Vehicle Engine Lock System for Theft and Alcohol Detection

P. Ranjana, Rajeswari Mukesh, Achhint Kumar, N.N.S.S.Sujith, C.H.Sathyasai

ABSTRACT--- Due to the increase in road accidents the death rate is increasing and it is a major concern than one can't imaging. The reason for road accidents are the driver's alcohol consumption. The death rate due to drink and drive is in high in rate due to this especially in countries like India. So a system is proposed to detect the alcohol content level of the driver. The proposed work explores the possibility to detect alcohol at very first using technology. The alcohol content of the driver is detected using the MQ3 sensors embedded in the steering of the vehicle. The breath of the driver is sensed through this sensor and the alcohol content is the blood is analyzed. The driver cannot start the car if the alcohol content is above the threshold value. The added features to this system is the alcohol sensors sense only the person sitting in the driver's seat and will not take into account of the fellow passenger. It is also used to track the theft of the vehicle if there using the figure print recognition technique. This is done by measures of the sensors connected to the NodeMCU Arduino micro controller where it is programmed to give a buzzer sound when the driver is drunk or theft to the vehicle. So the driver with alcohol consumption is identified with more accuracy and theft of vehicle can be identified .

Keywords—Actuators, Embedded, Sensors, Vehicle, Micro controller, Program.

I. INTRODUCTION

One major reason of deaths on Indian roads is accidents due to drunken driving. This happens because of drunk people being able to take control of vehicle even after being drunk. This problem can be solved by designing a system which automatically switches off the vehicle's engine whenever alcohol of certain quantity is detected in the driver's breath. As soon as the presence of alcohol is detected, the micro controller stops the engine of the vehicle and a siren is blown to alert nearby people to convey that something is wrong with the vehicle and a message "Alcohol Detected" is flashed on the LCD screen which is installed in the system, so that nearby people can interpret gravity of the situation and inform the concerned authorities to avoid any kind of incident.

II. DRIVER'S BEHAVIOUR

A. Normal behaviour:

The driver behavior is normal when he drives without any mistake normally. If the driver is drunk his behavior will change in terms of driving style like speed, breaks etc.,

B. Drunk behaviour:

If a person is drunk his behavior will change. Some of the behaviors changes for the drivers driving the vehicles. If the driver is drunk they become fatigue and reckless and they do some abnormal activities like apply sudden break, giving high acceleration and not able to control the speed of the vehicle.

III. REVIEW OF LITERATURE

There are many works carried out on the drivers drowsiness detected. A large number of road accidents takes place due to the fatigue of drivers due to alcohol consumption. An embedded system with UNO and open CV is developed. Where the Alcoholic drivers are detected in real time using the drivers drowsiness and intoxication, since large number of road accidents takes place due to alcohol drinking . In the a computer vision concept is used which has an alcohol gas sensors combined with the Raspberry pi micro-controller and embedded systems[1]

An ARM based face recognition system is developed with open CV library using the ARM based micro-controller and USB camera to detect continuous image . The image captured is compared with the existing database and the output is sent to the GPS and sent the information regarding the person to the authorises incharge using GSM [2]The drivers vigilance level is monitored and alerts the driver for about the abnormal driving. It also detects the drivers drowsiness based on the Viola jones algorithm by analysing the the faces and eyes. The algorithm is embedded in Raspberry Pi and integrated with the video camera and Computer vision open library [3].The eye ball movement are tacked using the camera and that is taken as the input. The face recognition steps uses the face detected and select the area of analysis using the pixel of each coordinate. The number of white of pixels are compared with the between the coordinates for recognition. From this recognition it identity the drivers fatigue[4].Raspberry pi is used in unmanned aerial vehicles used for disaster areas. The done are used in anomaly detection in atmosphere temperature. Thee drones are provided with the ability to land if the temperature is beyond the threshold value. The temperature is measured using the monitor attached to it [[5].The

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intentional accidents has become more in recent years due to the development of new in-vehicle technology. The drivers scenario like eye blink are collected and drivers were dictated on how to drive through their mobile phones. It analyses the behaviour of the driver and classifies it and avoids the accidents through the metric obtained. [6].An ardunio based embedded system is designed for a more safe and secure journey . They used a vehicle based control in the school zone and controls the speed of the vehicle in brides, hospital areas and many other important areas [7]. Though there are many works carried out they concentre only on a specific feature and the accuracy level should be improved.

