

Intelligent Driver Monitoring and Vehicle Control System

Kiruthikamani.G¹ Saranya.B² Pandiyan.P³

^{1,2}Assistant Professor ³Assistant Professor(Sr.Gr)

^{1,2}Department of Electronics & Communication Engineering

³Department of Electrical & Electronics Engineering

^{1,2,3}Sri Ramkrishna Institute of Technology, Coimbatore, India

Abstract— In this modern, fast moving and insecure world, it is a basic necessity to be aware of one’s safety. Moreover, the number of occurrence of accidents is increasing day by day. Many statistics say that most of the accidents are caused due to consumption of alcohol or due to the drowsiness of the driver. A system using modern technology is developed to overcome such accidents by monitoring the activities of the driver. Eye blink sensor is used to monitor the drowsiness of the driver. Alcohol sensor is used for the detection of alcohol consumption by the driver. Ultrasonic sensor is used to alert the driver if any vehicle comes near to his vehicle. The status of the driver can be monitored by the help of sensors implemented in the vehicle and the details are updated to the owner. The real time monitoring using various sensors and automatic vehicle controlling can be achieved through this system.

Key words: WiFi, IoT, IR Sensor, Arduino, Ultrasonic Sensor, Alcohol Sensor

I. INTRODUCTION

One of the main reasons for the cause of accidents in this modern world is due to carelessness of drivers. Many statistics say that most of the accidents are caused by drivers either due to consumption of alcohol or due to drowsiness of the driver. There are many technologies available in order to overcome those incidents. IoT is trending technology implemented in various sectors now-a-days. By this method we can monitor the current status of anything from anywhere through internet. Using various sensors we can monitor the details of the driver. From the output of these sensors the owner of the vehicle can monitor the current condition of the driver. Arduino is used to process the details from the sensors. Then this information is transmitted to the webpage by visiting the particular webpage anyone can know the condition of the driver at present.

II. LITERATURE SURVEY

In [1] 2012, Sawant Supriya C, Dr. Bombale U. L., Patil T.B proposed a paper on “An Intelligent Vehicle Control and Monitoring Using Arm”. In this paper ARM 7 microcontroller is used where programming is a tedious process when compared to arduino programming. ARM uses more memory and it is complex to operate for this small specific application hence it is costlier than arduino.

In [2] 2013, K.U.G.S. Darshana, M.D.Y. Fernando, S.S. Jayawadena, S.K.K. Wickramanayake proposed a paper on “Intelligent Driver Monitoring System”. This method uses bio-physiological data of the driver such as brain wave patterns, respiratory dynamics and heart rate variations. This intrusive nature of these systems reduces its usability in real time.

In [3] 2012, Girma S. Tewelde proposed a paper on “Sensor and Network Technology for Intelligent Transportation Systems”. This paper reviews the technology deployed to support intelligent transportation systems with the aim to reduce cost and power consumption with wireless sensor networks. This has a disadvantage of using video technology for capturing eye movements and sign of fatigue which is being a time consuming process and also of more cost.

In [4] 2016, Tariq Jamil, Iftaqueruddin Mohammed and Medhat H. Awadalla proposed a paper on “Design and implementation of an eye blinking detector system for accident prevention”. In this paper Drowsiness of the driver is found from the image processing technique by the images captured from the camera placed at the dash board of the car. It has slow success rate at night times, this act as a major disadvantage this includes high cost.

In [5] 2016, Duy Tran, Eyosiyas Tadesse ,Weihua Sheng, Yuge Sun, Meiqin Liu and Senlin Zhang proposed a paper on “A Driver Assistance Framework based on Driver Drowsiness Detection. In this, they use webcam for detection of drowsiness of the driver. It consists of three sections. Facial expression feature analysis, steering wheel feature analysis and feature level integration. Implementation of this method is costly as it uses webcam for image processing.

In [6] 2015, Dimil Jose, Sanath Prasad, V. G. Sridhar proposed a paper on “Intelligent Vehicle Monitoring Using Global Positioning System and Cloud Computing”. In this paper status of the vehicle is monitored and alcohol consumption of the driver is detected and the information is transmitted through Zigbee which can be used only for short range.

