AUTOMATIC ENGINE LOCKING SYSTEM THROUGH ALCOHOL DETECTION

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ABSTRACT

The GPS tracker and alcohol detector with an engine locking system using GSM technology is a project that focuses on promoting road safety and preventing accidents caused by drunk and driving. The project utilizes an ATmega328 microcontroller as the core processing unit, integrating various components to form a cohesive system. The system includes an MQ-3 sensor responsible for detecting alcohol levels in the driver's breath, ensuring accurate and reliable results. In the event of detecting alcohol above a predefined threshold, the system triggers a series of actions. First, the GPS module pinpoints the exact location of the vehicle, providing crucial information for prompt response.

Simultaneously, an SMS is sent to authorized authority members, alerting them about the situation and sharing the vehicle's GPS coordinates. This enables swift intervention and appropriate action to be taken. To further prevent the intoxicated driver from continuing to operate the vehicle, an engine locking mechanism is employed. A relay is utilized to immobilize the engine, rendering it inoperable until the situation is resolved. Additionally, an audible warning is sounded through a buzzer to alert and sent a SMS to the authorities. The LCD display is incorporated to provide real-time information, displaying essential parameters such as alcohol concentration, vehicle location, and system status. This visual feedback assists the authorities in understanding the situation and facilitates

efficient decision-making. By combining these components, the GPS tracker and alcohol detector system with an engine locking mechanism offers a comprehensive solution to combat drunk and driving. Its ability to detect alcohol levels, communicate with authorities, immobilize the engine, and provide location information helps ensure the safety of individuals on the road and reduces the risks associated with alcohol-impaired driving.

1.INTRODUCTION

The current scenario shows that the most of the road accidents are occurring due to drunkdriving. The drivers who drink alcohol are not in an stable condition and so, rash driving occurs on highway which can be risky to the lives of the people on road, the driver inclusive. The enormity of the dangerous driving transcends boundary. The laws in India are currently prohibiting drivers to drink and drive so that the fine can stop them to drink and drive. Whatsoever, effective observation of inebriated drivers could be a challenge to the policemen and road safety officers, the rationale for this stems from the natural inability of citizenry to be present additionally as state among identical house and time.

This restricted ability of enforcement agents undermines each manual effort geared toward edge drink-driving. There is therefore the need for an alcohol detection system that can function without the restriction of space and time. The Indian Ministry of Statistics reported thousands of road accidents in 2016. Though the report declared speed violation is the foremost reason for these accidents, it will safely be inferred that almost all of the cases are because of drivers unstable condition caused by drivers becoming drunk before they drive. The investigation done by the Planet Health Organization in 2008 shows that concerning 50%-60% of traffic accidents square measure associated with drink-driving. Moreover, WHO information on road traffic deaths disclosed. million traffic deaths were recorded globally in 2013 with the low- and middle-income countries having higher fatality rates per a 100K population (24.1% and 18.4% respectively), information collected showed that several of economic vehicles drivers in Bharat admitted to drinking alcohol throughout operating days.

This shows that almost all drivers, particularly business and serious duty trucks drivers interact in drink- driving, which may result in accident. Bharat sets a legal limit of

30mg/100mL blood alcohol concentration (BAC), any level higher than that's same to be ineligible. The BAC depicts the amount of alcohol in an exceedingly sure volume of blood. It's measured as either grams of alcohol per metric capacity unit of blood or milliliters of blood, (mg/ml, utilized in a lot of Europe). For BAC level from 0.4 to 0.6. drivers feel dazed/confused or otherwise disoriented, and it's typically not safe for a driver to drive a vehicle beneath such condition. Also, BAC level for 0.7 to 0.8 makes a drivers mental, physical and sensory functions to be severely impaired. At this stage, a driver is inactive and incapable of driving. BAC level of 0.2 to 0.3 continues to be not safe however the motive force still. So, there is need of such system which can reduce the number of road accidents caused due to drunk driving.
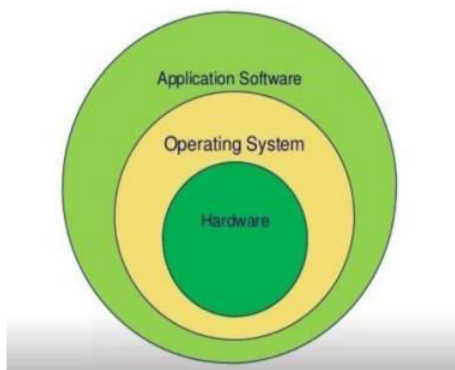

