

ALCOHOL SENSING AND IGNITION PREVENTION SYSTEM

—

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01

THE PROBLEM

DRUNK DRIVING AND ITS EFFECTS

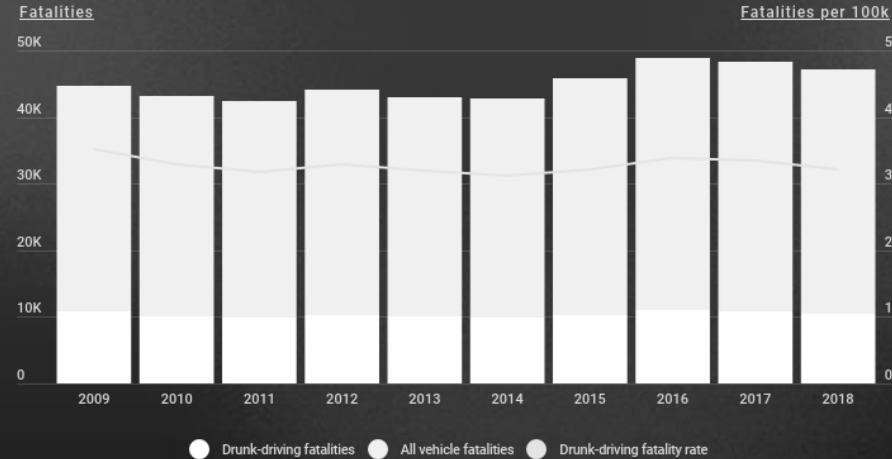


DRUNK DRIVING

According to a report by the Ministry of Road Transport and Highways on road accidents in India, drunken driving is the third major cause of road fatality, with the first being over speeding followed by lane indiscipline¹. In 2019, there were 12,256 accidents related to drunken driving where 5,325 persons were killed, and 10,564 were injured¹.

Drunk driving is a criminal offense under the Motor Vehicle Act 1988 in India. Section 185 of the Act states that any person who is found to have alcohol exceeding 30 mg per 100 ml of blood in their system is breaking the law.

Drunk-driving fatalities have remained relatively stable for the last decade



Source: U.S. Department of Transportation Fatality Analysis Reporting System (FARS)

MAIN REASON OF DRUNK DRIVING RELATED ACCIDENTS

Safe driving requires the ability to concentrate, make good judgements and quickly react to situations

NO AWARENESS

SLOW RESPONSE

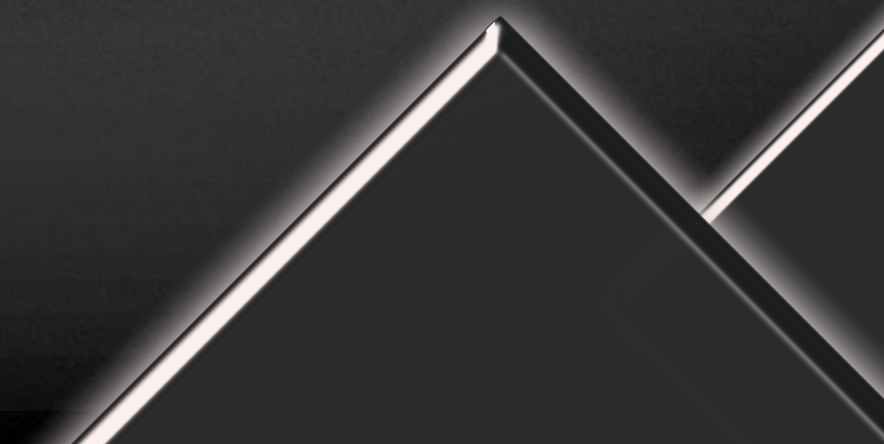
OVER-CONFIDENCE



02

THE IDEA

HOW IT ALL STARTED:



