RASPBERRY PI DRIVER FATIGUE ALERT SYSTEM

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ABSTRACT

The real time drowsiness detection system here to locate driver eyes and monitor them for fatigue is capable of detecting drowsiness in a rapid manner. The system is capable of differentiating a normal blink verses the drowsiness. Which can help preventing the driver from entering the state of sleepiness while driving? The system can be further improved and used in the automotive commercially. Based on the various images captured the knowledge is build which can help the system to decide the drowsy condition. Once the drowsy condition is identified the real time system issues an alarm. When such system is implemented in automotive this can reduce the risk of possible accidents due to drowsiness.

INTRODUCTION

The main aim of this project dials up system using GSM technology. The purpose of this project is receiving and cancelling incoming call through IRIS (Iris Recognition Immigration System) Technology in driving mode. Now a day, every system is automated in order to face new challenges in the present day situation. Automated systems have less manual operations, so that the flexibility, reliabilities are high and accurate. Hence every field prefers automated control systems. Especially in the field of electronics automated systems are doing better performance increasingly. This system can be control GSM via IRIS technology. If person in driving mode, call is coming to mobile. His/her receiving and cancelling through IRIS recognition using Pi Camera. If Pi Camera detect eye blinking 5 times then automatically receiving call and eye blinking more than 10 times call automatically cancelled.

IRIS Recognition In biometrics is a type of physical identification that is based on the personal and unique characteristics of the iris the colored ring around the pupil of an eye. Similar to the more common fingerprint recognition, iris recognition is based on scanning a person's iris and comparing the scan to a stored photograph or template to make an identification match. Iris recognition is a method of identifying people based on unique patterns within the ring-shaped region surrounding the pupil of the eye. The iris usually has a brown, blue, gray, or greenish color, with complex patterns that are visible upon close inspection. Because it makes use of a biological characteristic, iris recognition is considered a form of biometric verification. In iris recognition, the identification process is carried out by gathering one or more detailed images of the eye with a sophisticated, high-resolution digital camera at visible or infrared (IR) wavelengths, and then using a specialized computer program called a matching engine to compare the subject's iris pattern with images stored in a database.

BLOCK DIAGRAM:

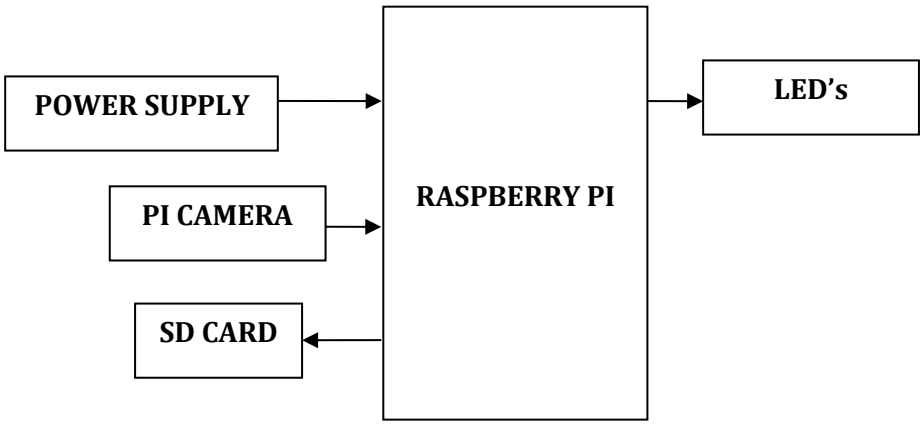


Fig. 1 Block Diagram

LITERATURE SERVEY

Iris recognition technique is one of the biometric verification and identification techniques which also include fingerprint, facial, retinal and many other biological features. They all present novel solutions for human being recognition, authentication and security applications. The iris has been in use as biometric from few decades. However, the idea of automating iris recognition is more recent.

