

# Vehicle Safety System Using IoT

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## ARTICLE INFO

### Article History:

Accepted: 10 April 2023

Published: 20 May 2023

### Publication Issue

Volume 10, Issue 3

May-June-2023

### Page Number

165-169

## ABSTRACT

Vehicle manufacturers are enhancing their product through smart innovations and introducing it to the society. With the increase in the number of vehicles roads are becoming accident prone zone. Recent researches have predicted that one of the main reasons for increase in death rate worldwide is due to accidents. The increase in rate of accidents greatly affects the society. Vehicle theft is also becoming common. Using IoT many applications are being developed as a solution to many problems. Smart ignition system will put an end to the above-mentioned problems. Our proposed system is designed to increase the rider safety, vehicle protection and decrease the accident rate. User authentication is implemented to prevent vehicle theft and alcohol and blink sensor is used to prevent accident. This work has been designed and implemented using Arduino and is also highly cost effective.

**Keywords:** Smart ignition system, IoT, Arduino, alcohol sensor, blink sensor

## I. INTRODUCTION

Road accident is one of the most prominent issues in the fast-moving traffic on roads. Road accidents come at ninth place in the ranking provided by World Health Organization as the disastrous reasons for taking human life. The impact on society seems significant when the cost of casualties and injuries from road accidents is evaluated. The young researchers are evaluating the causes and implementing safety measures to preserve human life from dangerous road mishaps.

Automobile companies are implementing many smart applications and technologies for improving driver

safety. The companies are trying to provide rider assistance. IoT encompasses devices like sensors and authentication systems. Nowadays the major concern of the people is securing the valuable objects like vehicles. Security is being enhanced by using GPS. The proposed system is also used as an anti-theft system. It prevents the vehicle from being stolen.

Recent researches have predicted that the root cause of accident is difficult to determine due to complex combinations of threats like the intellectual nation of the riders, road conditions, weather, and violation of traffic rules. Our proposed system concentrates on reducing the accidents due to violation of traffic rules such as consuming alcohol while riding.

This system was designed to increase the rider and vehicle safety and decrease the accident rate. Initially, the RFID based driving license was scanned by our system if the rider is an Authorized person the system comes to check the next condition. That is alcohol detection if the driver passes the alcohol test the vehicle will be started automatically. These bike current status are sent to the mobile application for the reference or remote monitoring. Adding the ESP8266 wifi module to our main board the internet connection was established to our system. We are using the Arduino Uno as the main microcontroller. To turn on or off the vehicle ignition the relay is connected to our microcontroller. If the previously defined conditions become false the relay unit will prevent the vehicle from getting started.

Drowsiness is another major problem while riding, so sleep monitoring is another important factor. Our system also has a sleep detecting module. This module has its own microcontroller to detect the sleep state. Here we are using the Arduinonano as the microcontroller in this module. This module has a transmitter to transfer the sleep state to the mainboard. If the sleep state is true the main system will be turned off. And also sleep detecting module have and in-built buzzer to indicate the sleep warning to the rider.

## II. RELATED WORK

The complete working of this system[1] can be divided into two stages – the first being an ignition stage followed by a second stage known as the monitoring stage. Further to this, a Heads Up Display (HUD) developed using HTML on a tab is also provided to make the user experience a more intuitive one. This HUD showcases instructions for the ignition mode and also acts as an intimation screen during the monitoring mode.

The main purpose of the ignition mode is to perform a biometric check of the driver before actually allowing the user to drive the car. This involves a series of 2 tests wherein face recognition followed by finger print

recognition is performed. Further to this, a breath analysis is also performed to verify whether the user is under the influence of alcohol or not.

The authors in [2] propose a deep learning method to show real time navigation maps which adapts as per road diversions and climatic conditions using the concept of vehicular ad hoc networks (VANETs).

The authors in [5] propose an intelligent solution which concentrates on road mobility, safety and utilizes “vehicle to infrastructure” communication to locate obstacles and problems on the road.