THE SOLUTION TO THE PROBLEM

IF WE OBSERVE CLOSELY THE MAIN ISSUE OR THE DEFECT HERE IS THE DRIVER AND HIS STATE

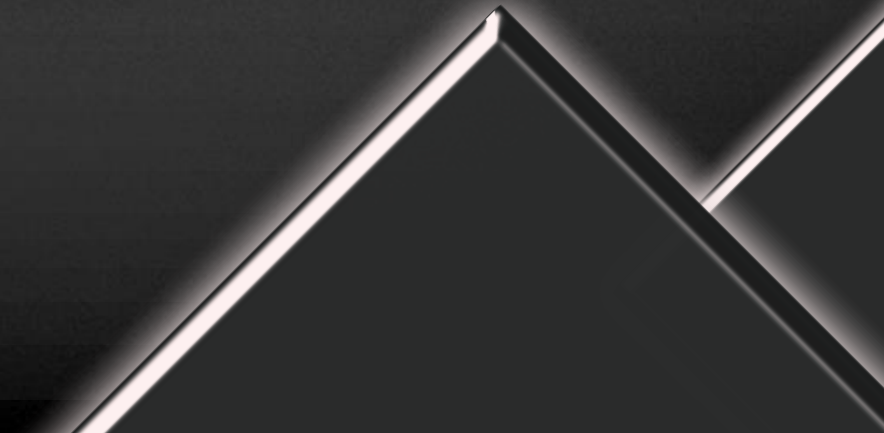
MANY PROGRAMS BY THE LAW ENFORCEMENT AGENCIES ARE ACTIVELY TRYING TO PREVENT DRUNK DRIVING BY IMPOSING FINES BUT THESE ARE IMPLEMENTED AFTER THE DRIVER IS FOUND DRUNK AND THE DAMAGE IS ALREADY DONE SINCE THE DRIVER IS DRIVING IN HIS DRUNK STATE AND POSING AS A THREAT TO OTHER PASSENGERS ON THE ROAD

SO TO PREVENT THIS WE MUST DEVISE A SOLUTION TO STOP A DRUNK PERSON TO DRIVE THE CAR ITSELF

03

THE APPROACH

HOW WE WANT TO SOLVE THIS



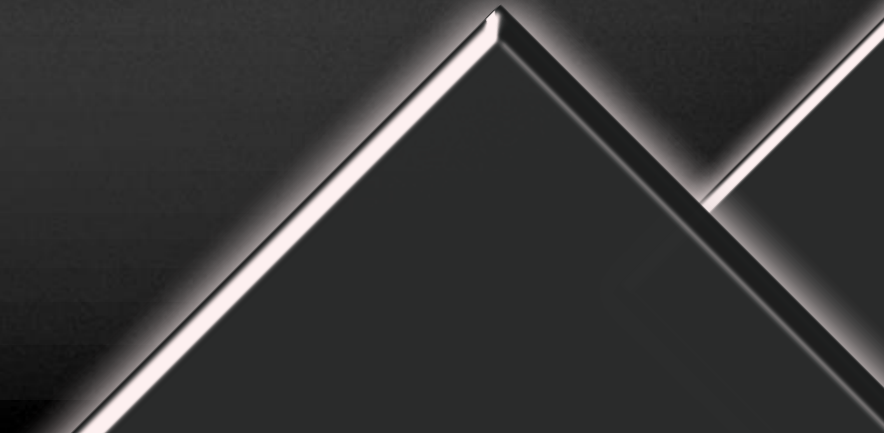
SYSTEM TO DETECT ALCOHOL AND PREVENT VEHICLE IGNITION

- FOCUS ONLY ON THE DRIVER
- FULLY MODULAR
- TAMPER PROOF
- SIMPLE AND EFFECTIVE
- CHEAP TO MANUFACTURE EVEN AT LARGE SCALE