In 1987, Flom and Safir obtained a patent for an unimplemented conceptual design of an automated iris biometrics system with the concept that no two irises are alike. The pioneering work in the early history of iris biometrics is that of Daugman. Daugman's 1994 patent and early publications became a standard reference model. Integro-differential operators are used to detect the center and diameter of the iris. The image is converted from Cartesian coordinates to polar coordinates and the rectangular representation of the region of the interest is generated. Feature extraction algorithm uses the 2D Gabor wavelets to generate the iris codes which are then matched using Hamming distance (Daugman, 2004). The algorithm gives the accuracy of more than 99.99%. Also the time required for the iris identification is less than 1 Sec.

Several studies have shown various possible techniques that can detect the driver drowsiness. Such driver drowsiness detection can be measured using physiological measures, ocular measure and performance measure. Among these physiological measure and ocular measure can give more accurate results. Physiological measure includes brain waves, heart rate, pulse rate measurements and these requires some sort of physical connection with the driver such as connecting electrode to the driver body. But this leads to discomfartable driving conditions. But ocular measure can be done without physical connection. Ocular measure to detect driver eye condition and possible vision based on eye closure is well suited for real world driving conditions, since it can detect the eyes open/ closed state non-intrusively using a camera.

In Real Time Driver Drowsiness System using Image Processing, capturing drivers eye state using computer vision based drowsiness detection systems have been done by analyzing the interval of eye closure and developing an algorithm to detect the driver's drowsiness in advance and to warn the driver by in vehicles alarm.

PROPOSED SYSTEM:

Eye movement controlled a wheelchair by using Raspberry Pi exists one that controls the wheelchair by monitoring eye movement**.**In these proposed system is eye blink cursor based controlled by wheel chair via eye movement.

ADVANTAGES:

- Handicap people can operate computers
- High accuracy

To get started with Raspberry Pi, we have to store required OS on SD card. Now to store OS on SD card we need to install OS on SD card. If you want to know how to install/store OS on SD card you can refer Installing Operating System Image on SD card. Here, we installed the Raspbian OS on SD card. Now, we have an SD card with installed OS and Raspberry Pi Board. Initially to use raspberry Pi we need computer monitor or Digital Display. We can directly connect Raspberry Pi to the Digital Display using HDMI cable.

