used to trace the position of the vehicle. Here pressure sensor is used to detect accident occurrence of vehicle after it occurs immediately SMS will be send to police, and hospitals, and also family members. After the vehicle accident, it will provide fast indication by SMS and the accident location to the concern person. If the person has taken alcohol that is driving the vehicle, then the vehicle will be stopped immediately by giving alarm. It provides very accurate data via GPS system.

II. LITERATURE REVIEW

Smart cities administrations ranges from open well being and movement administration to canny road lighting and water treatment. The principle point is to accomplish zero disappointment foundation for the general public. The World Health Organization's (WHO) give an account of Road Safety (2013) states that the assessed GDP misfortune because of street car accidents is around 3% for India. Attributable to dangerous condition on streets, the rate of mishaps in India has been high. As indicated by WHO insights for 2012, out of around 11.8 lakh street disaster passing over the world, 84,674 passings were accounted for from India alone. In the year 2014, the quantity of street mischance passing's in India expanded to 92,618. Considering the gravity of the conditions, there is accord that deliberate measures are vital for lessening this abnormal state of mischance passing's and wounds through enhanced security measures and movement

administration. The proposed framework has been intended to beat the weakness in the movement administration. The framework gives data about street blockage, capacity to control the stream of activity and furthermore practice crisis exit for crisis vehicle. Interfacing of Internet with the genuine existing movement instrument additional items the capacity of the proposed framework to lessen human intercession and increment the nature of activity administration.

III. Components & Methodology

1. Alcohol Sensor:

An alcohol sensor detects the attentiveness of alcohol gas in the air and an analog voltage is an output reading. The sensor can activate at temperatures ranging from -10 to 50° C with a power supply is less than 150 Ma to 5V. The sensing range is from 0.04 mg/L to 4 mg/L, which is suitable for breathalyzers.

MQ-135 Gas Sensor:

The MQ-135 gas sensor senses gases like ammonia nitrogen, oxygen, alcohols, aromatic compounds, sulfide, and smoke. The boost converter of the chip MQ-3 gas sensor is PT1301. The operating voltage of this gas sensor is from 2.5V to 5.0V. The MQ-3 gas sensor has a lower conductivity to clean the air as a gas sensing material. In the atmosphere, we can find polluting gases, but the conductivity of the gas sensor increases as the concentration of polluting gas increases. MQ-135 gas sensor can be implemented to detect the smoke, benzene, steam, and other harmful gases. It has the potential to detect different harmful gases.The MQ-135 gas sensor is a low cost to purchase.

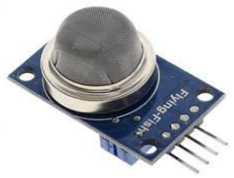

Image2: MQ-135 Gas Sensor

Basic Pin Configuration of Alcohol Sensor:

The MQ-3 alcohol gas sensor consists of a total 6-pins including A, H, B, and the other three pins are A, H, B out of the total 6-pins we use only 4 pins. The two pins A, H are used for the heating purpose and the other two pins are used for the ground and power. There is a heating system inside the sensor, which is made up of aluminium oxide, tin dioxide. It has heat coils to produce heat, and thus it is used as a heat sensor.

Working Principle:

The MQ-135 alcohol sensor consists of a tin dioxide (SnO2), a perspective layer inside aluminium oxide micro-tubes (measuring electrodes), and a heating element inside a tubular casing. The end face of the sensor is enclosed by a stainless steel net and the backside holds the connection terminals. Ethyl alcohol present in the breath is oxidized into acetic acid passing through the heating element. With the ethyl alcohol cascade on the tin dioxide sensing layer, the resistance decreases. By using the external load resistance the resistance variation is converted into a suitable voltage variation.

2. ATmega328P:

ATMEGA328P is high performance, low power controller from Microchip. ATMEGA328P is an 8-bit microcontroller based on AVR RISC architecture. It is the most popular of all AVR controllers as it is used in ARDUINO boards.

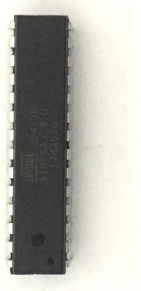

Image1: AT mega 328p chip

3. Piezoelectric Buzzer Beeper Alarm:

- Product: Piezo Buzzer Alarm
- Type: Piezoelectric Buzzer
- Length: 15mm
- Diameter: 30 mm
- Voltage: 5-20v
- Current: <25MA
- Color: Black

Image3: Piezoelectric Buzzer

4. Piezoelectric Crystal:

The piezoelectric crystal is one of a small scale energy resource. When these crystals are automatically deformed then they produce a tiny voltage which is known as piezoelectricity. This kind of renewable energy cannot be suitable for industrial situations. The main concept of these crystals is to provide Piezoelectricity in reply to applied automatic stress which can be reversible within the crystals. This twist can be done through only manometers and it has helpful applications like the fabrication as well as sound detection.

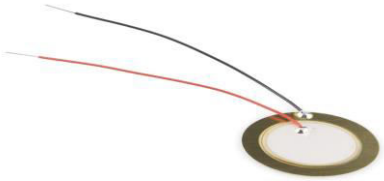

Image4: Piezoelectric Crystal

5. Piezoelectric-Crystal Working:

The shape of piezoelectric crystal is a hexagonal, and it includes three axes namely optical, electrical, & mechanical. It is named a piezoelectric effect. The working of this crystal is whenever force is applied to the crystal then it generates the electricity. Whenever an electromagnetic force is applied on crystals, afterward the crystals begin vibrating otherwise demonstrate a mechanical growth and reduction. It is called an inverse piezoelectric effect. When any accident occurs due to pressure piezo crystal will generate power will in turn activate controller to send SMS.