## III. COMPONENTS USED

### Arduino Uno:

Arduino Uno is the Low cost and effective micro controller for the real time applications Arduino Uno have Both Analog and Digital pins for the sensors connection. This controller is used to control relay, RFID, Alcohol sensor, DS3231, timer. ESP8266Wi-Fi module is also connected to this main board only to establish the internet connection. The Arduino Uno is a microcontroller board based on the ATmega328. It has 20 digital input/output pins (of which 6 can be used as PWM outputs and 6 can be used as analog inputs), a 16 MHz resonator, a USB connection, a power jack, an in-circuit system programming (ICSP) header, and a resetbutton.



### Arduino Nano:

The Arduino Nano is a small, complete, and breadboard-friendly board based on the ATmega328P (Arduino Nano 3. x). It has more or less the same

functionality of the Arduino Duemilanove, but in a different package. It lacks only a DC power jack, and works with a Mini-B USB cable instead of a standard one.



**DS3231:**

The DS3231 is a low-cost, extremely accurate I2C real-time clock (RTC) with an integrated temperature-compensated crystal oscillator (TCXO) and crystal. The device incorporates a battery input, and maintains accurate timekeeping when main power to the device is interrupted.



**IR Sensor:**

This sensor is used to detect whether the rider is sleeping or not. This sensor contains two light emitting Diode's one for emit the radiation and another one for detecting the radiation. The sensor sends the value of 1 while the eyes are open and provides the value of 0 while the eyes are closed. If the sensor continuously sends the value 0 for particular time range it comes to sleeping state.



**ESP8266:**

The ESP8266 WI-FI Module is a self-contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WI-FI network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor.



**MQ3:**

Air quality sensor for detecting a wide range of gases, including NH3, NOx, alcohol, benzene, smoke and CO2. Ideal for use in office or factory. MQ3 gas sensor has high sensitivity to Ammonia, sulphide and Benzes steam, also sensitive to smoke and other harmful gases. It is with low cost and particularly suitable for alcohol monitoring application. If the detected value is greater than threshold value the system conformed as the driver or rider was drunken.



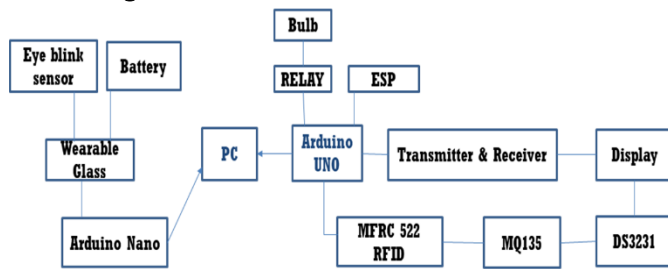
**RFID:**

RFID (radio frequency identification) is a form of wireless communication that incorporates the use of electromagnetic or electrostatic coupling in the radio frequency portion of the electromagnetic spectrum to uniquely identify an object, animal or person. We are using RFID for Validating the Authorized persons in our project. If RFID tag returns Unauthorized person value the Ignition of the vehicle will be becomes to off State.

#### IV. PROPOSED WORK

Our system has three modules. One to authenticate the user, second for alcohol detection and the third for sleep detection. These three modules are combined in order to protect the vehicle being stolen and to safeguard the rider during his travel. The main aim of the proposed work is to save human life.

##### Block diagram:



In module 1, the vehicle owner will be provided with a user authentication card. The motorcycle will get ignited only after the user passes authentication and alcohol test. At first user has to verify his/her authentication card. If the user is not an authenticated person then vehicle will not be started. If it is valid he/she has to undergo alcohol detection test.

In module 2, the rider should undergo an alcohol detection test. Most of the accidents now a days happens due to the consumption of alcohol. The rider who is drunk is a great threat to the society. They may cause a serious life taking accidents in a fraction of seconds. To avoid those mishappenings we are using alcohol detector. If the rider fails to clear the test, vehicle will not be started. Once the user passes those two verifications vehicle will be started.

