

Automotive Driver Monitoring System

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Abstract - A path to implement our innovation idea in the form of the project named automotive driver monitoring system. It is a safety system and is also known as driver attention system. The basic concept which emerges for our project is drunk driving detection, drowsiness detection and heart beat monitoring. For the project we have used camera, pulse rate sensor And alcohol sensor. If the alcohol is detected in the driver before driving the ignition off the car will be turned off automatically with the help of 5v relay unit and the status of the engine will be indicated by a led. Drowsiness can be detected using camera, we will use machine learning algorithms to identify facial features and alarm the driver using buzzer. The heart beat sensor monitors the heart rate and the GSM module sends the messages to the registered mobile number.

Keywords: *LPC2148 microcontroller, MQ3sensor, Heartbeat sensor, Camera, DC motor, LCD display.*

1. INTRODUCTION

The automobile industry is one of the most important industries of the world. It enables people and goods to travel farther and faster but how safe is it. It brings us to a question . Is there a need of monitoring a driver? . Yes, so in this paper we proposed an efficient way to monitor a driver and take necessary actions during driving .

In India the alcohol consumption is more than 6 billion liters that is 16 crore people consume alcohol. From 2008 to 2017, 76446 people died in 211,405 road accidents nationwide due to consumption of alcohol. The driver who drinks alcohol is in the state of confusion, he/she loses the ability of proper driving and quick judgment therefore accidents take place. It not only kills the driver but also copassengers and people involved in the accident die due to severe injuries. In order to prevent it we have designed a self monitoring system which can detect alcohol in the driver before driving. The driver should provide his/her sample of breath based on the smell we can conclude if the driver has consumed alcohol or not, if he/she has consumed alcohol the ignition of the vehicle will be turned off using a relay unit.

To reduce the number of accidents due to driver fatigue , we use camera for the visual information and MATLAB coding is used . To determine driver drowsiness we use the following measures:

- (1) background images
- (2) face detection
- (3) face component detection
- (4) drowsiness detection

Drowsiness/fatigue can be caused by many reasons such as overworking, lack of sleep, alcohol consumption. it may lead accidents . when the driver is drowsy the alertness of the

driver is very low so in this paper we have designed a hardware to monitor the driver's drowsiness. The camera will monitor the component of the face that is our eyes and it will measure the eye blink rate based on the value we can determine drowsiness and create an alert using buzzer.

The health of the driver is also an important factor while driving. The normal heart rate of a driver is between 60 to 100 . A heart rate that's consistently above 100 beats rate per min or below 60 beats per min will reveal the risk of heart. This system monitors driver's heart beat rate. Sensors are used to measure this factor. Microcontroller is used to compare sensor values with reference value provided. The message is sent by using GSM module to registered phone numbers to alert the concerned people about driver's condition.

2. LITERATURE SURVEY

[1] High Sensitive alcohol sensor with auto car ignition disable function

The main objective of this paper is to avoid accidents which is caused due to drunken drive by using MQ3 alcohol sensor and 8051 microcontroller if driver consumes the alcohol above the limited value the ignition system automatically disables.

[2]Automatic Driver Drowsiness Alert and Health Monitoring System using GSM

This paper aims to design for prevention of drowsiness and heart attack which may caused during driving so it is done by implementation of eyeflash sensor for monitoring drowsiness and pulse sensor for monitoring pulse rate if pulse rate below threshold value then alert message send to respective person through GSM moduel by using 8051 microcontroller so this makes driver and his/her family members to feel secure and safe while driving.

[3] Detection of Driver Drowsiness using Eye Blink Sensor

The main objective of this paper is to detect the blink rate of the eye using a eyeflash sensor. If the value of the blinks exceeds threshold value then the alert is created.

[4]Facial features monitoring for real time drowsiness detection

The main objective of this paper is to detect the face and track the eyes. It acquires the video from the camera and detects fatigue, that is eyes open or close if the eyes are closed the alarm is turned on.