6. 16x2 LCD Module Pin:

The JHD162A LCD module has 16 pins and can be operated in 4-bit mode or 8-bit mode. Here we are using the LCD module in 4-bit mode.

Image5:16x2 LCD Module Pin

7. SIM 808 GSM/GPRS/GPS Module with GPS and GSM Antenna:

SIM808 module is a GSM and GPS two-in-one function module. It is based on the latest GSM/GPS module SIM808 from SIMCOM, supports GSM/GPRS Quad-Band network and combines GPS technology for satellite navigation. It features ultra-low power consumption in sleep mode and integrated with charging circuit for Li-Ion batteries, that make it get a super long standby time and convenient for projects that use rechargeable Li-Ion battery. It has high GPS receive sensitivity with 22 tracking and 66 acquisition receiver channels.

Image: 6- SIM 808 GSM/GPRS/GPS Module

Features:

- Quad-band 850/900/1800/1900MHz
- GPRS multi-slot class12 connectivity: max. 85.6kbps(down-load/up-load)
- GPRS mobile station class B
- Controlled by AT Command (3GPP TS 27.007, 27.005 and SIMCOM enhanced AT Commands)
- Supports charging control for Li-Ion battery
- Supports Real Time Clock
- Supply voltage range 3.4V ~ 4.4V
- Integrated GPS/CNSS and supports A-GPS
- Supports 3.0V to 5.0V logic level
- Low power consumption, 1mA in sleep mode
- Supports GPS NMEA protocol
- Standard SIM Card

8. Raspberry Pi:

Here we have used Raspberry pi 4 models B.

Features

- Model-Raspberry Pi 4 Model-B
- Processor-Broadcom BCM2711, quad-core Cortex-A72(ARM v8)64-bit@1.5Hz
- RAM Memory-2 GB LPDDR4 SDRAM
- 2xUSB 2.0 Ports
- 2xUSB 3.0 Ports
- 2.4 GHz and 5.0 GHz IEEE 802.11b/g/n/ac wireless LAN
- 5 Volt 3 Ampere DC via GPIO Header
- 5 Volt 3 Ampere DC via USB Type-C

Image: 7- Raspberry pi 4 model

IV. BLOCK DIAGRAM

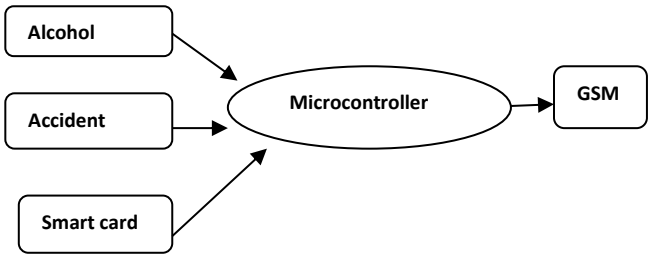

Fig: block diagram of Accident Detection and Reporting

- **Activity diagram**

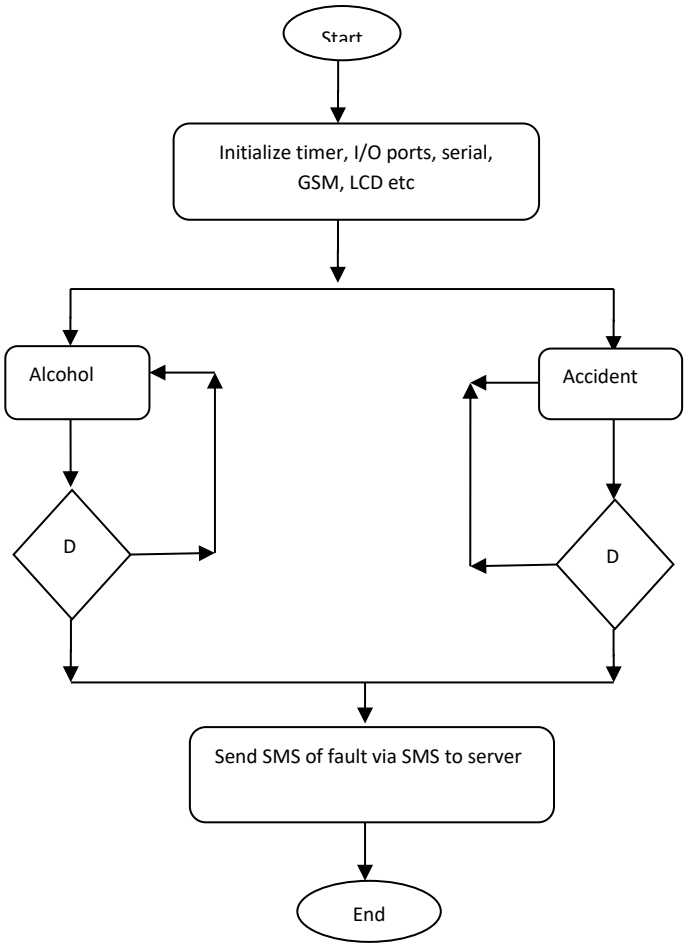

Fig.4.1-Flowchart of the Accident Detection and Reporting System

V. CONCLUSION

In this paper, we have presented an "IOT Based Vehicle Black Box". The main intention of this project is to find the accident spot at any place and intimating it through the GPS and GSM network. Global System Mobile (GSM) technology is used to establish cellular connection.GPS is used to trace the position of the vehicle. Here pressure sensor is used to detect accident occurrences of vehicle after it occurs immediately SMS will be send to police, and hospitals, and also family members. After the vehicle accident, it will provide fast indication by SMS and the accident location to the concern person. If the person has taken alcohol that is driving the vehicle, then the vehicle will be stopped immediately by giving alarm. It provides very accurate data via GPS system.

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expensive test step while delivering extra value to customers"

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