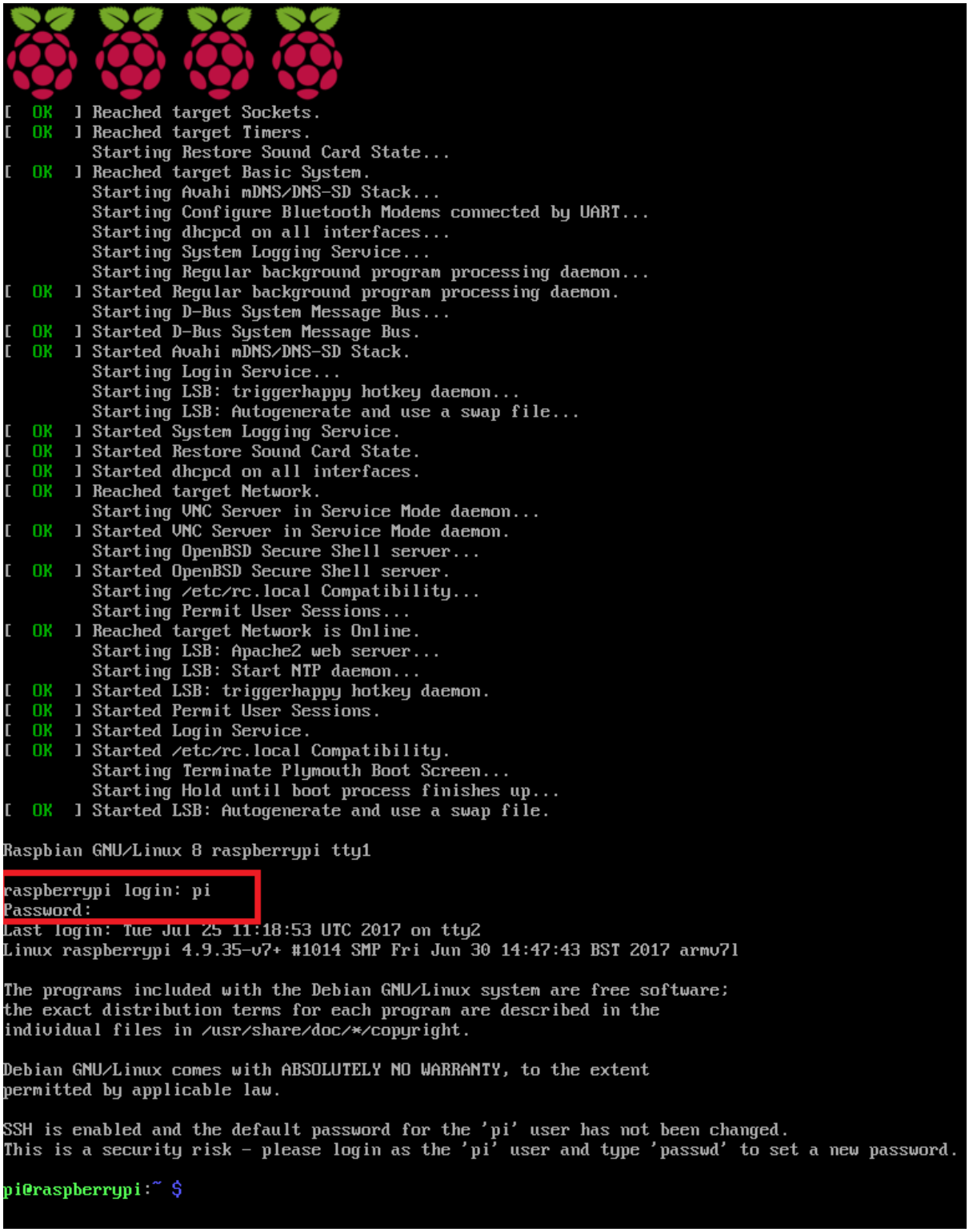
HDMI Cable

- But, if we have a computer monitor (VGA Display), then we need an HDMI to VGA converter along with a VGA cable for connecting Raspberry Pi with monitors. HDMI to VGA converter and VGA cable is shown below.

HDMI to VGA Converter

VGA Cable

Now, connect the Raspberry Pi to the Display/monitor and Power-On Raspberry Pi. We will get a Black command window asking for Login and Password as shown below



- Then, use the following login name and password

raspberrypi Login: pi

Password: raspberry

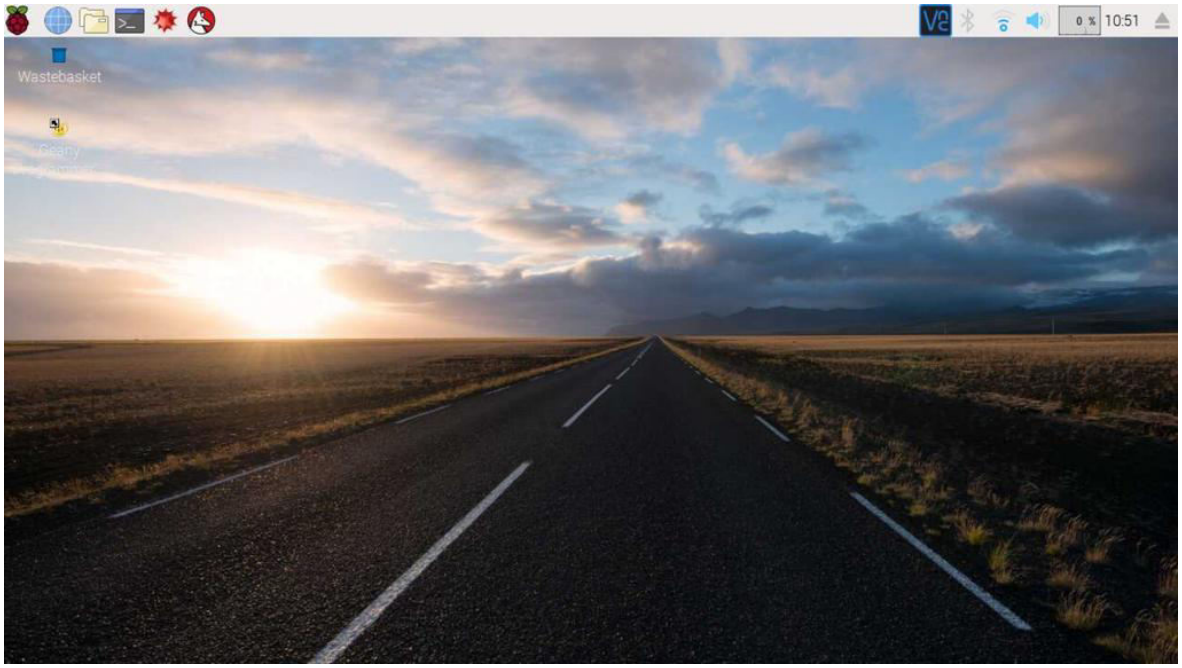
- This is the default user name and password. You can change the password after the first login.