III. PROPOSED SYSTEM

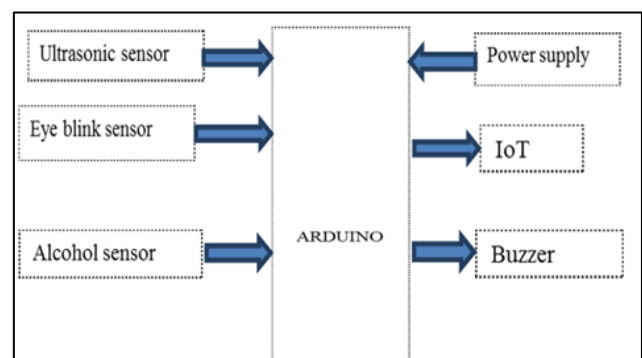


Fig.1: Block diagram

A. Arduino

Arduino microcontroller is easy to use. Since the software for arduino is open source and hardware is of low cost it is used in most of the specific applications everywhere. Output of the sensors is given as input to the arduino. Arduino processes

the details provided by the sensor. Arduino is dumped with the program already. Arduino program is similar to that of C/C++ programming. Only few commands are required to perform useful operations.

B. Ultrasonic Sensor

Ultrasonic sensor is used to find the distance measurement. Ultrasonic sensor (#28015) is used here. Operating range of this sensor is about 2cm to 3m. It has three pins one for 5v DC supply second for ground and third for I/O. The signal emitted by the transmitter section is about 40 KHZ (ultrasonic). From the time taken by the signal between transmission and reception, the distance of the nearer vehicle can be measured. If the vehicle crossing nearby is too closer, then the buzzer sound ring to alert the driver and also a message is sent to the owner. This detail can also be used to find the faults in the driver during accidents. Distance measurement in the sensor is calculated using the formula ($\text{Distance} = (\text{time} * \text{velocity of sound})/2$). Velocity of sound in air is 343m/s.

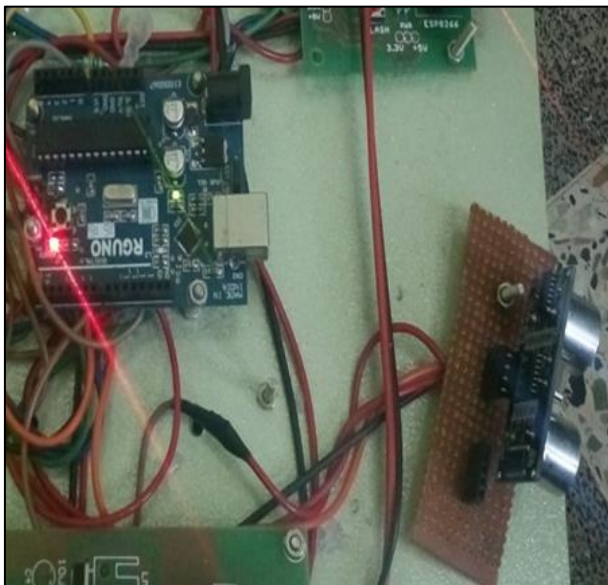


Fig. 2: Vehicle system with ultrasonic sensor

C. Alcohol Sensor

It is used to detect whether the driver has consumed alcohol or not. MQ3 alcohol sensor is used to detect the presence of alcohol in the air. If it exceeds the normal limit then it is detected by the sensor. It is highly sensitive to gases such as ammonia, sulfide and benzene. This sensor consists of heating element made of aluminium and tin oxides. When the air containing alcohol more than normal level is incident on that element, ethyl alcohol is converted into acetic acid. Conductivity of the circuit inside the sensor increases along with the concentration of the gas. The change of conductivity is converted into corresponding output signal. If the driver has consumed alcohol then automatically the engine of the vehicle is turned off and message is updated on the webpage. This reduces the accidents to greater extent.