[5] Heart beat monitoring using optical sensors

The main objective in this paper is the led transmits the light pulse which goes to finger of the skin and interfaces with blood inside the vein depending on the pulse the blood density varies periodically thus the amount of the light reflected depends on this density . The photodiode measure this reflected light and help us in calculating the heart rate.

[6] An open source remote heart rate image method with practical apparatus and algorithms

The main objective in this paper ,it takes in video input from the webcam and then uses some image processing techniques to measure heart rate by looking at your face so, the series of image

Lined to next to each other colour changes at each pixel from one image to the next and this a method to detect the heart rate.

3. PROPOSED CIRCUIT DESIGN

The model is divided into two stages

- i. Hardware connections
- ii. Software to bind all the components

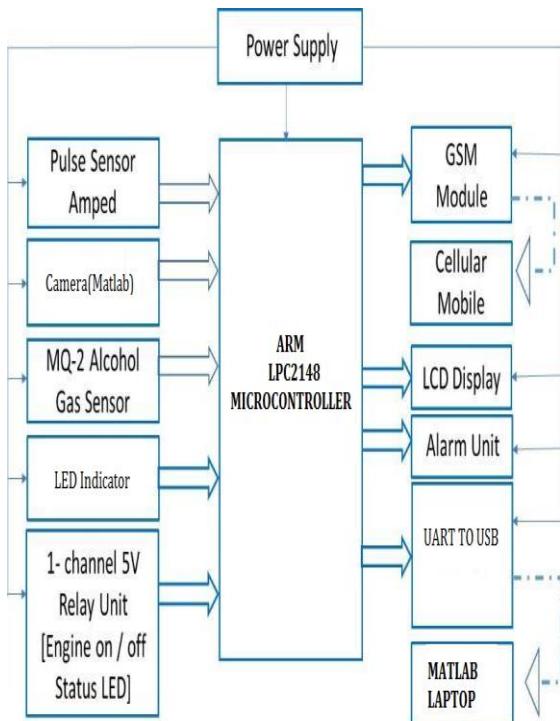


Fig-1 Detailed Block Diagram

a) LPC2148 MICROCONTROLLER

LPC2148 is a 32-bit microcontroller based on ARM7 family. It consist of 512 kb flash memory and it also has 32 kb SRAM. It offers high speed operation with wide range of interface almost 128 bits. It gives chargeable output with 10 bit digital to analog converter. It has many serial interfaces. Erasing of data in full chip takes 400 milliseconds. 256 bytes of programming is done in 1 milliseconds. Power conserving of Idle and power down.

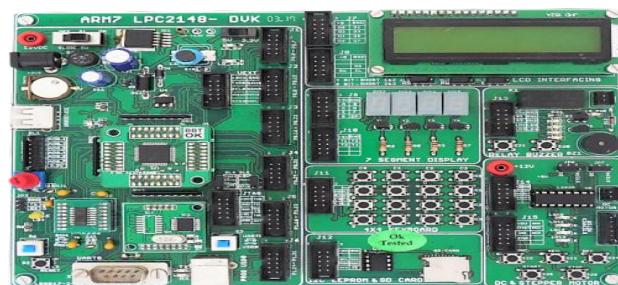
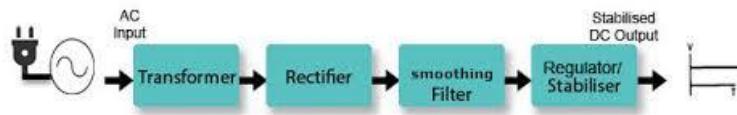


Fig-2 : LPC2148 MICROCONTROLLER

b) POWER SUPPLY

Power supply consists of several parts like ac supply, transformer, rectifier, filter, regulator dc output. The Ac supply is of 230v.



