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VEHICLE SAFETY AND ACCIDENT DETECTION USING IOT

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Abstract : Due to the increase in demand for vehicles, road accidents and road hazards have increased. People's lives are at grave danger. The victims' chances of dying rise as a result of the ambulance's late arrival at the scene of the accident. Systems that automatically detect accidents may include "VEHICLE SAFETY AND ACCIDENT DETECTION" systems. The Internet of Things (IoT) connects various devices, individual components, and perform operations using inputs provided by sensors. To save the priceless human life, there is a critical need for an effective automated detection of accidents and automatic alerting of the location of the accident and the emergency services. This paper focuses on the alerting and identification of accidents. It depicts the precise longitude as well as latitude of the vehicles that has been engaged in the crash, vehicle collision, and alcohol detection.

Keywords **- accident , IoT, detection, alert**

I. INTRODUCTION

The Association for Safe International Road Travel (ASIRT) predicts that annually, approximately 1.3 million individuals lose their lives in automobile crashes and 20 to 50 million sustain injuries. In the event of an accident, the current solution helps the passengers. The person who is hurt has to manually turn on the assistance function. However, if the person had been in a life-threatening or risky non vital circumstance, it would not have been feasible. An IoT-based system is the approach we provide, when an accident occurs, the "VEHICLE SAFETY AND ACCIDENT DETECTION USING IOT" initiative sends an alert to the nearest emergency centers. Utilizing the both x-value and y-value, an accelerometric sensor is used to measure whether the position of the vehicle has changed. A vehicle collision is detected using a tilt sensor. Along with these sensors, the setup we're proposing additionally comprises an alcohol sensor that will turn on if the driver is intoxicated.

The key findings of this project are as follows: (i) Developing a novel intelligence-based IoT approach that would result in a decrease in crashes (ii) Implementing a safety system that detects the position of the vehicle during a collision and determines whether or whether the motorist has had alcohol. (iii) To provide a system that delivers a warning message that includes the car's location, to the concerned authorities in the event of an accident. This paper starts off by providing an empirical examination of automobile crashes. The literature review, proposed system, methodology, and implementation are all discussed subsequently in Chapters II, III, IV, and V. Results, conclusions, and future scope appear in Sections VI and VII.

II. LITERATURE REVIEW

This section explores the benefits and limitations of existing, comparable systems. Several techniques are available that only assess accidents. There hasn't been a system in place that can efficiently detect and avoid accidents at the same time.
Automatic Vehicle Accident Detection and Messaging System Using GSM and GPS Modems [1] proposes a system that calibrates the accelerometer and checks the connectivity and response of GPS and GSM modules. In this system, accidents are monitored but not prevented. Automatic Engine Locking System Through Alcohol Detection [2], the system uses the MQ-3 sensor to continuously check the alcohol concentration level, and if the level rises above a certain point, it switches off the vehicle's engine. Intelligent Expeditious Accident Detection and Prevention System [3], using data gathered from the tilt sensor, this system determines the accident's severity. It can track the vehicle's tilt angle and provide monitoring for it.

III. REQUIREMENTS

A. DC Motor

DC motors are a type of electrically powered rotating machinery that transforms electrical power into mechanical power. Here, motor is used to replicate the vehicle motor.

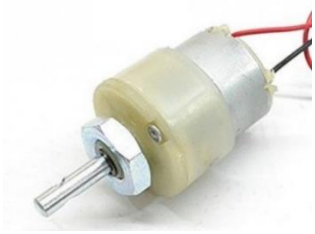

Fig3.1 DC Motor

B. Relay

Relays are switches that are controlled by electricity. Solid state control circuits without motor components use semiconductor devices to replace.

Fig3.2 Relay

C. Alcohol detecting Sensor

A cheap semiconductor sensor that can identify alcohol gas in quantities ranging from 0.05 mg/L to 10 mg/L is the alcohol gas sensor (MQ3).

Fig3.3 Alcohol Sensor

D. LCD Display

It is one reasonably electronic show module employed in an intensive variety of applications like mobile phones, calculators, computers, TV sets, etc.

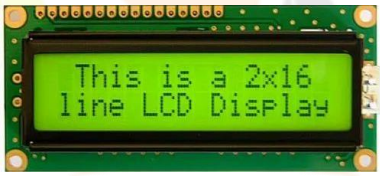

Fig3.4 LCD Display

E. ADXL335 Accelerometer Sensor

The ADXL335 accelerometer provides 3-axis acceleration measurement in its entirety. Within a 3g range, this module measures acceleration in the x, y, and z axes. This module produces an analogue voltage that is proportional to acceleration as its output signal.