The above command window can be used to operate Raspberry Pi.

- To get GUI environment on Raspberry Pi, use below command,

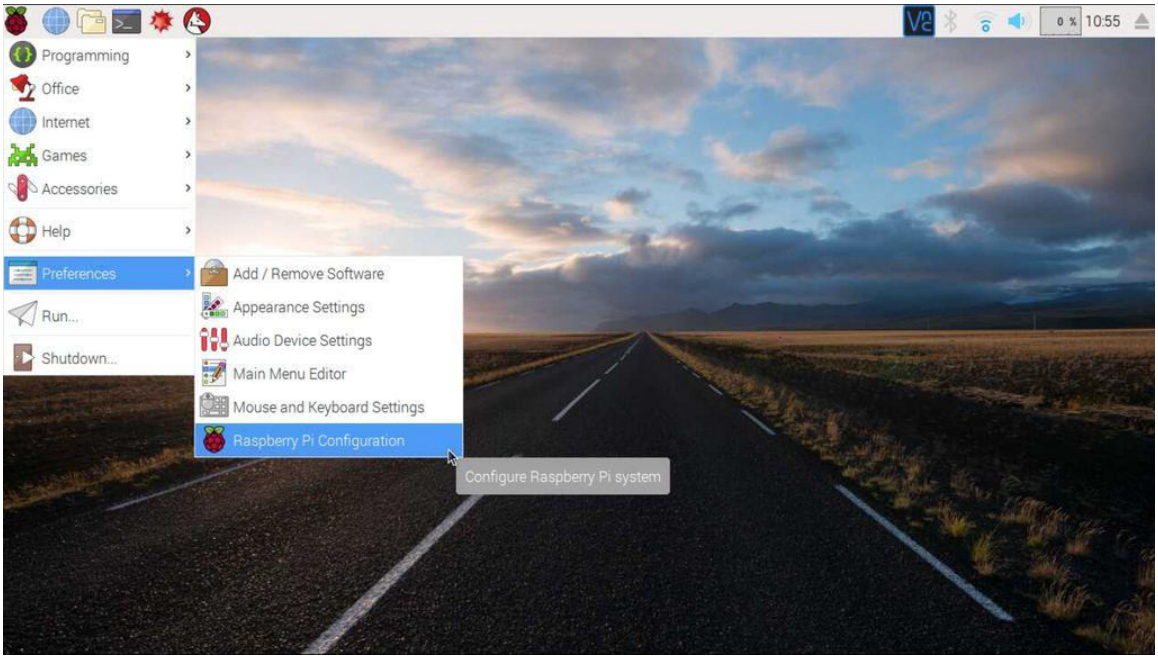
```
startx
```

And we will get Home Screen of Raspberry Pi as shown below:

