

# Electronic nose for accident prevention and vehicleblack box system

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**Abstract**—In this paper I had developed a system to provide the prior to accident information to the vehicle controller unit. So that the vehicle to prevent the happens of accident. During the vehicle is moving the system will continuously record the vehicle's moving status and conditions, so that the record will provide the accident investigation, if it unfortunately happens the accident. This system consists of an acceleration sensor which displays the speed of the vehicle. This system also indicates obstacles which would reduce the crowd of the vehicles in accident prone areas. Alcohol is detected while running the system and vehicle will stop automatically. Sonar sensor is used to detecting the obstacle continuously. Finally when accidents occurred, the system will suddenly send a text message to family members and preset number via GSM network.

**Key Word**—Accident, Drunken Driving, Sonar Sensor, Vehicle, GSM, GPS, Steering grip sensor.

## I. INTRODUCTION

Now a day's road accidents are frequently occurring due to the carelessness of the driver. In other causes for these accidents may be drunk and driving, fatigue, drowsiness of the drivers. To prevent road accident up to maximum level all the above mentioned factors should be considered seriously road accidents. It states that the drunken driving is a major factor for the rising of death on roads. The recent report says [5] that annual average of 700,000 road accidents, 10 percentages occur in India which has overtake China. The latest annual statistics revealed by the World Health organization (WHO) in its first Global status report on road safety many people are killed on Indian roads due to speed, and drunken driving, less usage of helmet, seat belts and child restraints in vehicles. Another latest report of National Crime Records Bureau or NCRB [2] says that 40 people under the age of 25 die in road accidents around the world. It states that the drunken driving is a major factor for the rising of deaths on road. To provide the prior to accident information to the vehicle controller system, so it enables the vehicle to

prevent the happening of accident and it gives automobile safety and security. In the field of an automotive researches, a method to monitor and to detect a fatigue/drowsy or a drunken driver has been studied for many years, but people died in alcohol-related crashes and drowsiness, inside and outside the city are due to drunken driving and drowsiness no testing methodology is adopted to avoid these fatalities in those areas, so by use of sensor it gives information to the vehicle unit and preset number before the accident.

## II. EXISTING SYSTEM

By existing method, vehicle accident prevention by method of alcohol detector in an effort to reduce traffic accident cases based on driving under the influences alcohol. This project is developed by integrated the alcohol sensor with the controller. The alcohol sensor used in this project is mq-3 which to detect the present of alcohol content in human breath. Previous researches uses sensors such as an infrared camera for pupil detection or voice to detect fatigue, or image processing to detecting driver expression. Even these approach are able to detect driver's fatigue however; these methods are not driver adaptable or interactive with an outside driving situation. Sonar or ultrasonic sensing uses propagation of acoustic energy at higher frequencies than normal hearing to extract information from the environment. This investigation shows the fundamentals and physics of sonar sensing for object localization, landmark measurement and classify in robotics applications. LCDs are available to display arbitrary images (as in a general-purpose computer display) or fixed images which can be displayed, such as preset words, digits, and 7-segment displays as in a digital clock.

## PROBLEM STATEMENT

Eye blinks continuously, may be due to some dust, insects or eye problems then also the system may come to halt. brake

control system comes halt at middle of the road may be without preventing it may lead to accident .It may apply Brakes high altitude terrains while climbing a hill that can make the vehicle fall from the top and lead to severe accidents.

### III. PROPOSED METHOD

This paper presents an advanced step to the concept of car black-box in developing a comprehensive vehicle safety system which would not only record the video or audio, but also try to prevent a possible collision by limiting the speed of the vehicle in accident areas. In case of an accident, the time and location (co-ordinates) is sent through GSM to a preset number for immediate rescue and treatment. Recorded data can also be used for investigation, revealing the problems that caused the accident and give manufacturer an idea for improvement. So it's to develop an embedded integrated system consisting of a microcontroller, and power supply unit, sensor, memory, a motor driver unit and a GPS/GSM modem.

The Black-box is a digital video-audio event data recorder. The concept is similarly to the "black box" data recorder on airplanes. It records all the information, like speed & temperature of the cabin/engine, time and location, before and after the accidents so that it can be used to analyze the accident accordingly. It includes a web-camera, microphone, and real-time clock, and other electronic components, all controlled by a microprocessor with embedded software and fully self-contained in a tiny, black box that installs unobtrusively on the dash board . Benefits customers receive are accurate, real time, easy to interpret data, a tamper proof system, and additional security.

Other benefits include being able to see what the driver could see, hear, and feel in a crash. The user interface is very simple and has been designed to minimize driver distractions. A green indicator light shows that the system is armed and ready to capture an event. As soon as a collisions is detected automatically, the indicator light will turn On red and start recording all the relevant data during a pre-defined period before and after the accident. The black-box is modified according so that the system is triggered automatically as soon as abnormal readings are detected by the sensors and which can be easily stored in a flash memory card. For more efficiency, the data recorded will get refreshed on every start of the vehicle for managing the limited data storage capacity, unless an accident has taken place.

The applications of Car Black-box:

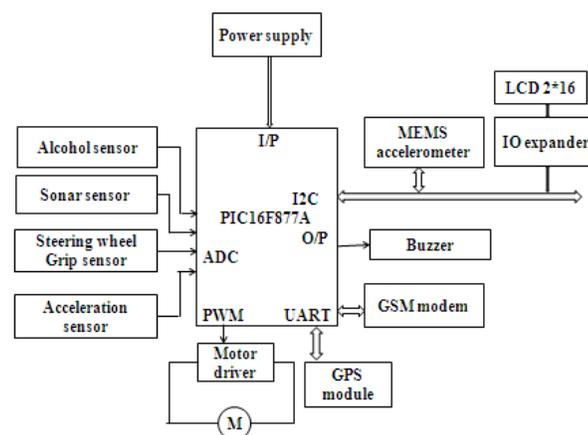
- (i). Better crash research that may produce improved driver education programs, safe road designs and improve highway safety.
- (ii). Collision data for research, data to improve vehicle design internally and externally (iii). To

not only record the relevant data, but also try and prevent a possible collision by limiting the speed of the vehicle in accident-prone areas.