FIG.1.1Overview of embedded system architecture

Now, let us see the details of the various building blocks of the hardware of an embedded system. As shown in Fig. the building blocks are;
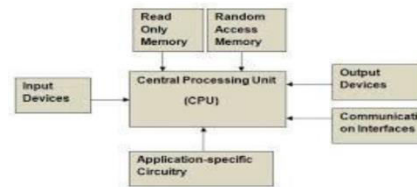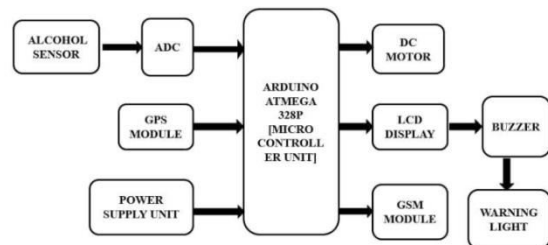

FIG.1.2 Various building blocks of hardware of an embedded system ·

2. BLOCK DIAGRAM

The block diagram of the proposed system is shown in figure .It consists of power supply section, MQ-3 alcohol sensor, DC motor, LCD, microcontroller, alarm and LEDs. The various units were designed and tested separately. The detected analog voltage values are read by the microcontroller; the Arduino Uno board contains 8 channels, 10-bit device that changes an analog voltage on a pin to a digital number. The system will link input voltages from 0-5V with values from 0-1023V to generate 5Vs for every

1024 units. The system will process the analog signal and convert it to digital value of 0 or 1. Also, the analog values from the alcohol sensor will be scaled to percentage, and this percentage is equivalent to the analog voltage values in ppm (part per million). The first condition is the intoxication stage; the second condition is the slightly drunk stage and the last stage is drunkenness stage. Each stage will be a condition to perform a task based on the level of alcohol. In the intoxication stage, the LED indicator will be activated only, the alarm will be OFF and the car engine will be ON. In stage two, the alarm and the green LED indicator will be ON, as well as the car engine. Finally, the driver is mentally and physically inactive in stage three, so the engine will be OFF while the alarm and red LED will be ON. Therefore, once the system detect alcohol in stage three the car will be stoped and we can track location of the vehicle .

3.DESCRIPTION OF COMPONENTS

3.1 POWER SUPPLY

The input to the circuit is applied from the regulated power supply. The a.c. input i.e., 230V from the mains supply is step down by the transformer to 12V and is fed to a rectifier. The output obtained from the rectifier is a pulsating d.c voltage. So in order to get a pure d.c voltage, the output voltage from the rectifier is fed to a filter to remove any a.c components present even after rectification. Now, this voltage is given to a voltage regulator to obtain a pure constant dc voltage.
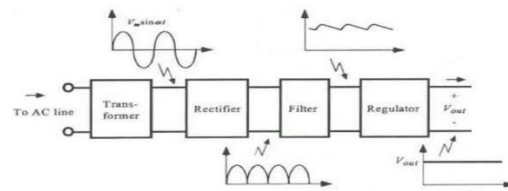
3.1 Block Diagram of Power supply

3.3 BUZZER

3.3.1 GENERAL DESCRIPTION

A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers and confirmation of user input such as a mouse click or key stroke. Buzzer is an integrated structure of electronic transducers, DC power supply, widely used in computers, printers, copiers, alarms, electronic toys, automotive electronic equipment, telephones, timers and other electronic products for sound devices. Active buzzer 5V Rated power can be

directly connected to a continuous sound, this section dedicated sensor expansion module and the board in combination, can complete a simple circuit design, to "plug and play."

Fig 3.4 Buzzer

3.4 TRANSFORMER

A transformer is a device that transfers electrical energy from one circuit to another through inductively coupled electrical conductors. A changing current in the first circuit (the primary) creates a changing magnetic field; in turn, this magnetic field induces a changing voltage in the second circuit (the secondary). By adding a load to the secondary circuit, one can make current flow in the transformer, thus transferring energy from one circuit to the other.

The secondary induced voltage V_S, of an ideal transformer, is scaled from the primary V_P by a factor equal to the ratio of the number of turns of wire in their respective windings:

$$\frac{V_S}{V_P} = \frac{N_S}{N_P}$$

3.5 BRIDGE RECTIFIER

A diode bridge or bridge rectifier is an arrangement of four diodes in a bridge configuration that provides the same polarity of output voltage for any polarity of input voltage. When used in its most common application, for conversion of alternating current (AC) input into direct current (DC) output, it is known as a bridge rectifier. A bridge rectifier provides full-wave rectification from a two-wire AC input, resulting in lower cost and weight as compared to a center-tapped transformer design, but has two diode drops rather than one, thus exhibiting reduced efficiency over a center-tapped design for the same output voltage.

