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CAR ACCIDENT AND ALCOHOL DETECTOR AND RECORDER BLACKBOX

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ABSTRACT

Road traffic injuries make high economic losses for people, their families, and to countries in general. These misfortunes emerge from the expense of treatment as well as lost efficiency for those killed or crippled by their injuries, and for family individuals who need to get some much-needed rest work or school to really focus on the harmed. Road traffic crashes cost most nations 3% of their GDP. So here we design a system that can alert the vehicle owner/loved ones over SMS as soon as any signs of accident or may lead to an accident are detected. The system makes use of Temperature sensor for fire detection in car, Vibration sensor to detect any impact force or heavy vibrations, Alcohol sensor to check if driver was drunk, gyro scope sensor to record data if vehicle tilted or turned over during accident and a GPS and GSM modem to send SMS with GPS Coordinates about the incident. This complete system is now powered by an Arduino Mega to operate the system. The system also has 2 Motors used to demonstrate as car engine. The system monitors all sensor data to check for any abnormalities. Is alcohol sensor is triggered the controller similarly sends an SMS notification with alcohol data and GPS Coordinates on Map link for easy vehicle location tracking. In case of any sensor triggers an abnormal activity, the black box starts storing all sensor data on a second-by-second basis in an SD card so that investigation team may recover the data and study exactly what went on during the accident.

KEYWORD: Arduino Mega, temperature sensor, alcohol sensor,GPS tracker, IC, Relays, MEMS, amplifier, LED.

1. INTRODUCTION

The causes of car accidents are not too difficult to investigate as that of plane crashes, but there are some cases that are very difficult to solve due to contradictory stories of drivers. . In order to know what type of sensors should be installed into the vehicle, research was carried out to identify the main information needed for better accident analysis. A wireless box using micro electro mechanical systems (MEMS) accelerometer and GPS tracking system is developed for accidental monitoring. In the event of an accident, this wireless device will send a short message on the mobile phone, indicating the position of the vehicle using a GPS. As soon as the driver runs the motor, the system will begin saving the events of corresponding vehicle. Black box refers to collection of several different recording devices. Car black box is “event data recorder”. The causes of the car accident are not too difficult to investigate as that of plane crashes but many cases are very difficult to solve due to contradictory stories of drivers. The collection of the real time data after the detection of collision around the vehicle environment and analyze the collected data to have the conclusion regarding the collision and simultaneously transmitting the data over the wireless network. A black box system is very useful for the automobile industry innovative black box is developed using various sensors like steer touch sensor, hall effect sensor and an android app that contains features of audio/video and GPS/GSM. This could be done

effectively using a black box. Car black box is digital electronics device, which records and stores vehicle's speed, vehicle location, vehicle temperature, distance from obstacles, and real time and vehicle's other status information's. It helps to discover and to analyze the reason of an accident easily and to settle many disputes related to a car accident, such as, crash and insurance settlements. Data from all sensors is recorded using electrically erasable programmable read only memory (EEPROM).

2. BLOCK DIAGRAM

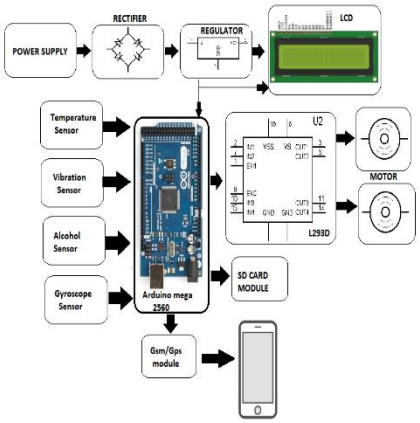


FIG 2.1 BLOCK DIAGRAM

ARDUINO MEGA

The ARDUINO Mega is a microcontroller board ATmega1280 . It has 54 digital input/output pins (of which 14 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack

MEMS SENSOR

The MEMS (Micro Electro Mechanical System) which consists of a 3-axis accelerometer which gives output based on three axis movement. This setup is fixed on the road vehicles and during normal movement

TEMPERATURE SENSOR

Here LM35 device acts as a temperature sensor. The surrounding temperature is sensed by the sensor. LM35 is a device whose output voltage increase depending upon the temperature

ALCOHOL SENSOR

This detects the presence or concentration of gases in the atmosphere. Based on the concentration of the gas the sensor produces a corresponding potential difference by changing the resistance

ULN DRIVER

The ULN2003 is comprised of seven high voltage, high current NPN Darlington transistor pairs. All units feature common emitter, open collector outputs. To maximize their effectiveness,

BUZZER

A buzzer or beeper is an audio signalling device, which may be mechanical, electromechanical, or piezoelectric (piezo for short). Typical uses of buzzers A buzzer or beeper is an audio signalling device

GSM MODEM

Modem (from **mo**dulator-**dem**odulator) is a device that modulates an analog carrier signal to encode digital information, and also demodulates such a carrier signal to decode the transmitted information. The goal is to produce a signal that can be transmitted easily and decoded to reproduce the original digital data.

