

Alcohol Safety System for Automotives

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Abstract - We usually come across drink and driving cases where drunk drivers crash their cars under the influence of alcohol causing damage to property and life. So here we propose an innovative system to eliminate such cases. Our proposed system would be constantly monitoring the driver breath by placing it on the driver wheel or somewhere, where the driver's breath can be constantly monitored by it. So if a driver is drunk and tries to drive, the system detects alcohol present in his/her breath and locks the engine so that the vehicle fails to start.

In this system we use an Microcontroller interfaced with an Alcohol sensor along with an Buzzer and a DC motor to demonstrate the concept. So here the alcohol sensor is used to monitor user's breath and constantly sends signals to the microcontroller. The microcontroller on encountering high alcohol signal from the alcohol sensor will make the buzzer to beep indicating alcohol being detected.. The GPS will locate the position and GSM will send a message with the location details to a predefined number and also stops the DC motor to demonstrate the locking of engine. New innovative feature of our project is, the owner or supervisor can override the system by an authorized SMS reply when alcohol detects and engine stops.

Keywords— Alcohol Safety System, An Arduino Embedded System, Road Safety, MQ-3 module

1.INTRODUCTION

^[8]Drunk driving is the most serious one of the road killers and the leading cause of fatal traffic accident. "Drink not to drive, drive not to drink", although the words be plausible, but how many people will do it? Drink and drive not only bring road traffic hidden danger to others, but also affects the safety of his own life. In India, every year traffic accident caused by drunk driving up to the tens of thousands, while the accident caused death more than 50% where drunk driving is concerned. In order to protect the safety of people's lives and property, and ensure social stability, taking effective measures to control and eradicate the acts of drunk driving has reached a critical state.

As liquor vends and pub-owners complain of losses as a result of the Supreme Court order banning the serving and sale of alcohol near state and national highways, the question arises: do India's dry states see fewer road

accidents than states in which the sale of alcohol is allowed? Also, the court has said that "drunken driving is a potent source of fatalities and injuries in road accidents." So, do fewer people die in alcohol-related accidents in states where liquor is banned? According to latest data compiled by the National Crime Records Bureau(NCRB), drunk driving was responsible for only 7061- a mere 1.5%- of the 4,64,674 road accidents in India in 2015. Significantly, however, the share of drunk driving accidents was significantly lower than this national average in states that are fully or partially dry.

Aimed at the serious Phenomenon of drunk driving in modern society, ARDUINO microcontroller is used in the system. With alcohol sensor MQ3, the alcohol concentration is detected. Through Arduino, the detected signal is converted into digital signal. According to the digital signal, the car is controlled automatically, can't be driven after driver drinking, thus avoid occurrence of driving.

2.LITERATURE SURVEY

- An Arduino Based Embedded System in Passenger Car for Road Safety (IEEE 2017)

^[1]This paper gives high importance on road safety. It gives us many features like speed control, honking roads on different areas like School zone, Bridge, Accident prone zone etc. It also helps to detect alcohol while driving vehicles. They have made use of arduino microcontroller.

- Drunken Driving and Rash Driving Prevention System (IEEE 2010)

^[6]Lot of accidents occur because of rash driving of drink and drive incidents. This paper gives a full proof system which detects alcohol and notifies police control room about it.

- Control Area Network (CAN) based Intelligent Vehicle System for Driver Assistance using Advanced RISC Machines (ARM) (IEEE 2015)

^[3]This paper refers with great ideas for avoiding road accidents.This system propose to detect alcohol, dizziness, distraction occurred because of cellphones etc. It uses ARM alcohol and eye-blinker sensor, Webcam etc. to meet all their needs for the system.