Power Supply Block Diagram

Fig-3 : POWER SUPPLY

The transformer converts the incoming voltage to the required voltage of the device. The rectifier rectifies the incoming ac voltage to the dc voltage. The filter filters out the roughness of the dc wave. The regulator stabilises the ripple voltage so that the the components connected to the power supply should not get damaged. The power supply brings life to all the components. The power supply is given to microcontroller using screw terminal or through the USB port.

c) MQ-3 ALCOHOL SENSOR



Fig-4: MQ3 SENSOR

MQ3 sensor is an alcohol sensor that senses the alcohol which is present in the surrounding environment. There is a SNO₂ element inside the sensor, which is low in conductivity in the clean air, and its conductivity increases when alcohol is sensed. It has good sensitivity to alcohol and less sensitivity to gasoline

Typically there are 4 pins

1. ao-analog output
2. do-digital output
3. GND-ground
4. VCC

This sensor works on 5v. The potentiometer used to set the limited value for the MQ3 sensor and limited value is 25 mg. when it reaches above the limited value it gives an alert to the driver and locks the ignition of the engine. Then the information is given to the concerned person.

d) CAMERA

A video camera is used for monitoring of the driver. The average blink rates in a human eye are between 10 to 22 blinks per minute and one blink lasts about 1/3 seconds. If the eye blink rate increases more than the threshold value it mark that the driver is sleepy or drowsy. first we will detect the face component and track the component to detect the drowsiness of the driver if the drowsiness is detected we will alert the driver through alarm.

e) PULSE SENSOR

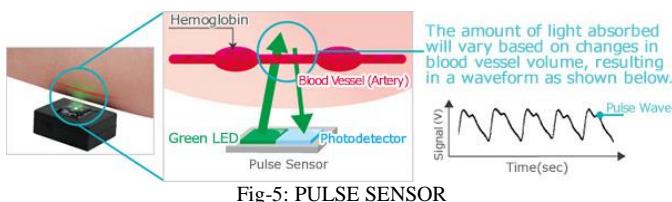


Fig-5: PULSE SENSOR

Pulse sensor is the change in the volume of the blood vessels that occurs when the heart pumps is also known as heart beat sensor. when the finger is placed on the sensor the LED light is emit or flash into our body .The oxygenated blood has a characteristic to absorb the incident light so by sensing the blood flow (when the heart pumps the blood circulation increases due to which more absorption of light and less reflection happens . If absorption of light is less more light is reflected which is monitoring using photodiode) we are able to measure the pulse signal.

A finger is been sensed by the sensor in the transmitter circuit because of which the governing microcontroller detects the heart beat rate. Depending on the range of heartbeat, message is sent through the transmitter. For a normal person , a very high(above 100 beats per minute) or low heart beat rate(below 60 beats per minute)may reveal risk for heart attack .

f) GSM



Fig-6: GSM MODULE

Gsm module stands for global system for mobile communication.

COMPONENTS OF GSM MODULE.

1. Mobile station (MS): It consists of Handset + Sim card (mobile phone) Subscriber identification module.
2. Base transceiver system (BTS): It establishes Communication ,modulation, encryption and encodes.
3. Base station controller (BSC): Handles call set-up, responsible for controlling BTS.
4. Mobile switching center : Call routing , call set-up, billing .
5. Home location register (HLRP) : Supplementary services , subscriber states, authentication key.

6. Visitor location register (VLR):It handles Current location identification ,MSRN(mobile station roaming number) .

7. Equipment identity register: It stores list of international mobile identity (IMEI)numbers.

WORKING : A GSM module is designed as digital system using TDMA technique for communication purpose .GSM is a wireless modem that works with wireless cellular communication technique, 'AT command' is used to control modem, Sim card is mounted on modem its function is to receive command and send that to microcontroller through serial communication .While program is executed ,the gsm modem receives the command 'STOP' to develop an output at the microcontroller.

g) LCD DISPLAY



Fig-7: LCD DISPLAY

LCD display is commonly used to display the messages using liquid crystal to produce visible images. 4.7 v to 5.3v is the operating voltage. It can be programmed easily. It has 16 columns and 2 rows that is why it is called 2*16 display module.