IV. PROBLEM IDENTIFICATION

The manual detection device that cops use, do analyze the breath and detect the alcohol consumption and penalize the defaulting drivers but then it becomes increasingly impossible for the traffic-cops to control, measure and monitor the vehicle movement given the size of modern-day traffic. It therefore becomes imperative for government-authorities to take advantage of the growing-technology to prevent such accidents and possibly prevent drunken-driving. The theft of the vehicle is also a major concern today, so if any theft happing in the vehicle should be notified to the police or the vehicle owener.

V. HARDWARE AND SOFTWARE DESCRIPTION

A. *Hardware description*

The breath of the drivers is sent as a input to the sensor. The sensors are placed on the steering of the driver. The alcohol content in the blood is captured through the driver's breath. The sensors are attached to the micro controller where it is programmed to get the data through the sensors. It analyzed the data based on that it decides if the person has consumed alcohol or not. Thus it minimizes the loss by saving life and property of a person.

The theft in the vehicle is detected by scanning the users figure print and comparing with the owners figure print and also the jerk from the vibration movement that happens in the vehicle if any un known person tries to enters the vehicle. The components used to build this product are

- Indicating light – This a LED which will indicated if the driver has consumed alcohol or not
- Alarm – This is a buzzer sound which comes when alcohol is detected in the driver.
- Engine lock: This unit consists of a DC motor. The DC motor will stop working if the alcohol content is more than the threshold and the driver cannot start the vehicle.
- Alcohol checking: This is used to check the breath of the driver and locks the engine if the driver is drunk. The micro-controller only locks if the alcohol content.

The advantages of the proposed system are

- Safe driving
- Prevents traffic chaos
- Compact size
- Reduces in accident number
- Apt devices for police

The devise is made of an Arduino programmed on a circuit board. The board has a micro controller that can sense and control the objects like the components LEDs, sensors etc. In this work the micro controller used is NodeMCU. It is a open source software and hardware environment build on a chip. The Features of NodeMCU ESP8266 are On board Antenna, Operating voltages: 3-3.6V, 10-digit Analog-Digital converter etc. MQ3 Alcohol sensor is used as a breath analyzer by cops to detect the alcohol content in the blood of drivers. The alcohol detection gas sensor used here too is MQ3 which is suitable for detecting if a person has consumed alcohol or not. As and when it detects the presence of alcohol in air, the sensor conductivity increases, generating the output for MQ3. Its sensitivity towards benzene, gasoline, smoke and vapor is less while that toward the alcohol is very high. Ultra sonic distance sensor which can emit the ultrasound up to 40,000 HZ and detects the obstacle on its path. It has the accuracy of 0.3cm.. Servo motor is a rotatory actuator used to control the linear position, velocity and acceleration of the vehicle..

B. *Software Description*

The software is necessary for the hardware to work properly and to get the expected output.

A software module is necessary for hardware setup. The hardware is programmed using the embedded C code. The code written in text editor and saved with the extension .ion for execution.

VI. SYSTEM ARCHITECTURE

The main components in this system is the alcohol sensor which is placed inside the vehicle. Sensors gives signal to the comparator. The comparator is connected to the micro controller. It gives signal to alert the buzzer. The components used in this system are represented in figure1 which consists of LCD, Buzzer, GPS Module, GSM Module, Breadboard, Arduino UNO, Power Supply, Jumper Wires, Micro controller, Petrol Level Sensor, Red & Green LED, Vibration Sensor Module, Alcohol Detector Module, Ultrasonic Distance Sensor. The hardware components are integrated in the Micro controller NodeMCI SEP 8266.