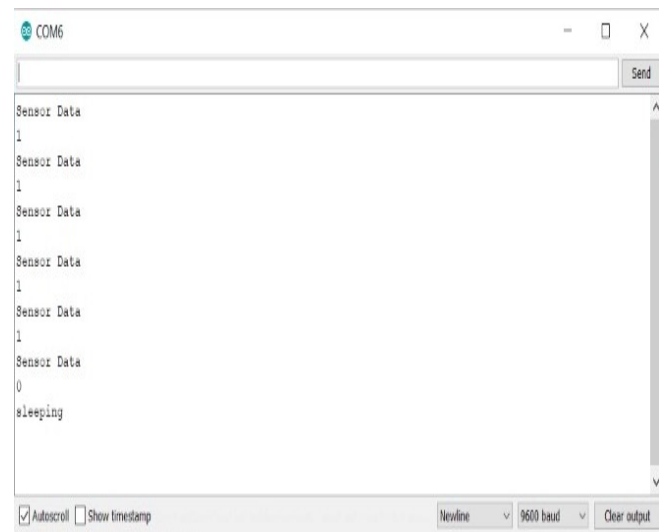
In module 3, we are using eye blink detector. By nature we blink our eyes constantly with a time interval. The time interval differs from one person to the other. According to the researches made before, once we blink our eyes normally, it doesnot lasts for more than 3 seconds. With that idea the proposed work is designed.

Due to drowsiness the rider may fall asleep during his/her travel, resulting in heavy loss of life. To avoid

this, a blink detector is attached to the wearable glass. The blink detector will be in continuous monitoring of the eye movement of the rider. It alerts the rider if the eye is closed for continuous three seconds. When the rider opens eye the sensor stops alerting, else the vehicle goes to off state.

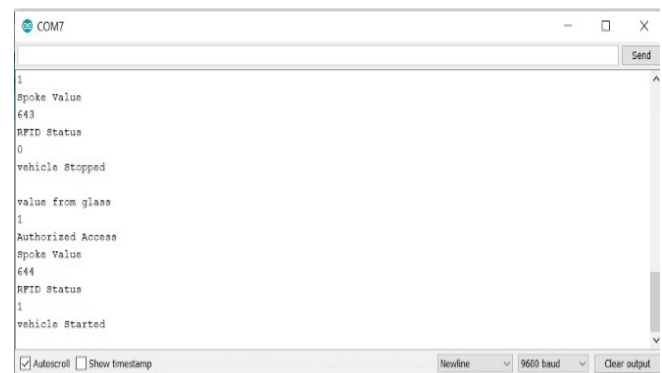
#### V. WORKING MODEL AND OUTPUT

##### SLEEP DETECTION:



##### OFFLINE:

##### CARD AUTHORIZATION, ALCOHOL DETECTION:



#### VI. CONCLUSION

As the world grows, it emerges with complicated problems. Internat has given solutions to many of the problems. The only thing is we have to apply the methodologies in the right way. Therefore we have given three solutions to the existing problems. Thus the proposed idea indulged with IoT narrow down the

problems and saves the vehicle from theft and also saves the life of the rider.

## VII. CHALLENGES AND FUTURE WORK

Though we have given solutions to the existing problems, our system has its own discrepancies. In module 3, the eye blink sensor arises the buzzer if the conditions are not met. After the buzzer if the rider doesnot wakeup, then the ignition system goes to off state. The above mentioned solution saves the rider from serious injuries. The problem occurs when the rider is in a traffic rich road. When the ignition system goes to off state this particular vehicle will be stopped suddenly, others have no idea about this happening and they may collide with each other leading to serious issues. To overcome this problem the indicator of the vehicle must start functioning and indicate the other travellers about this particular vehicle. This module will be implemented in future.

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