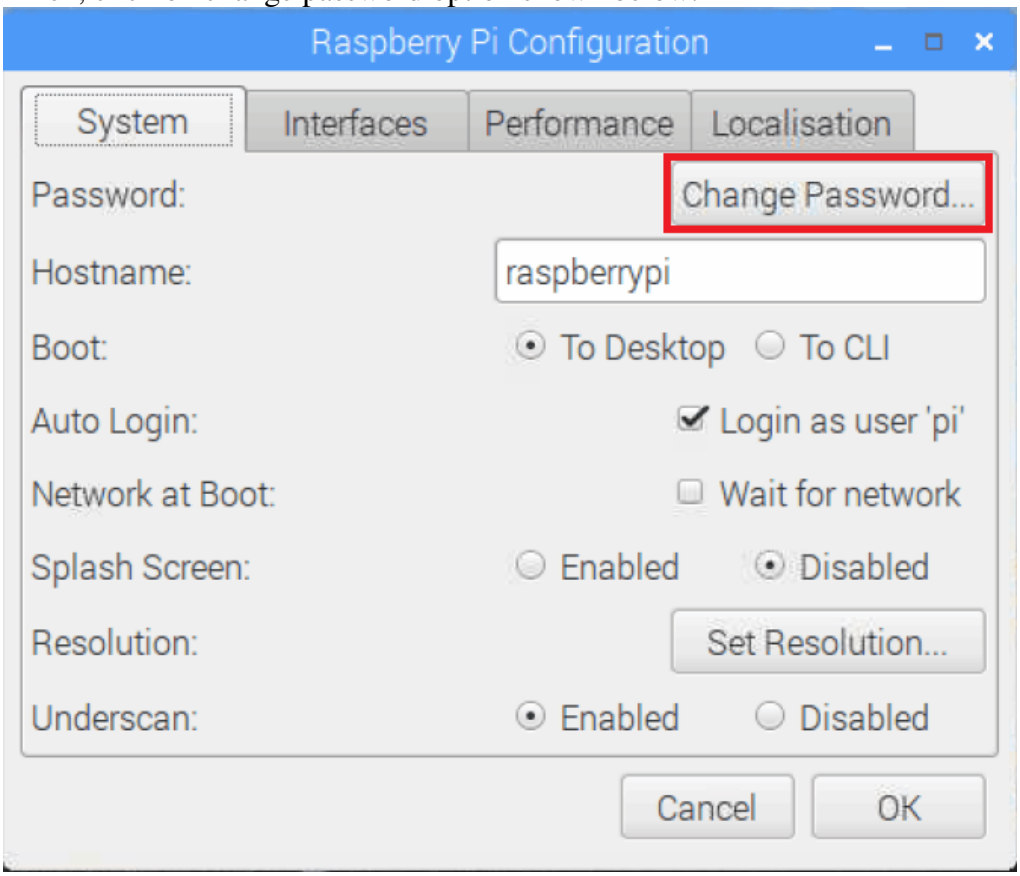


On display, there is a symbol of **raspberry** to the top-left corner of display. After clicking on it, we will get menu as shown below.

- As we can see, the Raspbian OS has installed Python 2 & 3. It also has different programming IDE like Geany, BlueJ Java IDE, etc. As raspberry pi 3 has On-chip Wi-Fi, we can connect it to the network and will get access over Internet.
- We can also change password of "Pi" user.
- To change password, click on **preferences** and then select **Raspberry Pi Configuration** which will provide a pop-up window.



- Then, click on change password option shown below.



Now, we are quite familiar with Raspberry Pi OS.