3.SYSTEM ARCHITECTURE

In this system we use an ARDUINO UNO microcontroller interfaced with MQ3 gas detector which will detect alcohol present and will make the Arduino aware of it. Arduino will signal GPS to get a location, and will make the GSM module send a message to the predefined number with the location as the content. The owner of the car can override the system by The override function is implemented by usinauthorized SMS reply

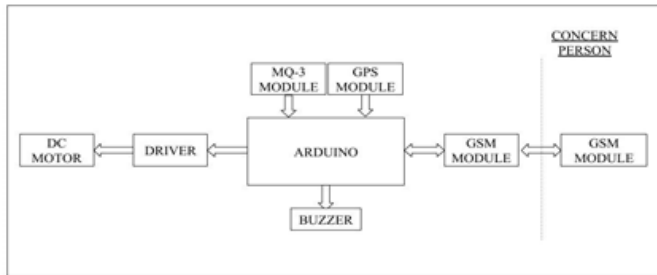


Fig -3.1: System Architecture

3.1 Hardware Components:

Our System Consist of following components:

Arduino UNO: Arduino is an open-source platform used for building projects. It has 14 digital input/output pins and 6 analog inputs. It is an open-source microcontroller which can be easily programmed using USB cable. It can be powered via USB connection or with an external power supply.

MQ-3 Module: MQ-3 alcohol sensor module can be easily interfaced with Microcontrollers, Arduino Boards, etc. This module provides both digital and analog outputs. It has high sensitivity to alcohol and has a good resistance to disturbances due to smoke, vapor and gasoline.

GPS Module: The Global Positioning System (GPS) is a space-based satellite navigation system that provides location and time information in all weather conditions, anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites. This provides assistance of emergency. For tracking and positioning of any vehicle.

GSM Module: Global System for mobile communication (GSM) is used to send a SOS message along with the precise and make calls etc.

Buzzer: Buzzer is an audio signalling device. It is also called as Beeper. Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke.

3.2. Implementation Design:

Use-case Diagram:

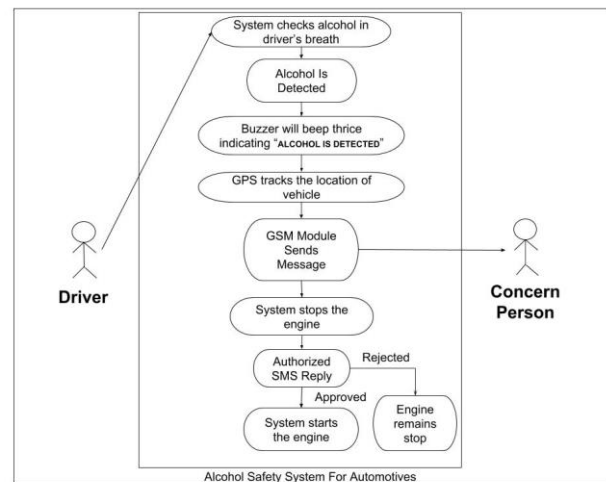


Fig- 3.2: Use-case Diagram

In our system Arduino UNO is the main controlling component to which mq-3 module, GPS, GSM modules, Buzzer, motor driver is connected.

MQ-3 detector sends analog signal to analog input pin of arduino and keeps sending the current signal. GPS tracks the location as and when told my Arduino and then GSM sends a message to a predefined number with the content told by arduino in this case the location gained from GPS. The motor driver drives the motor which is connected to driver which takes power from external battery.

Flow Diagram:

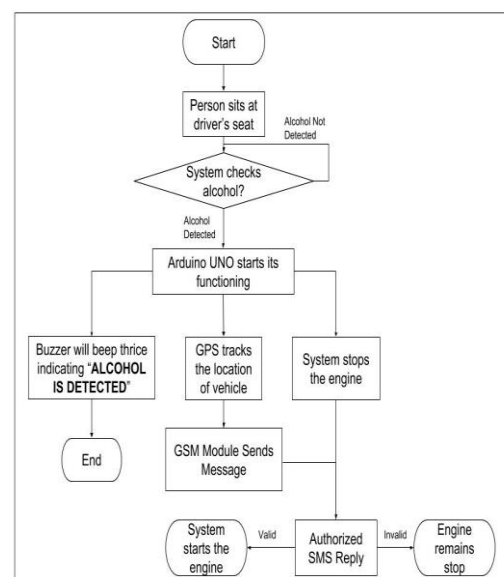


Fig -3.3: Flow diagram

WORKING MODEL

In this system we have used an Arduino Uno microcontroller, MQ-3 as a Alcohol Detector which detects the amount of alcohol consumption by a driver. If it is found in a proportion less than adjusted value, he/she will be able to drive a car or else motor won't start.