04

THE SYSTEM

OUR ATTEMPT FOR A SOLUTION



THE STAR COMPONENTS

ARDUINO
UNO

MQ-3
SENSOR

BATTERY
KILL SWITCH

THE BRAINS

THIS WHERE THE ENTIRE
OPERATION IS CARRIED
OUT AND CONTINUOUSLY
MONITORS THE
CONDITIONS IN THE CAR
ATMOSPHERE

THE EYES

THIS SENOSOR
CONTINUOUSLY MONITORS
THE ALCOHOL CONTENT
OF THE AIR IN THE
DRIVER SPACE

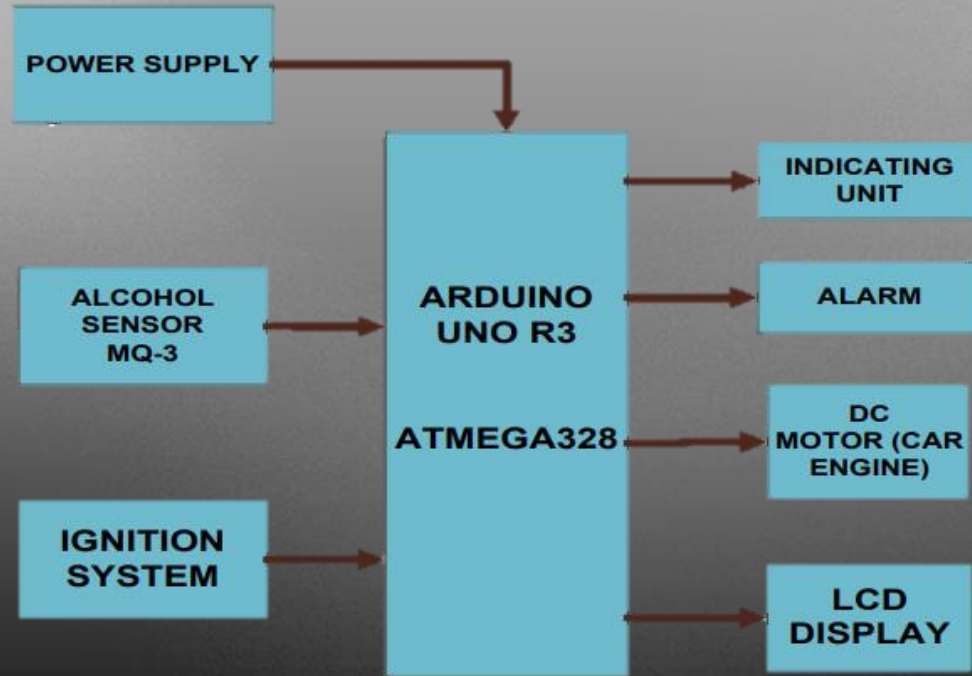
THE HANDS

THIS IS THE SWITCH
WHICH KILLS THE
POWER TO THE IGNITION
PLUG OF THE ENGINE
AND PREVENTS
MOVEMENT OF THE
ENGINE AND IS
CONTROLLED BY THE
ARDUINO BOARD

OTHER ADDITIONS

- 16X2 LCD DISPLAY
- SMOKE SENSOR
- GPS MODULE
- SMS MODULE (GSM)
- ACCELEROMETER MODULE
- IR MODULE

THE SIMPLIFIED REPRESENTATION OF CHAIN OF OPERATION



#1 POWER SUPPLY

OUR DEMO SYSTEM REQUIRES ONLY **5V DC**
TO RUN THE SMART CONTROLLER WHICH
IN REAL APPLICATION CAN BE SOURCED
FROM THE CAR BATTERY TO RUN ALL THE
COMPONENTS

#2 ATMEGA32 MICROCONTROLLER

- The proposed system is built around ATmega328 Arduino Uno microcontroller board. The unit consists of 14 pins which allows inflow and outflow of feeding (it is possible to use 6 of those pins as Pulse Width Modulation signal outputs), 6 continuous signal with time changing quantity, 16 megahertz electronic oscillator, a Universal Serial Bus port, a power connector, an on-board voltage regulator, ICSP header, and a reset button. The ATmega328 has 32 KB flash memory, 2 KB SRAM and 1 KB EEPROM.

