Design and Development of Drivers Driving Pattern Analysis for Safe Driving Using IOT

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ABSTRACT:

In our present day, most of the road accidents are occurred by drunk driving and rash driving. The main concept of this paper is to prevent the road accident so to prevent the road accident we are using alcohol detection sensor, eye blink sensor, ultrasonic sensor and vibration sensor. This can be done using raspberry pi. If the person is drunk, it is detected by the alcohol sensor and the car is automatically slowed down or speed is reduced based on the traffic. Ultrasonic sensors are used to detect whether any vehicles are present in the front or back of the car. From this sensor reading if any vehicle is present car is slowed or if any vehicles are not present means car is stopped. Along with drunk and drive detection drowsy driving can also be detected using this system. This is done by using the eye blink sensor. It is used to capture the eye lid movement and if the eye is closed for longer time vehicle's speed is controlled based on ultrasonic sensor and trigger the alarm to conscious the driver. This will reduce the accidents. If in case of any accident, the vibration sensor notices the accident. In the case of an accident, the message or SMS will send to the relative of the driver and if the driver is consuming alcohol & driving and the message will also send to the local police to prevent the accident.

Keywords: Communication, Safety, Raspberry Pi, Alcohol detection, Alcohol sensor, Ultrasonic sensor, Eye blink sensor, Vibration sensor

I. INTRODUCTION

Road safety has become a major public health concern. Everyday road accidents are happening all over the world according to the statistics (20 – 40) percentage of road accidents are happening due to drunk & driving and rash driving. If the driver drunk means he/she will be unconscious they will not able to control themselves in that situation if they drive the car means it can affect them and others also. Thus drunken driving is most common reason of accidents in almost all countries all over the world. This system should be installed in the vehicle.

This proposed system of Drunk Driving Detection using IOT is mainly used to detect the drunken drivers and control their vehicles to reduce the accidents. This system is installed in the vehicle. If the person is drunk and driving the car then alcohol sensor present inside the car detects the alcohol through the breath of the driver. UV sensor is present in the front and back of the car. If any vehicle or object is present, then speed of the car slowed down. If nothing is present then car is stopped and buzzer will ring. If any accident occur vibration sensor detects it and sends a message to the relatives.

II. METHADOLOGY

The road safety system uses Raspberry pi as a major component. The vehicle's system is connected to raspberry pi which is in turn connected to the sensors and alarms. The computer programs the raspberry pi with certain conditions and how each sensor should respond when these conditions are met. The IOT is used to incorporate the sensors and alarms into the vehicles system. All the sensors i.e., alcohol sensor, vibration sensor, eye blink sensor, ultra sonic sensor are connected to the raspberry pi. All the sensor readings are sent to the raspberry pi and raspberry pi monitors the speed of the vehicle. DC motor is used to indicate the speed of the vehicle. Raspberry Pi is a small size computer developed in by the raspberry Pi Foundation. There are two models of Raspberry Pi. They are model A and model B. The main difference between these two models is model B has an extra USB port and Ethernet. Various components of Raspberry Pi include GPU (Graphics Processing Unit), GPIO (General Purpose Input Output), LEDs, USB, HDMI, power, SD card slot, Ethernet.

Alcohol sensor MQ3 is used to detect the presence of alcohol in the air. It is used in breath analyzers. It has 6 pins. But only 4 of them are used. Two pins are used for heating purpose and the other two pins are used for connecting to the power and ground. It consists of Sno2 layer inside aluminium micro tubes and there is a heating element in the tube. Ultrasonic sensors consist of two main parts called transmitter and receiver. Transmitter emits high frequency sound waves at regular intervals. They travel in air with velocity of sound. If they strike any object then their echo is received by the receiver. Distance is calculated by the time span between emitting the sound and receiving the echo. Eye blink sensor is used to capture the eyelid movement. Eye lid movement is captured by the infrared (IR) light reflected from the surface of the eye. Vibration sensor is used to detect the occurrence of accidents. If any accident occurs then an alert message will be sent to the family members.
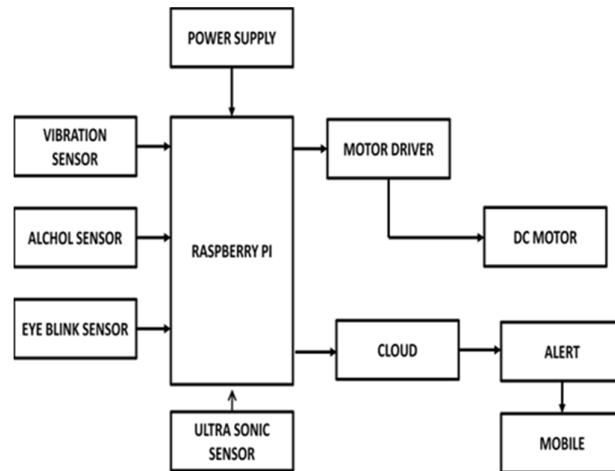

Figure 1: Design And Architecture

III. HARDWARE AND SOFTWARE

3.1 Hardware

3.1.1 Alcohol Sensor: The alcohol detection sensors are also connected to the steering of the car these sensor will identify whether the driver is drunk or not. The uniqueness of these sensors is it will identify only the driver is drunk or not it will not check the rest of the persons in the car, because the sensor will be fixed in the steering of the car so the capacity of the sensor is up to 5-10 cm to identify the alcohol consumption of the driver alone it will also send the SMS to their driver relatives and the local police.