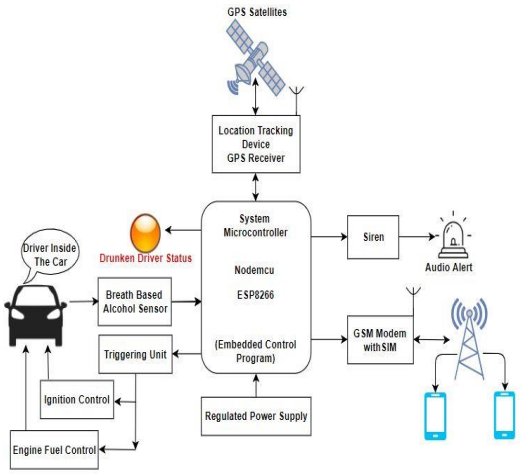

Figure 1: Alcohol Detection and Theft Detection

The GSM and GPS modem will track the location of the vehicle with it latitude and longitude and informs the drivers relative during accidents and to the police if they are drunken.

Location tracking device (GPS): For tracking the location of the drunk driver for remote communication, satellite-based GPS (global positioning system) receiver module, with antenna is used. GPS module used in the system uses civilian GPS signal to provide location accuracy of 30-50 m within 5 minutes or less. the aim of the active tracker is to induce the real-time location data of vehicle with drunk driver and transmit the same to the client mobile using GSM modem hooked up to controller.

GSM Modem**:** GSM electronic equipment (modulator-demodulator), SIM, is a very important part of the system that facilitates remote communication of 'SMS alerts' with location and vehicle number of drunk driver to the mobile phones of authorized persons (police station and/or family members). Primarily based upon the traditional} digital cellular network standard, referred to as global System for Mobile Communication (GSM)/2G network, the modem supports short message services (SMS) or 'text' electronic messaging to mobile phones. It uses the standard SIM (subscriber identification module.) card inserted into its slot provided by the cellular network service provider to communicate over the network and 'AT commands' for communication with micro controller using serial interface. The 'AT' commands are executed on hyper terminal or serial terminal software like Arduino IDE for message communication in textual type on explicit movable number/s from GSM modem and provides a convenient way to use mobile communication functions in an application.

Fuel supply Blocker: When alcohol is detected while driving then rather than stop mechanism directly while driving state, signal is passed to fuel blocker and fuel supply is cut-off. This leads to fuel supply cut-off to the engine. so, the engine stops operating or doesn't begin depending on the position of the vehicle.

Figure 2 shows the operational flow process. If the driver puts the key the key ignite the engine if the AQ3 sensor detects the alcohol level through the inhale and exhale of drivers. If the driver drunks while driving the engine slows down and stops the car and the location of the driver is notified to the higher authorities.

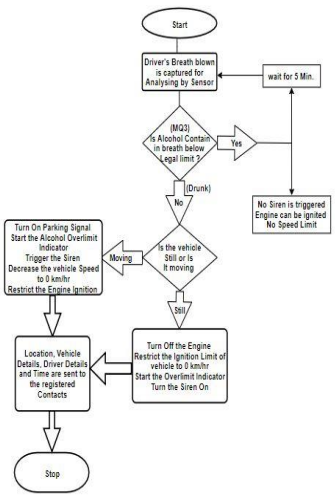

Figure 2: Operational Flow Diagram

TABLE 2: Sensitivity level Characteristics

Voltages (V)	Ppm (Part Per Million)	Percentage (%)
0	0	0
0.5	100	10
1	200	20
1.5	300	30
2	400	40
2.5	500	50
3	600	60
3.5	700	70
4	800	80
4.5	900	90
5	1000	20

TABLE 2:Level of drunkenness

Output	0 - 200ppm 0 – 1V 0 – 20%	200 – 400ppm 1 – 2V 21% – 40%	400 – 500ppm 2 – 3V 41% – 60%	500 - 1000ppm 3 – 5V 61%-99%
Serial Monitor	Intoxicated	Slightly Drunk	Drunkenness	Over limit drunk
Alarm	Enable	Enable	Enable	Disable
Ignition System	On	On	On*	Off
Indicator	Led Green On Led Red Off	Led Green On Led Red Off	Led Green Off Led Red On	Led Green Off Led Red On

Before using the sensor the sensitivity adjustment is done to make sensor to for more accuracy. The threshold value 0.8/l is considered.