h) BUZZER

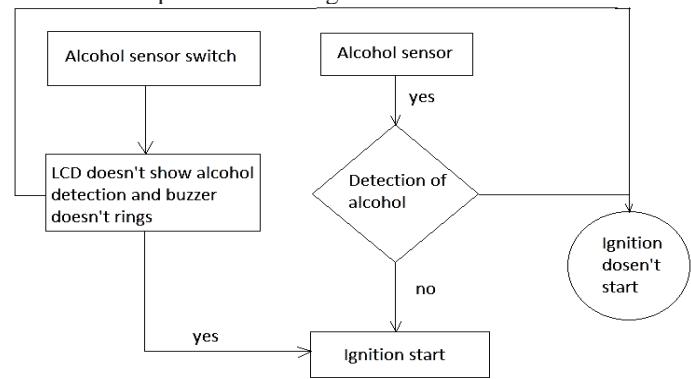


Fig-8: BUZZER

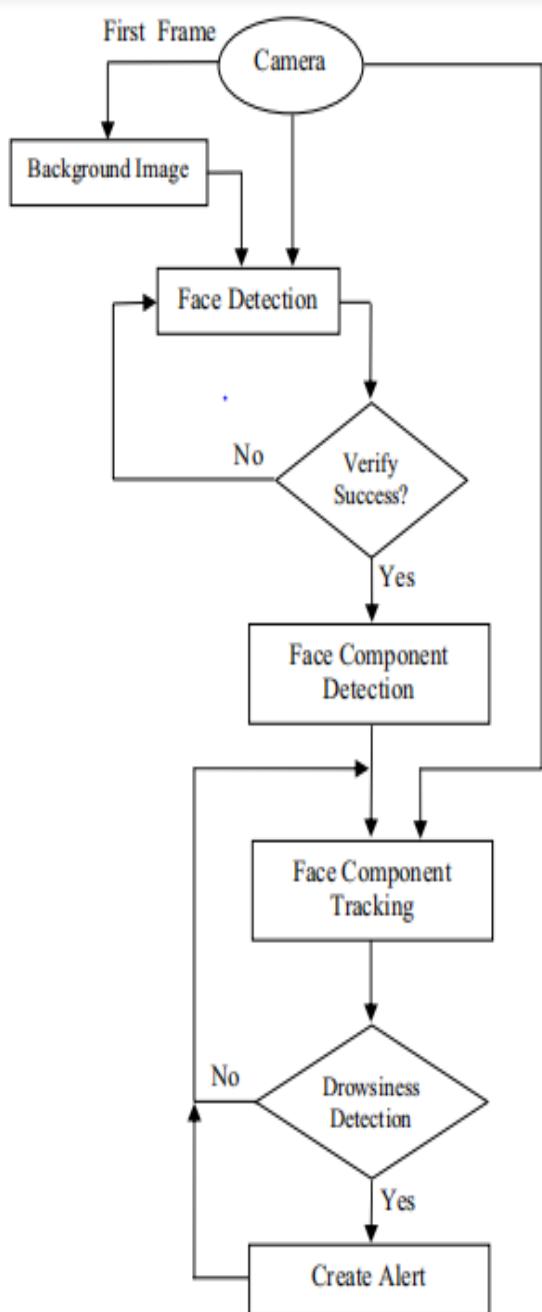
Buzzer is used to create alarm sound. Buzzer is used to create alertness if the driver is closing his/her eye.

4. SOFTWARE REQUIREMENTS

Software requirements Keil software version 4 is used to code the prototype of auto monitoring driver system. Embedded C is the language used for coding the ARM microcontroller. Flash Magic is used for dumping the code on the microcontroller. The coding of camera will be done by using the matlab software. The working and the control flow of the model is represented using a flowchart shown below.



FLOWCHART



5. APPLICATION

- This system can be installed in local buses.
- It is used in fleet vehicles.
- It is also used in private vehicles

6. CONCLUSION

The hardware design will make sure that the driver is not in the drunken state if he/she is in drunken state, the ignition will be automatically turned off.

It will also make ensure that the driver is not sleepy and will keep reminding/alerting the driver if he/she is sleepy.

The system keeps a check on the drivers heart rate and reveal the risks related to heart. The concerned people will be notified using GSM.

7. ACKNOWLEDGMENT

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