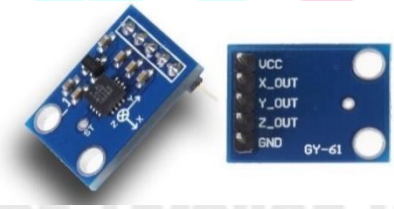

Fig3.5 Accelerometer Sensor

F. NEO-6M GPS Module

This Module has a larger built-in 25 x 25mm active GPS antenna with a UART TTL connector and employs the most recent technology to provide the greatest positional information.

Fig3.6 GPS Module

G. SIM 900 GSM Module

GSM SIM900 modem and antenna module bandwidth can be configured from 800-1800MHz. GSM and GPRS modems have a built-in TCP/IP stack that enables them to connect to the Internet using GPRS. Compatible with SMS, Voice and DATA transmission applications in the M2M interface.

Fig3.7 GSM Module

H. Arduino IDE

The Arduino Integrated Development Environment(IDE) is a cross-platform program written in the C++ language. This gives you access to the extensive Arduino library, allowing you to build programs and upload them to the device. USB cables are typically used to connect Arduino boards.

IV.PROPOSED SYSTEM

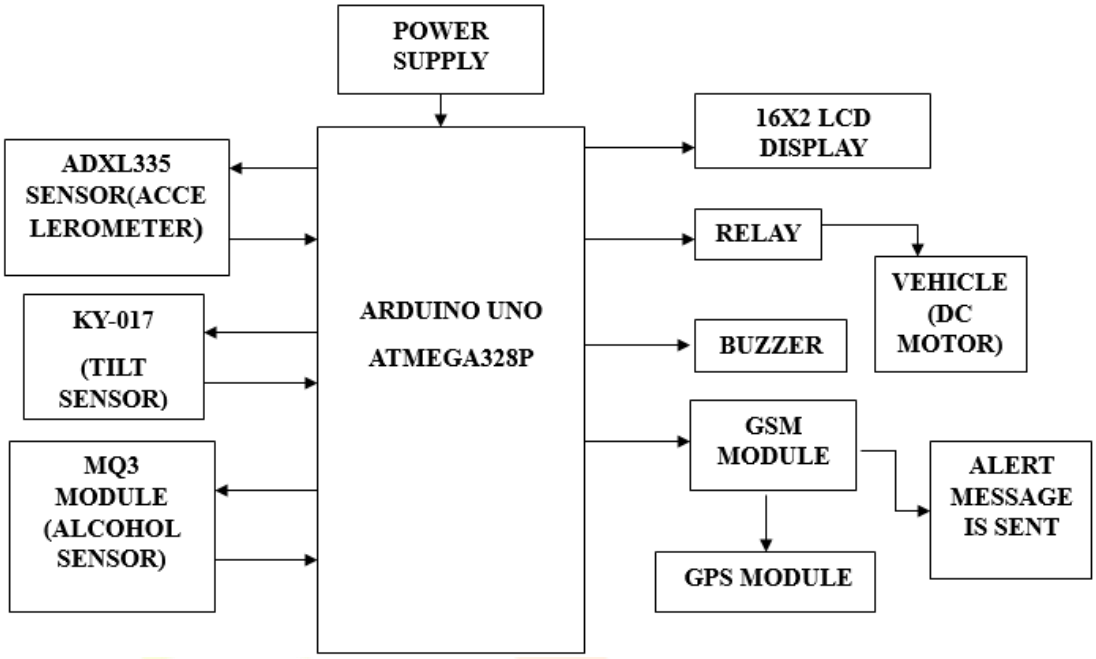

Fig 4.1 Block Diagram

Working: The power supply is given to the Arduino UNO. Now from the Arduino UNO, the12V supply is divided into 5V each and given to the accelerometer sensor, tilt sensor, alcohol sensor. The DC motor is connected through the relay.

Utilizing the tilt sensor, one can identify accidents when there is a collision. MQ3 sensor is used to detect alcohol gas. When its value is greater than 50% then it states that the driver is drunk and the is transmitted to the Arduino, further from the Arduino signal is sent to relay to cut-off the motor. When there is a collision the tilt sensor gets activated and the signal is sent from Arduino to the buzzer and relay, buzzer gets activated. When the relay is on dc motor is cut-off. The message “Vehicle is collided” is displayed on the LCD. When the value of alcohol is greater than 50, alcohol sensor is activated and LCD displays the message “Alcohol: 55.23%”.

The GSM module receives data from the Arduino serially. The GSM module's "sim insertion slot" is where the sim is placed. The location of the car is communicated to the specified number using the GPS module.