How to write C program on Raspbian OS

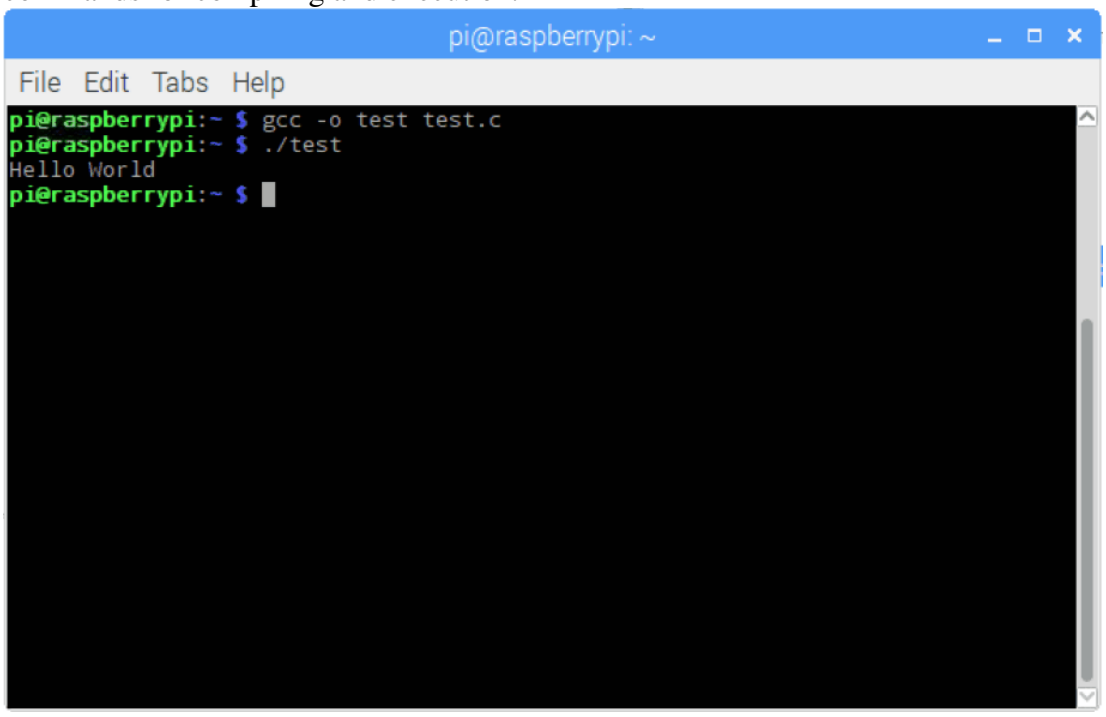
- So, let's write our First C code on Raspbian and execute it.
- First Create Empty file and label it with .c extension.
- Now write a small program to print "Hello World"