- (iv). Wireless communication by transmission of alert message in the event of a collision along with the time and location co-ordinates through GSM.

Advantages, like low power consumption, small size, direct digital output and simple design compared to traditional ones. The PS (global positioning system) continuously tracks the vehicle's position and keeps record of accurate time. The SD card used was selected keeping in mind newly emerging audio video consumer electronic devices. It can support easy interface allowing a pc to be connected without any special devices making it more portable. Hardware details are the specific microcontroller was chosen due to various advantages. It's a low-power, high-performance 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The on-chip Flash allow the program memory to be reprogrammed in-system or by a conventional non volatile memory programmer. The PIC16F877a controller which provides a highly-flexible and cost-effective solution to our project. Steering wheel grip sensor finds drowsiness of driver. The following block diagram shows vehicle control unit.

(a) ARCHITECTURE OF THE PROPOSED METHOD



#### Alcohol sensor

The alcohol sensor circuit will detect the alcohol depends on human breath and the signal will send data to PIC 16F877A as a controller to other circuits. The result of human breath contains alcohol that has detected from alcohol sensor circuit will display on the LCD 16x2 display. The main purpose of the ignition system circuit is to produce a spark at spark plugs so it can enable or disable vehicle's engine.

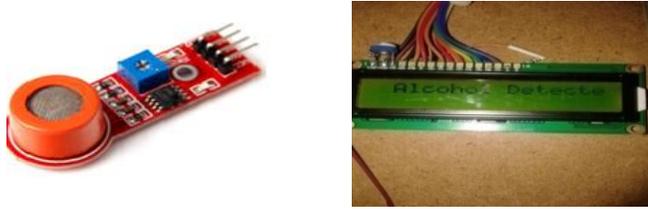


Fig1:Alcohol detection

#### Sonar Sensor

Sonar sensor detected echo is assumed to measure the range to the closest object. Ultrasonic emits high frequency sound pulse at regular intervals that propagate air and velocity of sound. If they strike an object then they reflected back as echo signal to sensor. It computes the distance to the target based on the time between emitting the signal at receiving echo.



Fig 2: Obstacle detection

#### PIC Microcontroller

PIC 16F877A is a 40-pin 8-Bit CMOS FLASH Microcontroller from microchip. The core of architecture is high-performance RISC CPU with only 35 single word instructions. it follows the RISC architecture, all single cycle instruction takes only one instruction cycle except for program branches which take two cycles. 16F877A comes with 3 operating speeds with 4, 8, and 20 MHz clock input. Since each instruction cycle takes four operating clock cycle, each instruction takes 0.2  $\mu$ s when 20MHz oscillator is used.

#### GSM Modem

A GSM modem is a wireless modem that works with a GSM wireless network; wireless modem sends and receives data through radio waves. Modems support a common set of standard at commands. (Reading, writing and deleting SMS messages)

#### Buzzer

A buzzer or beeper is a signaling devices, usually electronic, typically used in automobiles home appliances etc. Operating frequency :  $3.1 \pm 0.5$  kHz Operating voltage: 3 ~ 20VDC Current consumption: 14 ma.

#### GPS Module

The paper presents a small application based on Global Positioning System. It depicts the use of GPS module/receiver to find latitude and longitude of its location. The data obtained from GPS receiver is processed by the microcontroller to extract its latitude and longitude values.

#### Steering Wheel Grip Sensor

A low -cost and simple distributed force sensor that is particularly suitable for measuring grip force and hand position on a steering wheel. The sensor can be used in active safety systems that aim at detecting driver's fatigue, it is a major issue to prevent road accidents.

#### Acceleration Sensor

It measures change the devices acceleration vector in 3 axis. As a sensor of inclination, or tilt, or orientation in 2 or 3 dimension, as references from the acceleration of gravity ( $1 g = 9.8m/s^2$ ); Analog accelerometers output a constant variable voltage depending on the amount of acceleration applied.

#### MEMS Accelerometer

An accelerometer is an electromechanical device that measures acceleration forces. The acceleration measurement had a variety of uses. The sensor can be implemented in the system that detect velocity, or position, shock, vibration, or the acceleration of gravity to determine orientation.

#### Motor Driver

Motor Driver ICs are primarily used in autonomous robotically. Also most microprocessors operate at low voltages and require a small amount of current to operate while the motors require a relatively higher voltage and current. Thus the current cannot be supplied to the motors from the microprocessor.

#### Power Supply

The power supply then pulse the required amount of electricity and converts the AC current to DC current. It regulates the voltage to eliminate spikes and surges common in most electrical systems.

## IV CONCLUSION

. The Location can be found using GPS (Global Positioning System). We hope that the response of the module we have designed will be a great benefit and this module will save the lives of many people. Our system efficiently checks the drunken driving. By implementing this system it is safe for two and four wheeler journey ,which would decrease the number of accidents causing due to drunken driving. Initially, the system checks the condition of the motor and sends an alert message using GSM. System consists of an acceleration sensor which displays the speed of the vehicle. It also indicates obstacles which would reduce the crowd of the vehicles in accident prone areas. In advanced model (Black Box) and detect fatigue symptoms in drivers and to control the speed of vehicle to avoid accidents. Black Box system used to store all the databases .SMS (Short Message Services) will be sent while occurrence of an accident via GSM .The SMS contains details of Speed, Distance, Location).

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