3.5.1 BASIC OPERATION

When the input connected at the left corner of the diamond is positive with respect to the one connected at the right hand corner, current flows to the right along the upper colored path to the output, and returns to the input supply via the lower one.
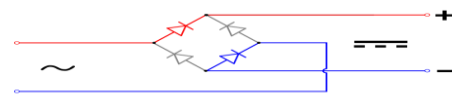
When the right hand corner is positive relative to the left hand corner, current flows along the upper colored path and returns to the supply via the lower colored path.
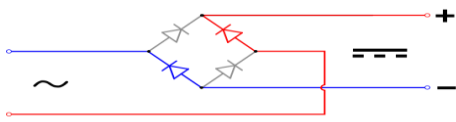
3.6Arduino UNO And Controller Microcontroller:

3.6.1 Introduction:

Microcontroller as the name suggest, a small controller. They are like single chip computers that are often embedded into other systems to function as processing/controlling unit. For example, the control you are using probably has microcontrollers inside that do decoding andother controlling functions. They are also used in automobiles, washing machines, microwaves ovens, toys….etc, where automation is needed.

Arduino Uno Microcontroller:

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digitalinput/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller;

simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

ARDUINO UNO BOARD:

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3.7 LIGHT EMITTING DIODE(LED):

LED is abbreviation of Light Emitting Diode. It's nothing, but just a combination of semiconductors which emits light when current pass through it . Over the years, semiconductor technology has advanced to bigger heights, Light Emitting Devices have also been a part of this revolution and as a result, Now we have LED's which give better illumination with low power consumption.
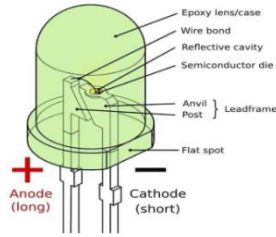
3.8 LIQUID CRYSTAL DISPLAY(LCD):

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data.
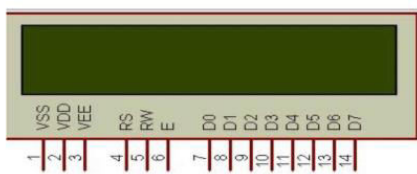

3.9 GSM MODULE :

GSM (Global System for Mobile Communications, originally Groupe Spécial Mobile), is a standard developed by the European Telecommunications Standards Institute (ETSI). It was created to describe the protocols for second-generation (2G) digital cellular networks used by mobile phones and is now the default global standard for mobile communications – with over 90% market share, operating in over 219 countries and territories. These module consist of a GSM module powered by a power supply circuit and communication interfaces (like RS-232, USB 2.0, and others) for computers. A GSM modem can be a dedicated modem device with a serial, USB, or Bluetooth connection, or it can be a mobile phone that provides GSM modem capabilities.

3.10 GPS MODULE: The GPS module is a wireless chip module combined on the main board of a mobile phone or machine. It can communicate with the global satellite positioning system in the United States. It can locate and navigate according to the condition of a wireless network signal. Many mobile phones have Equipment with a GPS module can communicate with GPS synchronous satellites for free at any time and area. The first point is that the GPS

navigation function needs two cooperation to complete, namely the GPS module and the GPS map, and the use of the GPS map generally incurs a certain fee, except for the map that is originally equipped in the mobile phone, if it is a cracked version of the map , then you don't need to spend any money.
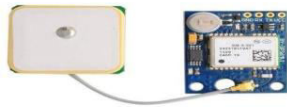
4. WORKING PRINCIPLE

The system continuously monitors the surrounding air using the MQ sensor for alcohol detection. The sensor measures the concentration of alcohol vapours in the air and provides an output signal based on the detected levels. The system compares the output signal from the MQ sensor with a predefined threshold value. If the alcohol concentration exceeds the threshold, it indicates that the driver is under the influence of alcohol. When the alcohol concentration exceeds the threshold, the system triggers the engine locking mechanism. This is achieved by activating a relay, which cuts off the ignition or fuel supply to the vehicle's engine. As a result, the engine becomes immobilized, preventing the vehicle from starting or running. The system incorporates a GPS module that

receives signals from GPS satellites. By analyzing these signals, the module determines the precise latitude and longitude coordinates of the vehicle. This information is used for real-time tracking of the vehicle's location. Simultaneously, the system sends an SMS alert to pre-configured authority members, such as law enforcement or vehicle owners. The SMS contains information about the detected alcohol concentration as well as the GPS coordinates of the vehicle. This ensures that the relevant authorities are immediately notified of the situation. To draw the driver's attention to the high alcohol levels, the system activates a buzzer, which emits a loud and distinct sound. This alerts the driver to the presence of alcohol and serves as a warning. Additionally, the system displays relevant parameters, such as alcohol concentration, GPS coordinates, system status, and any error messages, on an LCD screen. Once the alcohol concentration falls below the predefined threshold, the system allows the engine to be started or resumed. The engine locking mechanism is reset, and the system continues monitoring for any changes in alcohol levels.