GPS MODULE:

GPS in full global positioning system, space-based radio navigation system that broadcasts highly accurate navigation pulses to users on or near the earth. In the United States Navstar GPS, 24 main satellites in 6 orbits circle the earth every 12 hours. In addition, Russia maintains a constellation called GLONASS (Global Navigation Satellite System)**.**

L293 MOTOR DRIVER

L293D is a typical **Motor driver** or **Motor Driver** IC which allows DC **motor** to drive on either direction. **L293D** is a 16-pin IC which can control a set of two DC **motors** simultaneously in any direction. It means that you can control two DC **motor** with a single **L293**

DC-DC CONVERTER

The XL4015 is a 180 KHz fixed frequency PWM buck (step-down) DC/DC converter, capable of driving a 5A load with high efficiency, low ripple and excellent line and load regulation

LCD DISPLAY

LCD is mainly used for display the information. Here we are using 2x16 LCD. Operation of the LCD is the declining prices of LCDs. The ability to display numbers, characters, and graphics. This is in contrast to LEDs, which are limited to numbers and characters

POWER SUPPLY:

A power supply circuit is very essential in any project. This power supply circuit is designed to get regulated output DC voltage. The 9 volt transformer, step down the main voltage (230v) into 9 volts. The secondary voltage of transformer is rectified using bridge rectifier.

3. TEMPERATURE SENSOR

Here LM35 device acts as a temperature sensor. The surrounding temperature is sensed by the sensor. LM35 is a device whose output voltage increase depending upon the temperature. It is connected to the Amplifier (IC 741). The difference between inverting and non inverting input is amplified. This amplified output is fed to the microcontroller. LM35 is a temperature measuring device having an Analog output voltage proportional to the temperature.

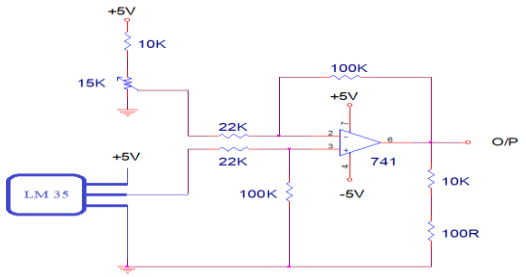


FIG 3.1 TEMPERATURE SENSOR

4. ALCOHOL SENSOR MQ-3

Alcohol **sensor** is a device which detects the presence or concentration of gases in the atmosphere. Based on the concentration of the gas the sensor produces a corresponding potential difference by changing the resistance of the material inside the sensor, which can be measured as output voltage.

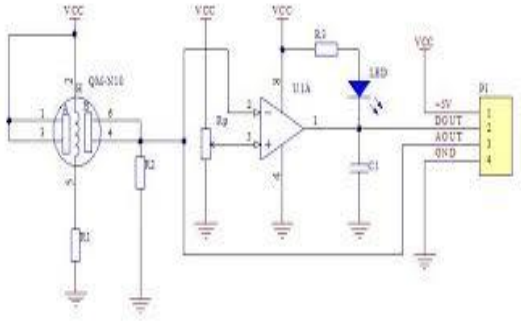


FIG 4.1 ALCOHOL SENSOR

5. GSM MODEM

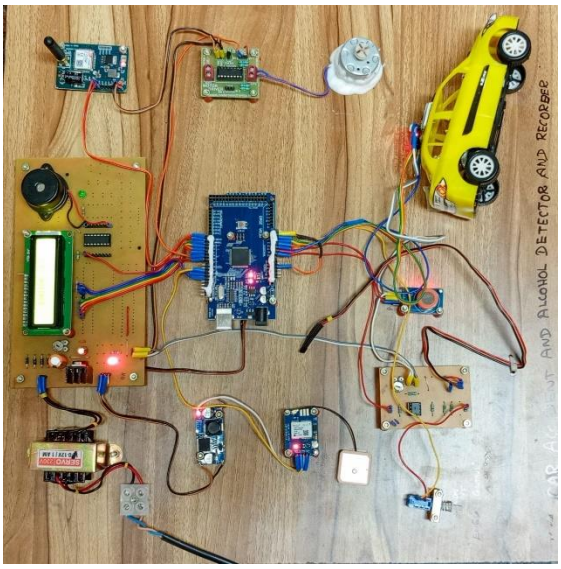
MODEM (from **mo**dulator-**dem**odulator) is a device that modulates an analog carrier signal to encode digital information, and also demodulates such a carrier signal to decode the transmitted information. The goal is to produce a signal that can be transmitted easily and decoded to reproduce the original digital data. Modems can be used over any means of transmitting analog signals, from driven diodes to radio.

6. ALARM

The output from a MC is connected to the base of transistor bc547 through a resistor 4.7kΩ. The transistor collector point connected to the buzzer. When there is a positive bias from the port. The buzzer will energize. if there is logic 'o' level output from port, the buzzer will de – energize.

7. HARDWARE OUTPUT

Our project has been targeted towards building an integrated system for emergency rescue services in the event of a road accident. The purpose of the project is to find the accident location using GPS module and to send this location by means of sending a message using GSM module to the pre-coded number. This system is usually placed inside the vehicle. It reduces the time it takes for emergency rescue to arrive at the crash location.



8. CONCLUSION

This project on **"CAR ACCIDENT AND ALCOHOL DETECTOR AND RECORDER BLACKBOX"** is working fire, getting the parameter envisaged during the conceptual stage. During the design, as well as during the construction, greater care has been put in to avoid hiccups at the final stage. The PCB layouts were prepared with at most care to incorporate the circuits in a modular manner. The circuit is made as simple as to our knowledge. Also components and cost. It was a very interesting process of developing the prototype, stage by stage and testing the same. We have to go through fairly large pages of data related to the components etc. It was a useful and fulfilling assignment to get the project completed in time. This gave as a sense of satisfaction and accomplishment.

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