Program

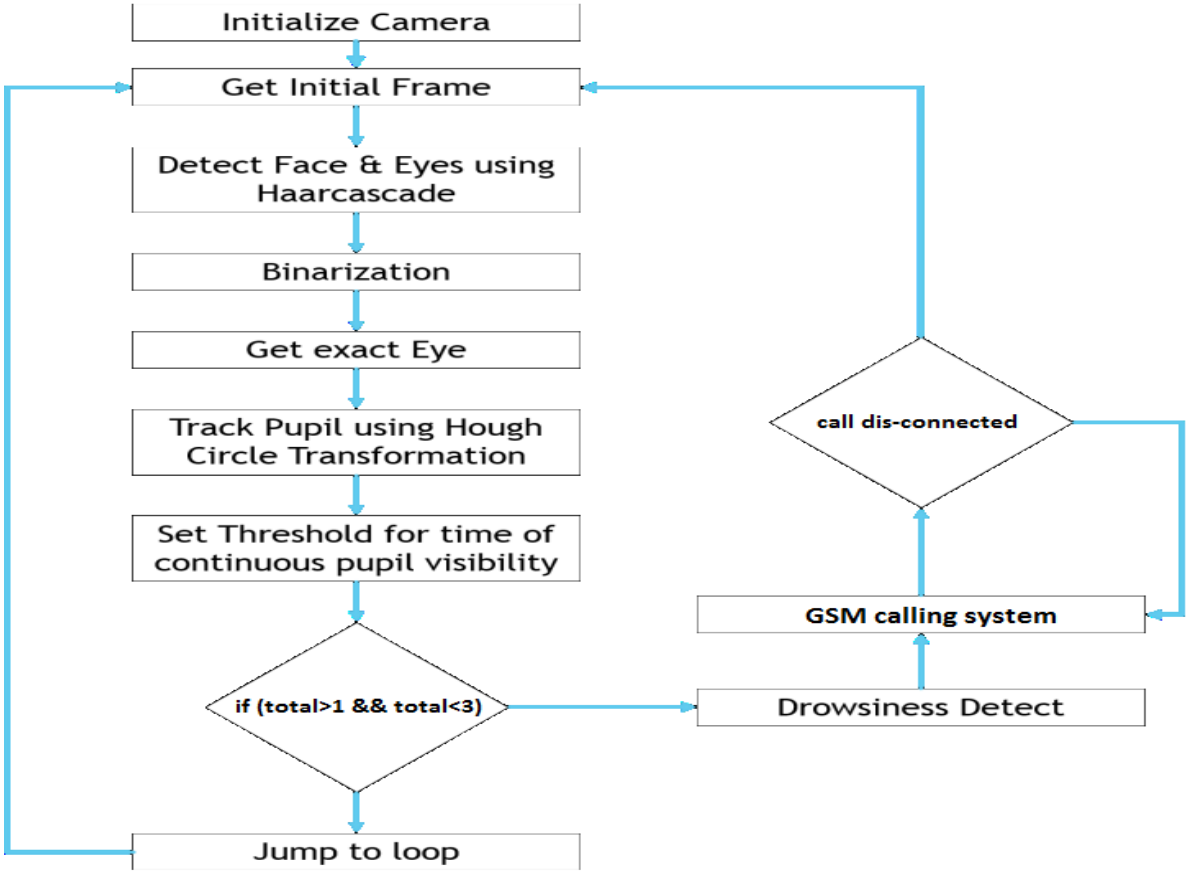
```
#include<stdio.h>
int main(){
```

```
    printf("Hello World");
    return 0;
}
```

After writing the code, open terminal (ctrl+alt+t) to execute it. Then, type following commands for compiling and execution.



FLOWCHART



Raspberry Pi will clubber with Pi Camera. Raspberry Pi will be using SD card, then the install raspbian OS and open cv on the raspberry pi. The first image will be captured by Pi Camera. Focus on the eye in the image and detect the center position of the pupil by opencv code. Take the exact position value of pupil as a reference, and then the next the different value of X, Y coordinates will be set for accurate command.

Raspberry Pi signals pass by GPIO to transistor circuit. One of the main aims of Eye Movement controlled wheelchair is to enable completely paralyzed patients to make their life more feasible and to provide the opportunity for independence. In order to use the pupil to control the mouse pointer (cursor) on the screen, the central coordinate of the screen is set as a start point. This position is used as the base for tracing, and the first position of the mouse pointer is set as the center of the screen. The moving position of the cursor takes the initial position as the base. As the pupil moves to one of the direction, the coordinate of the mouse pointer on screen change according to the action of the pupil. When the pupils return to the original position, the cursor stops moving.