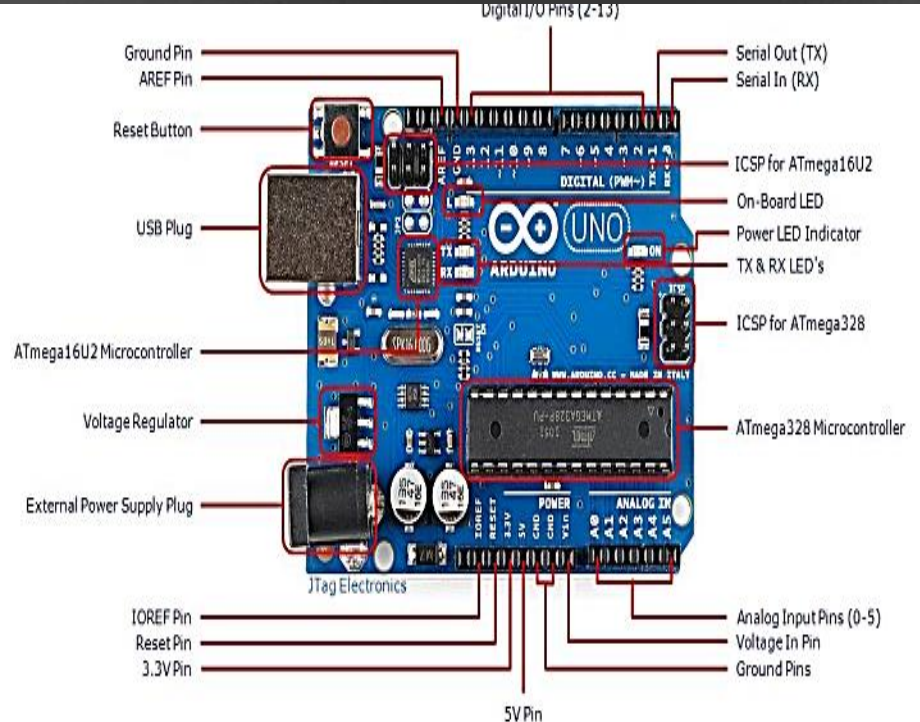


Fig. 2: Arduino Uno ATmega328 microcontroller unit

#3 MQ3 SENSOR

The sensor is made of Tin Dioxide (SnO_2) sensitive layer. The sensor is configured with a high sensitivity to alcohol and small sensitivity to Benzene. It has a simple drive circuit with fast response, stability, and long life. It has an analog interface type.

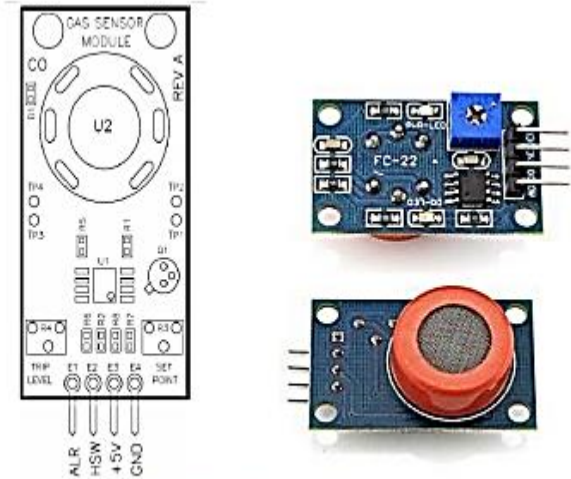
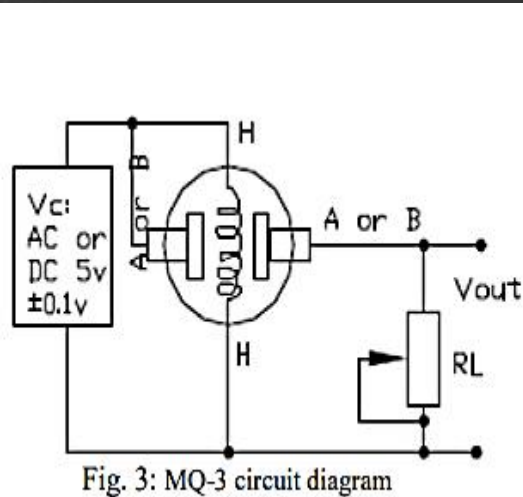


Fig. 4: Simplified circuit diagram of MQ-3 alcohol sensor

#4 ALARM & INDICATING UNIT

The alarm unit used is a buzzer which indicates when alcohol is detected. The buzzer used belongs to the PS series. The PS series are high-performance buzzers that employ Uni-morph piezoelectric elements and are designed for easy incorporation into various circuits. They have very low power consumption in comparison to electromagnetic units. It has a voltage requirement of 2V and is connected to pin 10 of the microcontroller.



LED INDICATOR

BUZZER



#5 DC MOTOR

An electric DC motor is used to demonstrate the concept of engine locking. Here in this work, the DC motor will be connected to pin 9 on the microcontroller, when alcohol is detected the DC motor stops in order to indicate that alcohol is detected and continue running when there is no alcohol detected.