3.1.2 Eye Blink Sensor: The eye blink sensors are connected to the steering of the car. It will check the eyeball movement of the driver & clarify whether the driver is sleeping or not. If the eye blinks two seconds it knows the driver is not sleepy if the eyes of the driver are closed for 5 seconds the eye blink sensors will identify that the driver is sleeping and then the sensors will trigger the alarm to make the driver conscious and the alarm will not stop until the driver became conscious.

3.1.3 Ultrasonic Sensor: The ultrasonic sensors measure distance by using ultrasonic waves. The sensor head emits an ultrasonic wave and receives the wave reflected back from the target. Ultrasonic Sensors measure the distance to the target by measuring the time between the emission and reception. When the ultrasonic sensor is activated its main purpose is to bring the vehicle to a halt. The sensor checks for any vehicle in the back and if there aren't any the vehicle is stopped immediately and if there are the sensor slows down the vehicle slowly and then brings it to a halt.

3.1.4 Vibration Sensor: Vibration sensors are sensors for measuring, displaying, and analyzing linear velocity, displacement and proximity, or acceleration. Abnormal vibration indicative of problems that might have occurred such as a crash. When the vibration sensor detects something a call or message is sent to the registered mobile numbers.

3.1.5 HDMI adapter: High density media interface. It is used to have connection between computer and raspberry pi kit. This converting the HDMI digital signal to VGA analog signal It enables the PC, Laptop DVD, PS3, Xbox360 Sky HD, Apple TV and other HD device to be connected to VGA monitor, projector or other display for education, business presentation, commercial promotion, conference, exhibition, etc. It supports the high definition output of 720P or 1080P.

3.1.6 Micro SD Card: As the R-Pi has no internal storage or built-in operating system it requires an SD Card that issue up to boot the R-Pi. You can create your own preloaded card using any suitable SD card you have. Be sure to backup any existing data on the card. Preloaded SD cards will be available from the R-Pi Shop .This guide will assume you have a preloaded SD card. Prepared Operating System SD Card Display (with HDMI, DVI, Composite or SCART input) Power Supply v Cables, Highly suggested extras include: USB mouse Internet connectivity- a USB Wifi adaptor (Model A/B) or a LAN cable (Model B).Powered USB Hub.
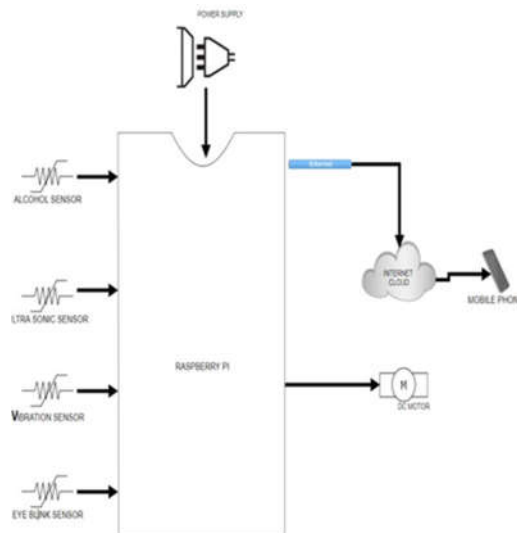

Figure 2: Circuit Diagram

3.2 *Software*

3.2.1 Operating system: Linux as it may seem, installing an operating system on your Raspberry Pi requires a Windows, Mac or Linux computer. This is because the stripped down mini-computer uses an SD card as its storage device, and as the device ships without the SD card, it is left to the user to download a suitable operating system and load it onto the card.

3.1.2 Programming languages: Python is an interpreter, interactive, object-oriented programming language. It incorporates modules, exceptions, dynamic typing, very high level dynamic data types, and classes. Python combines remarkable power with very clear syntax. It has interfaces too many system calls and libraries, as well as to various window systems, and is extensible in C or C++. It is also usable as an extension language for applications that need a programmable interface. Python is a high-level general purpose programming language that can be applied to many different classes of problems.

3.1.3 Raspbian: Raspbian is a free Operating System based on Debian. Optimized for the raspberry pi hardware. Raspbian comes with more than 35000 packages; pre-combined software bundled in a nice format for easy installation on Raspberry pi.

IV. MONITORING THE SPEED OF VEHICLE

The working of the device can be explained by using the following steps:

1. Whenever the person starts the vehicle this system starts working.

2. Check the alcohol level using alcohol sensor. If BAC (Blood Alcohol Level) is greater than 0.02% then check the ultrasonic sensor reading.

3. If the ultrasonic sensors reading is greater than 1m stop the vehicle else slow down the speed of the vehicle and again check the ultrasonic sensors reading.

4. If there is no alcohol in the body, check for drowsy driving using eye blink sensor.

5. If the eye is closed for 5 sec then check for any accident using vibration sensor. If there is any accident send the alert message.