VII. SYSTEM IMPLEMENTATION & RESULTS

The system is integrated with the hardware and the algorithm is programmed using embedded C. The algorithm will detect the theft of the vehicle by scanning the figure print . The algorithm for anti theft system is given below

Algorithm for Anti-theft system:

1. *Inset the Key mechanically*
2. *Place of thumb on the fingerprint scanner.*
3. *System scans the finger and verify with the already registered one.*
4. *User can register as many numbers of fingers he desires.*
5. *After verification engine ignition will active automatically.*
6. *if the finger is invalid then automatically a SMS is sent to the registered mobile number.*
7. If the vehicle has parked then system will monitor the body of the vehicle for any vibration.
8. if vibration found then system will send the SMS to the owner and the driver.
9. Even if the vehicle comes in motion in the parking mode, SMS will be delivered.

Making use of the anti theft system the theft of the vehicle is detected based on the figure print scanning and also the vibration of the vehicle. If no theft is detected the system detects the alcohol consumed by the user using the algorithm of alcohol detector as mentioned below:

Algorithm for Alcohol Detector System:

1. *Starting vehicle by driver.*
2. *Check speed of car.*
3. *If it is zero then start sensing by various sensor and notify detection. In this case alcohol is consumed by driver if it detected then stop ignition.*
4. *If speed is greater than 2 kmph then again sensing started. Detection of various parameter will be sense by sensor and notified.*
5. *At a same time if alcohol is detected then fuel supply will be blocked.*
6. *Vehicle will stopped and notify detection to relative and police station.*

The system implementation is shown by a simple visual representation of the wiring done in a step by step manner.

Step 1: Initiated with Ultrasonic Sensor

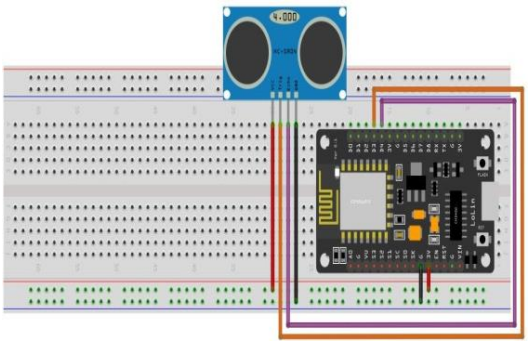

Figure 3:Initiated with Ultrasonic Sensor

Initially, Only Ultrasonic Distance sensor will be communicating with the NodeMCU. If the distance between the driver and the steering will be less than 25cm than only the further process will be initiated else the further process won't be initiated until than it keeps on checking whether someone is near the steering or not.

Step 2: MQ3 sensor is added:

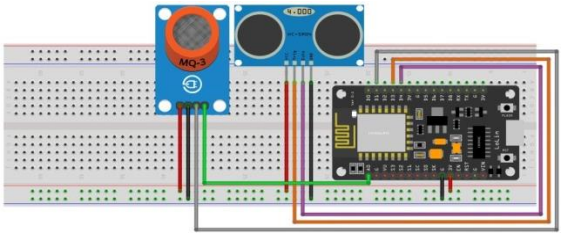

Figure 4: Adding MQ3 sensor

If the driver is at the steering, then the Alcohol sensor will get activated and started measuring concentration of alcohol in the drivers breathe. If the amount of alcohol is not determined in the drivers breathe than the process will be on going as it is.

Step 3: Buzzer and LED's are added:

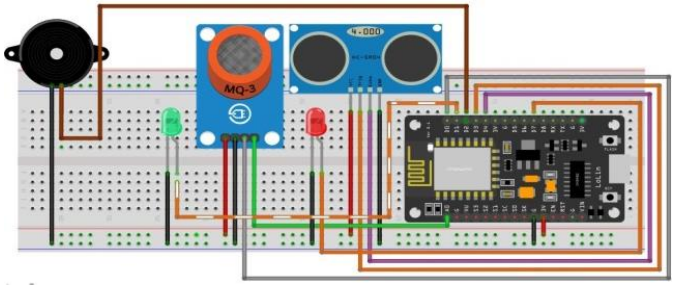

Figure 5: Adding Buzzer and LED's

Till then the alcohol is not determined, the green led will be activate. If the alcohol is determined in the drivers breathe than Green will be OFF and Red led will be active including Buzzer. The led will represent the status of the driver whether he is drunk or not and the buzzer will alert the nearby people when the driver is in drunk state.