SYSTEM FLOW CHART

The system algorithm comprises of three main steps. First is to boot up the system, next is the measuring state, this stage measure the amount of alcohol level from the drivers. A prescribed set limit will be given as input to the microcontroller, once the alcohol level exceeds the limit the car will not start.

- STEP 1: Power on the system
- STEP 2: checks for alcohol concentration
- STEP 3: if alcohol is detected
- STEP 3.1: turn off car engine
- STEP 4: Else
- STEP 5: Car engine running
- STEP 6: Go to step 1

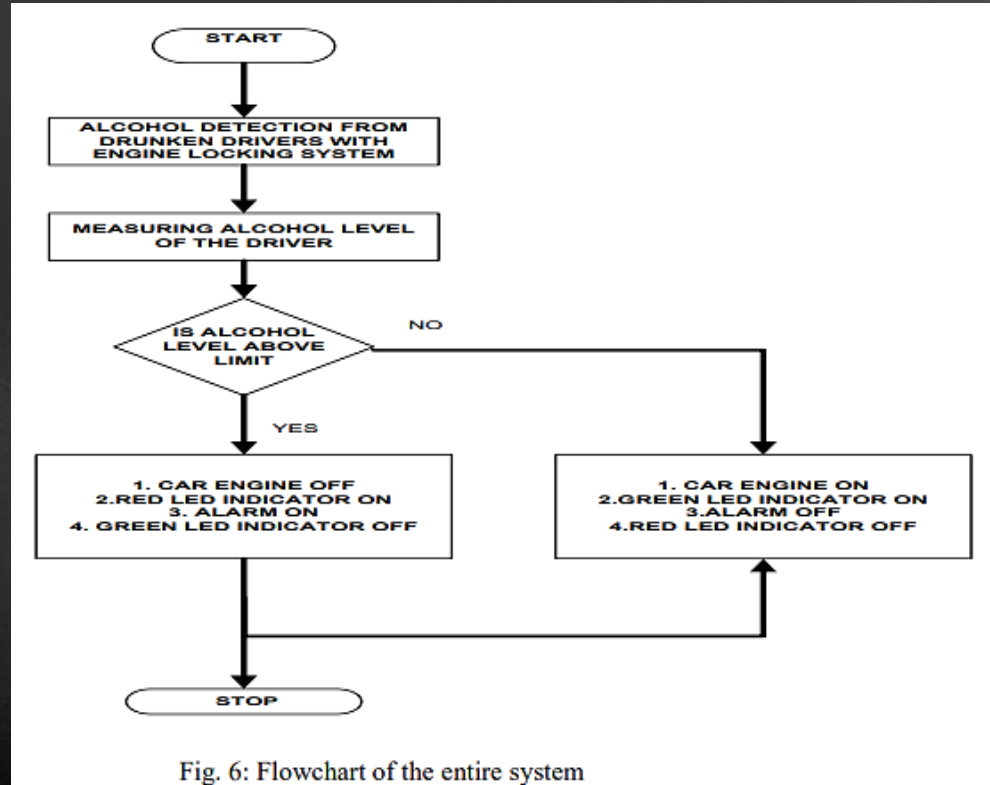


Fig. 6: Flowchart of the entire system

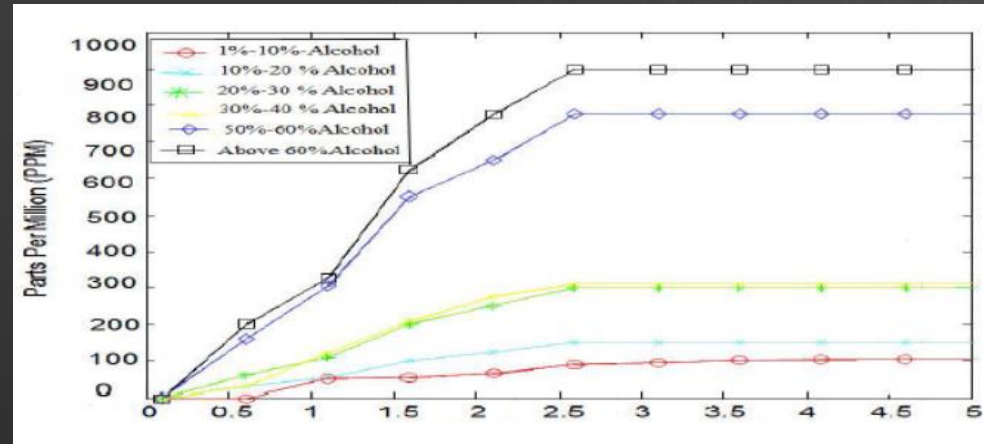
EVALUATION OF THE SYSTEM

LEVEL OF DRUNKNESS			
Voltage Output	200 - 300ppm 1 – 1.5V 20 – 30%	300 – 400ppm 1.5 – 2V 30 – 40%	400 – 500ppm 2– 2.5V 40 – 50%
LCD DISPLAY	INTOXICATED	SLIGHTLY DRUNK	DRUNKENNESS
ALARM	OFF	OFF	ON
IGNITION SYSTEM	ON	ON	OFF
INDICATOR	LED GREEN	LED GREEN	LED RED

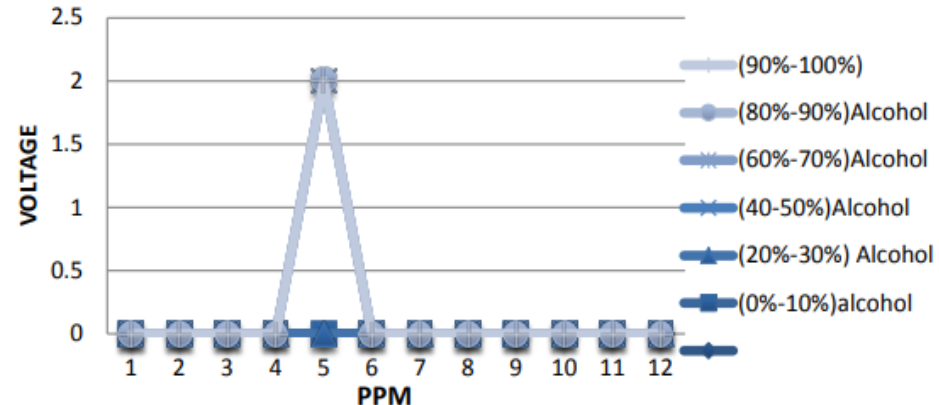
TEST RESULTS

WE HAVE THE FOLLOWING TEST RESULTS TO BASE OUR MODULE OPERATION ON TO DETERMINE THE STATE OF THE TEST SUBJECT AND THE LEVEL OF ALCOHOL IN THE SUBJECT'S BLOOD