V.RESULTS AND DISCUSSION

The Overall setup of the project is as shown in fig 5.1

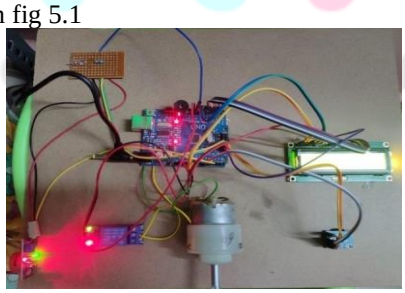

Fig5.1 Project setup

Whenever an accident is detected the mercury ball in the tilt sensor moves and a message, “Accident detected, vehicle collided “appears on the LCD as shown in fig5.2

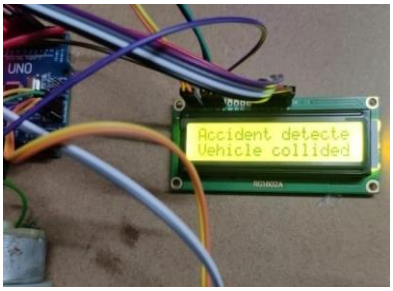

Fig5.2 Accident detection

If the alcohol sensor detects a value above 30%, the alcohol sensor is activated. When the alcohol sensor is activated the LCD displays the message “Alcohol-71.85%, Alcohol level exceed” as shown in the fig5.3

Fig5.3 Alcohol detection

The below fig5.4 shows the normal condition:

Fig5.4 Position indication during the normal condition of the vehicle

When the Accelerometer Sensor is activated it shows the position in which the vehicle is tilted. If the value of x is greater than 380^0, position is back and the LCD displays message as shown in fig5.5

Fig 5.5 Position indication during the accident condition of vehicle (back)

If the value of y is less than 290^0 the position is left and the LCD displays a message as shown in the fig5.6

Fig5.6 Position indication during the accident condition of vehicle (Left)

If the value of x is less than 290^0 the position is front and the LCD displays a message as shown in the fig5.7

Fig5.7 Position indication during the accident condition of vehicle (Front)

If the value of y is greater than 380 degrees, position is right and the LCD displays a message as shown in the fig5.8

Fig5.8 Position indication during the accident condition of vehicle (Right)

Message with location link sent using GSM modem to registered mobile number as shown in below fig5.9

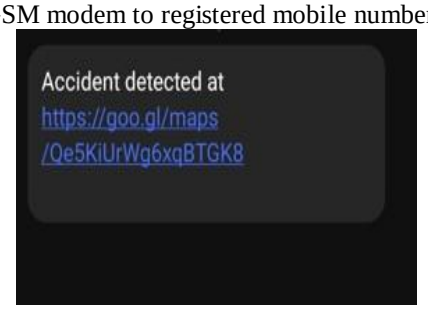

Fig5.9 Message sent to linked number

Location tracking using GPS module is shown in below fig5.10

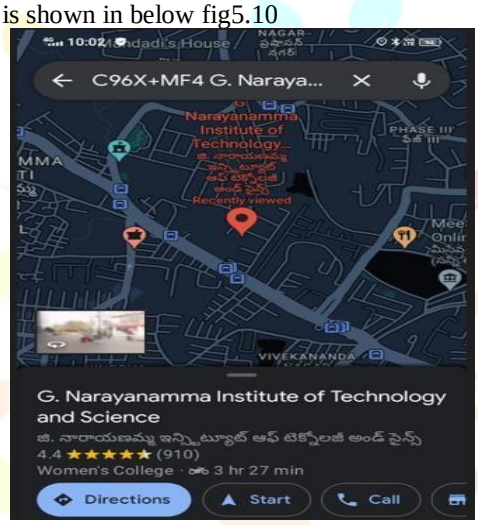

Fig5.10 Location of the accident

VI. CONCLUSIONS AND FUTURE SCOPE

•Vehicle safety and accident detection system which senses the position, collision of the vehicle and alcohol percentage of the driver. Motor is cut-off when any of these are sensed or exceeds the limits.

•Addition of GPS (Global Positioning System) module for vehicle tracking which allows to track the vehicle location and The SMS is transmitted via a GSM (Global System for Mobile) modem to nearby emergency centers and registered authorities.

•Thereby, decreasing the death rates resulting from accidents.

Future Scope:

Our system is busy detecting crashes. By giving the accident victim medicine at the site, however, this can be prolonged. We can avoid accidents by developing technology and equipping cars with warning systems that can stop them to prevent accidents.

VII. ADVANTAGES AND LIMITATIONS

Advantages:

•This method aims to prevent accidents before they happen. Thus, it increases the safety of drivers and other people on the road.

•Effective and easy implementation.

Disadvantages:

•Security detection systems have poor accuracy or effectiveness in the dark. These facts highlight the continuing risks for pedestrians when sharing the road with vehicles. It can contribute to an increase in pedestrian fatalities while reducing overall traffic accidents.

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