6. If there is no accident means repeat step 3.

4.1 *PSEUDO CODE*

    1. Import the required libraries.

    2. Select the required pins and set the pin modes.

    3. Declare from and to.

    4. Mail()

        a) msg = MIMEMultipart()

        b) msg['From'] = from

        c) msg['To'] = to

        d) msg['Subject'] = "required subject"

        e) body = "alert message"

        f) msg.attach(MIMEText(body, 'plain'))

        g) server=smtplib.SMTP('smtp.gmail.co m', 587)

        h) server.starttls()

        i) server.login(from, "123456789 10111213")

        j) text = msg.as_string()

        k) server.sendmail(from, to, text)

        l) print "mail sent" m. server.quit()

    5. Repeat

    i. alcohol sensor:

        a) i=GPIO.input(11)

        b) if i==0 then

        c) print "alcohol not detected"

        d) sleep(1)

        e) else if i==1:

f)   print "alcohol detected" g. sleep(1)

h)   mail()

ii. vibration sensor:

a)   i= GPIO.input(12)

b)   if i==0 then

c)   print "vibration not detected"

d)   sleep(1)

e)   else if i==1:

f)   print "vibration detected"

g)   sleep(1)

h)   mail()

iii. eye blink sensor:

a)   i= GPIO.input(13)

b)   if i==0 then

c)   print "person not sleeping"

d)   sleep(1)

e)   else if i==1:

f)   print "person sleeping" g. sleep(1)

h)   mail()

V. MOTIVATION

The main aim & the motivation of this project is used to prevent from drunk and drive accident so that we are using alcohol sensors Apart from alcohol sensors, we also include eye blink sensors and over speed controller sensors. These alcohol sensors will identify the driver is drunk or not and the ultrasonic sensor will check the car speed & if the car crosses the speed limit(40km/h) the over speed controller sensors will reduce the speed of the vehicle. It will also send the SMS to the police in case of drunk & drive.

VI. PROPOSED SYSTEM

In the proposed system, we are going to identify weather the person driving the car drank alcohol or not and according to that provide some applications like automatic lock system in vehicles. Alcohol sensor is used to identify the level of alcohol in the person. A. If he consumes alcohol and if he opens the car door, then it cannot be open or else if he is consuming the alcohol inside the car while driving it, then automatically slows down the car. Ultrasonic sensor detects the presence of any vehicle outside the car, if any cars are present then it maintains the low speed if there is no car means it will automatically stop the car and back light is "on" . In case of any accident vibration sensor is used to identify the accident. Along with drunk and driving dizzy driving can also be identified using eye blink sensor. If the person is sleepy and if he closes eyes for more than five seconds vehicle's speed can be controlled based on ultrasonic sensor reading.

Table 1: Sensor Conditions and their Responses

Condition	Response
Alcohol condition (Threshold level 500) && Ultrasonic condition(if any vehicle in 1m dist).	Reduce the speed of the vehicle to minimum set value
Alcohol condition(Threshold level 500) && Ultrasonic condition(if no vehicle in 1m dist)	Stop the vehicle and send the alert message
Eye Blinking(Eye remains closed for 5 Sec) && Ultrasonic condition (if any vehicle in 1m dist)	Reduce the speed of the vehicle to minimum set value
Eye Blinking(Eye remains closed for 5 Sec) && Ultrasonic condition (if no vehicle in 1m dist)	Stop the vehicle and send the alert message
Vibration sensor condition (Accident condition)	Send alert message

VII. ADVANTAGES

Using the Raspberry Pi has some significant advantages:

1. *Cost Effective:* As Raspberry Pi are very cheap and easily available, also setting up a Raspberry Pi is very easy. Hence setting up a Raspberry Pi in a network becomes easy.

2. *High Efficiency:* The effectiveness of the security system is high and the cost of operating and maintaining the security system is low.

3. *Simple:* Raspberry pi only requires the program to be written in simple python language. Any changes made to the program changes the function of Raspberry pi i.e., it is flexible.

4. *Small Size:* The Raspberry pi is small in size and hence is very compact.

5. *Low Power Consumption:* The power required for running the Raspberry pi is very low. So, it is energy efficient.

6. *Reliable:* The Raspberry pi is connected directly only to the sensors. So, even if the computer system crashes or is damaged the Raspberry pi still works.

VIII. CONCLUSION AND FUTURE SCOPE

The goal of the paper was to design a system to reduce the number of road accidents that are occurring due to drunken driving using Raspberry pi. This system is now implemented in cars or any four wheelers. Here, we discussed the latest technology that can help to reduce catastrophic accidents caused by drunk driving and rash driving. We designed the system and evaluated its effectiveness as well as scalability. With the improvement of sensor technology, the system will become more efficient and useful. This project is based on the Raspberry pi, and is integrated by using IOT. We are implementing a security system by interfacing sensors with the Raspberry pi and making it to check for any anomalies or for an intrusions and recording it. In future it can be implemented in two wheelers also. It can also be used in any organization to detect drunken persons. In addition to this GPS module can also be used to detect the location of vehicle if alcohol content is found in the body.

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