5. RESULT

As the system is designed with the help of sensor the input is identified by the breath of the driver and it is measured by the sensor and compare with the limits of the consumption. if it crosses a threshold limit, automatic lock on vehicle and stops if the vehicle is running. If the alcohol concentration falls below the predefined threshold, the system allows the engine to be started. the engine locking mechanism is reset and the system continues monitoring for any changes alcohol level.
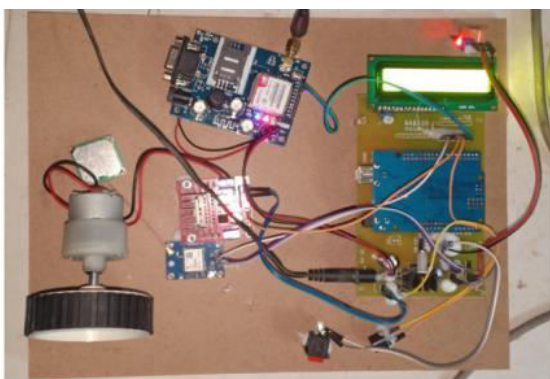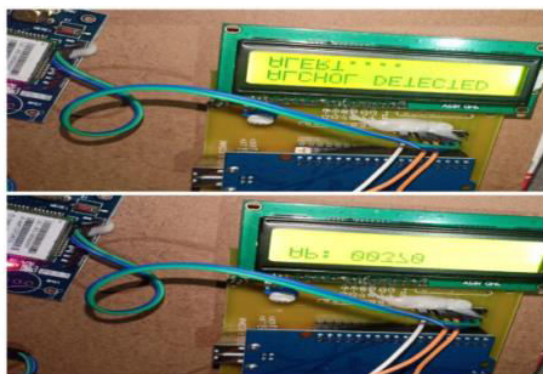

FIG 5.1 Off State of system
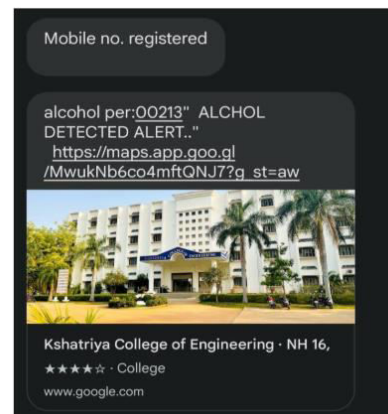

FIG 5.2 ON State of system

FIG 5.3 GPS Location

6. CONCLUSION

The GPS Tracker and Alcohol Detector with Engine Locking System using GSM technology is a significant advancement in ensuring road safety and preventing drunk driving incidents. By integrating a sensor to measure alcohol levels and a system to automatically lock the vehicle's engine if the alcohol consumption exceeds the specified limits, the project offers a proactive approach to address the issue of drunk driving. The system provides real-time alcohol detection based on the breath of the driver, enabling immediate action to be taken if alcohol consumption is detected above the defined threshold. By combining the alcohol detector, engine locking system, GPS tracking, and SMS alerts, the project offers a comprehensive solution to mitigate the risks associated with drunk driving. The automatic locking of the vehicle's engine

and the SMS alerts to authority members ensure that appropriate measures can be taken promptly, reducing the chances of accidents caused by drunk driving. However the system has some weaknesses too. The system relies on the accuracy and sensitivity of the alcohol detection sensor to determine the alcohol levels. While modern sensors are designed to be reliable, certain environmental factors or variations in breath samples could affect the accuracy of the readings. Also, the specifications of the alcohol detection sensor may have limitations in terms of the concentration range it can accurately measure. It's crucial to choose a sensor that offers a suitable range for detecting alcohol levels commonly associated with impairment. The integration of the system into different vehicle models and electrical systems may pose challenges, as each vehicle may have unique configurations. Ensuring compatibility and adaptability across a wide range of vehicles requires careful consideration and customization. AS Compared to Standard Methods/Technologies, the project\'s strength lies in its proactive approach to prevent drunk driving incidents through immediate engine immobilisation and alerting authorities. Traditional methods rely on law enforcement or personal vigilance to detect and apprehend drunk drivers. The project's use of technology provides a more efficient and automated system that can potentially reduce response times and improve overall road safety.

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