This might can happen, driver have not consumed alcohol and then as soon car starts, he consumes alcohol. So we have kept gas detector always on and if it detects alcohol in between it will stop the engine as soon as with sending a sms using GSM module with its, car's location which we will get by using GPS module. Another feature that we have kept is overriding, in case the person seating next to the driver is drunk then the driver can ask the owner for override and the Concern person can send a text "override" to the sim inserted in the GSM module and the motor will start again and the driver can drive the car.

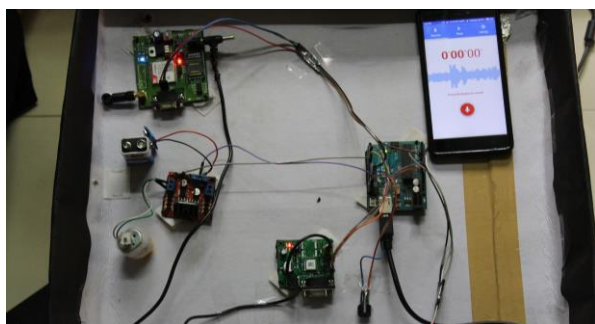


Fig -4.1: Working model

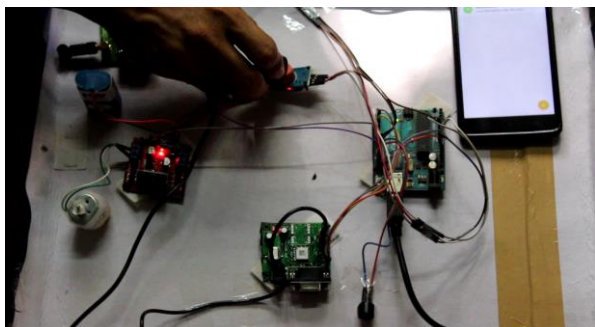


Fig -4.2: Alcohol Detected and Motor stops.

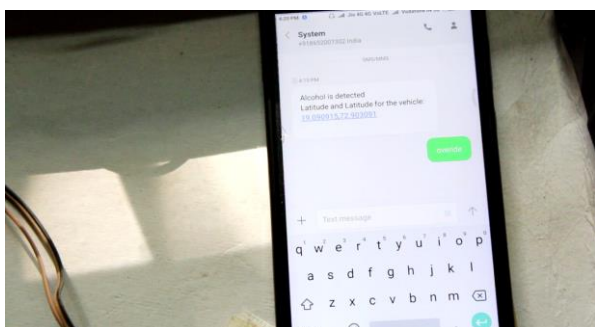


Fig -4.3: Code word "override" sent text to the system.

4. IMPLEMENTATION TEST CASES

Table -4.1: Test Cases

Test Case ID	Test Case	Output	Result
T01	System checks Alcohol in Driver's Breath	Alcohol detected properly	Pass
T02	Alcohol detected is above the defined limit then Buzzer will beep thrice indicating "ALCOHOL DETECTED"	Buzzer beeped three times	Pass
T03	If alcohol detected is below the defined limit Buzzer will not beep"	Buzzer not beeped	Pass
T04	GPS tracks the location of Vehicle and GSM module sends message to the concern person	Location tracked and message sent	Pass
T05	Authorized SMS reply to the system if Approved by the Concern Person then System Starts the Motor.	Text sent successfully and motor started.	Pass
T06	System checks Alcohol in Driver's Breath and if "ALCOHOL IS NOT DETECTED" then engine will start.	Alcohol not detected and engine started	Pass

5. CONCLUSION

Preventing drunk drivers from driving a vehicle is a need for safer roads. This system will help to reduce the amount of accidents occur because of 'drink and drive'. This system can be used even in State Transport service and private transport service. The system cost is affordable. The GPS and GSM will help to know the location of vehicle and notify that to the concerned person. This system consumes very low power and do not affect any other systems. The system do not have much maintenance, if the system hangs, just restarting it will make it work. Or else just low cost will cover it. Collectively, this system will help us to stop 'Drink and Dive' and make transportation safe.

Abbreviations and Acronyms

- DC : Direct Current
- GPS : Global Positioning System
- GSM : Global System for Mobile
- RISC : Reduced Instruction Set Computer
- etc : et cetera
- fig: Figure
- USB : Universal Serial Bus
- TV : Television
- AVR : Alf and Vegard's RISC
- MCU : Multipoint Control Unit
- SMS : Short Message Service

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