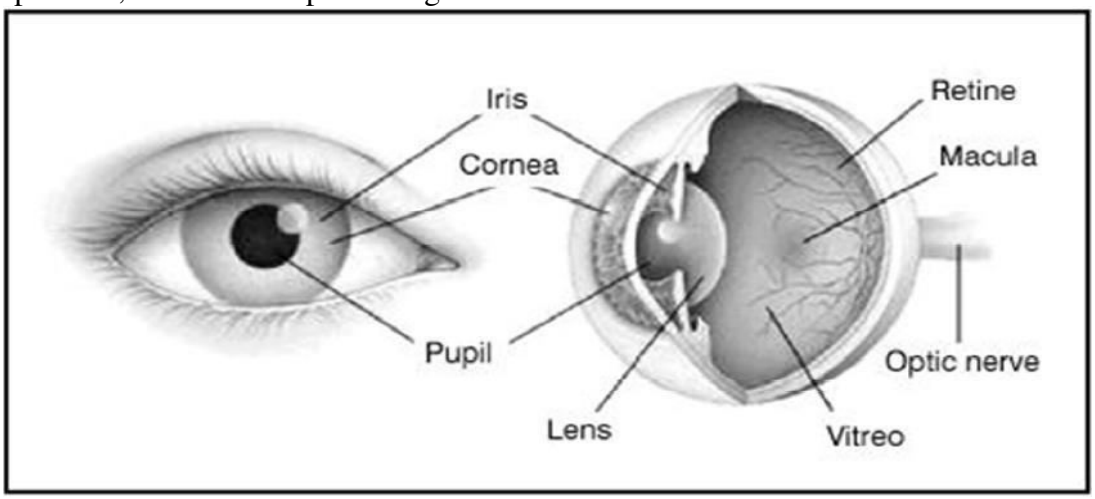


Fig. 2 Pupil anatomy

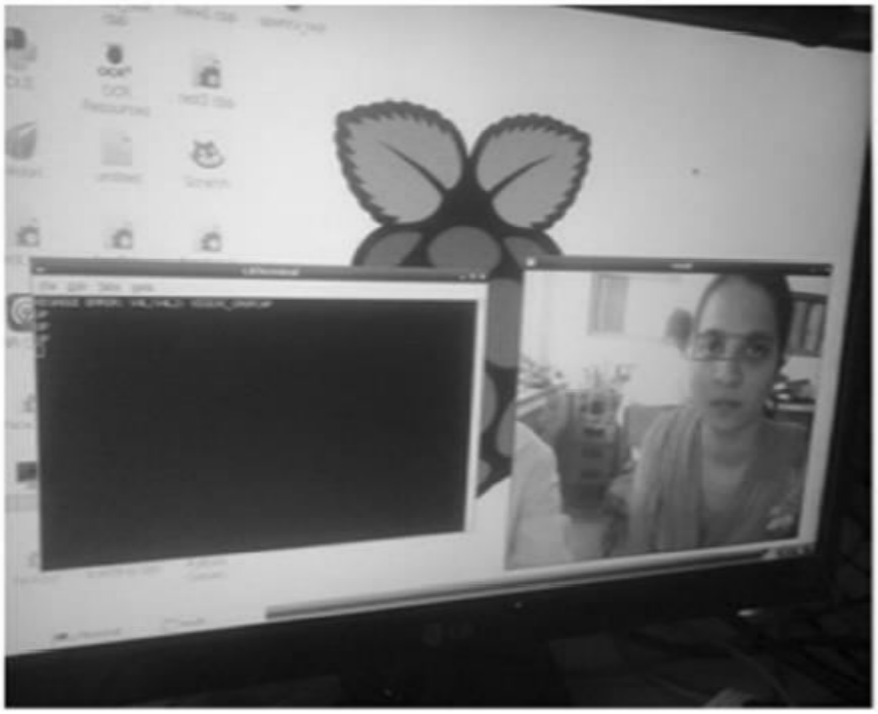


Fig. 3 Simulation results

The starting and stopping of the cursor are also controlled by movement of the eyes. When the user moves his eyes for a second, then the cursor starts or stops moving. That is if the cursor is in moving condition, then after an eye movement, it stops and vice versa. The eye direction arrows are used for testing purpose at the time of demonstration. Beside these arrows, a circle is seen in the green color. When some obstacle is detected in front of the eyes, this circle becomes red, a buzzer beeps and the cursor stops. Note that this circle doesn't appear red for the natural stopping of the cursor by eye movement.

CONCLUSION

The real time drowsiness detection system here to locate driver eyes and monitor them for fatigue is capable of detecting drowsiness in a rapid manner. The system is capable of differentiating a normal blink verses the drowsiness. Which can help preventing the driver from entering the state of sleepiness while driving? The system can be further improved and used in the automotive commercially. Based on the various images captured the knowledge is build which can help the system to decide the drowsy condition. Once the drowsy condition is identified the real time system issues an alarm. When such system is implemented in automotive this can reduce the risk of possible accidents due to drowsiness.

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