WE CAN UTILIZE THIS TO FINE TUNE THE SENSORS OPERATION RANGE BASED ON THE LOCATION OF THE SENSOR IN THE VEHICLE AND THE DISTANCE FROM THE PERSON IN THE VEHICLE



ALCOHOL DETECTION POINT



CONCLUSION

HERE WE PROPOSED A METHOD TO SENSE THE PRESENCE OF ALCOHOL FROM THE BREATH OF THE DRIVERS AND CURTAIL THE CATASTROPHIC EFFECTS IT CAN HAVE ON SOCIETY. THE SYSTEM WAS DESIGNED UTILIZING ARDUINO UNO ATMEGA328 AND MQ-3 SENSOR AND ITS ACCURACY AND ITS ABILITY OF FAST RESPONSE AND SIMPLE OPERATION AND LONG CONTINUOUS OPERATION AS A KEY PART OF THIS PROPOSAL AND THE MODULAR APPROACH OF THE SYSTEM.

THANK YOU!

DO YOU HAVE ANY QUESTIONS?

WE WOULD LIKE TO THANK GITAM UNIVERSITY,
THE HEAD OF THE DEPARTMENT OF ELECTRONICS AND
COMMUNICATION ENGINEERING DR.N MOHAN KUMAR
AND ITS ESTEEMED FACULTY MRS.MANJULA R
FOR BRINGING FORTH THIS PILOT PROGRAM FOR PROVIDING US
THIS OPPURTUNITY TO LEARN AND GAIN VALUBLE REAL WORLD
EXPERIENCE
WE LEARNT ABOUT THE USE OF THE VARIOUS ELECTRONICS WE
LEARN AND THEIR USES IN VARIOUS SITUATIONS