Step 4: Motor added to the circuit:

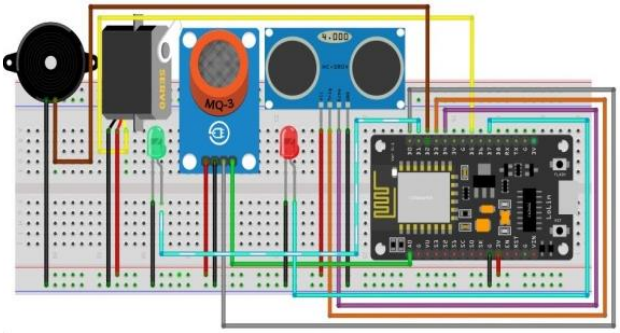

Figure 6: Adding Motor to the circuit

Here Servo motor is representing the Vehicle's Engine. Finally, Until and unless the alcohol is not detected the vehicle will be running smoothly and the green led glowing represents safe condition of nearby people. If the Driver is found drunken, in order to alert the local persons/vehicles about the drunk driver on road, Buzzer that makes typical loud noisy warning sound and also the red led will be activated. The Vehicle Engine will be set to certain speed limit for certain interval so that the driver can park the vehicle at the road side. After than vehicle ignition value will become zero until than it is safe to drive. The above components are integrated and the software is programmed with the hardware. The system after integrating is shown in figure 7.

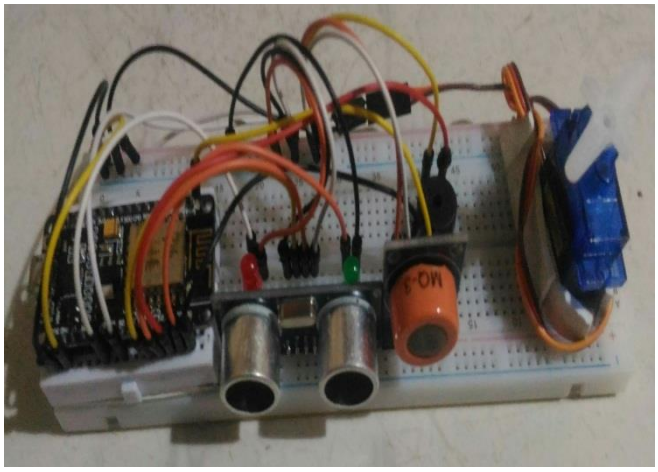

Figure 7: Hardware setup

The system integration in the vehicle is visualized as shown in Figure 8. The position of the alcohol detecting sensor is represented as a blue circle.

Figure 8: Location of sensor visualization

Since, the MQ-3 alcohol sensor is expected to detect alcohol level of the driver alone and not that of the fellow passengers in the motor-vehicle, it is important to embed the device at that position that is at the top of the steering wheel. This will ensure that the device work efficiently and effectively.

VIII. CONCLUSION AND FUTURE ENHANCEMENT

The system proposed accurately identify the drunken person through the sensors and stops the vehicle. It also identifies the theft happening in the vehicle. It has the advantage of detecting only the driver and also even if the driver attempts to close the sensor by a cloth it triggers an action by stopping the car. The system is able to detect the alcohol in any temperature even if the window of the vehicle is open of closed also detects any unknown user entering inside the vehicle. Every system is subject to certain limitations and inherent errors, the MQ3 based system for detecting alcohol content in blood too is subject to failure and system crash. If the driver wear the mask cannot be sensed accurately. This work can be further extended by using the tough sensors based on the drivers figure tough on the steering.

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