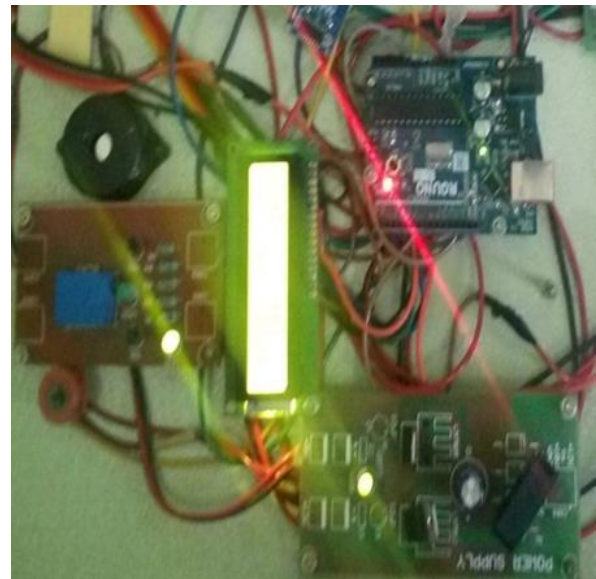


Fig. 3: Vehicle system with Alcohol Sensor

D. Eye Blink Sensor

Infrared sensor is used to detect the drowsiness of the driver. A glass is worn by the driver which has IR sensor placed in it. If the eye of the driver is closed more than several seconds then sensor sends the signal to the arduino. The threshold time can be set by the designer of the module at the time of programming. During night time most of the accidents are caused due to the drowsiness of the driver. In such cases this sensor detects the drowsiness of the driver and alerts the driver by using buzzer. Also the engine of the vehicle is stopped to prevent the accident. Vehicle moves only when the driver is in normal condition. An IR transmitter and receiver are connected to the frame of the glass so that we can identify that the driver is wearing that glass.

E. ESP8266

ESP8266 module has four pins. Transmitter, receiver, ground and supply. Transmitter and receiver pins are connected to D1 and D0 pins of the arduino which is shown in the figure 3.4. ESP8266 is an impressive, low cost module suitable for adding WIFI functionality to an existing microcontroller project via a UART serial connection.

The main features are:

- 802.11 protocol
- Wi-Fi Direct (P2P), soft-AP
- Integrated TCP/IP protocol stack

The ESP8266 requires 3.3V power. The ESP8266 needs to communicate via serial port.

1) DC Motors

A DC motor is one of a class of electrical machines that does conversion of direct current electrical power into mechanical power. The most common types rely on the forces produced by magnetic fields. Mostly all the types of DC motors have some internal mechanism, either electronic or electromechanical, which periodically changes the direction of current flow in that part of the motor. Nearly all produces rotary motion; a linear motor which directly produces force and motion in a straight line.

DC motors were the first type widely used, since they could be powered from existing direct-current lighting

power distribution systems. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings. A Brushed electric motor with a two-pole rotor (armature) and permanent magnet stator is used. "N" and "S" designate a polarity on the inside faces of the magnets; the outside faces have opposite polarities. The + and - signs show where the DC current is applied to the commutator which supplies current to the armature coils.

In this system two DC motors are used. These motors are controlled by Arduino. We can stop the motor if driver has consumed alcohol or drowsiness has been detected

IV. RESULTS AND DISCUSSION

In this paper, a driver monitoring system using sensors is made. Details such as alcohol consumption and drowsiness of the driver are detected and information is sent to the particular webpage.



Fig. 4: Prototype of proposed system

Figure 4 shows the Prototype of the proposed system and Figure 5 shows the Notification message with the IoT implementation. Several studies show that, most of the accidents are caused due to mistakes made by the drivers. We use simple and modern technique which can be implemented in the vehicles in order to minimize the number of accidents. Monitoring of vehicles also becomes easy for the owner as the details can be connected from anywhere at any time.

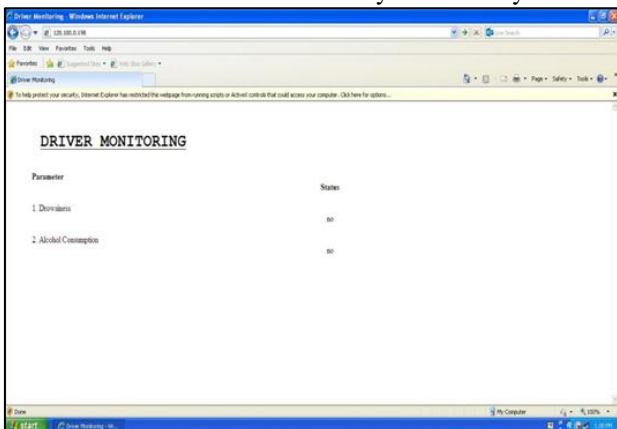


Fig. 5: Drowsiness and Alcohol Consumption by the driver

V. CONCLUSION

This system is tested under different condition of input by varying the obstacle distance, alcohol detection and drowsiness condition. All the other units in the system, including motors, relays, power unit and ESP8299 module are tested and are found to be in working condition. This system is fully automated, it saves a lot of time as it is automated. The driver monitoring system has been employed in the proposed system to reduce the accidents and make drivers alert in case of drowsiness. Thus this system finds its applications in day today driving.

ACKNOWLEDGMENT

The authors would like to thank the Management and Principal of Sri Ramakrishna institute of Technology for conducting the research in the campus successfully.

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