RASPBERRY PI HELMET WEARING DETECTION USING OPEN CV VIOLATION

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ABSTRACT

Smart Helmet - Intelligent Safety Helmet for Motorcyclist is a project undertaken to increase the rate of road safety among motorcyclists. The idea is obtained after knowing that there is increased number of fatal road accidents over the years. Through the study identified, it is analysed that the helmets used is not in safety features such as not wearing a helmet string and not use the appropriate size. Therefore, this project is designed to introduce safety systems for the motorcyclist to wear the helmet properly. With the use of Image processing unit using Raspberry Pi and OpenCV , the motorcycle can move if there is helmet pound wearing, in accordance with the project title Smart Helmet - Intelligent Safety for Motorcyclist using Raspberry Pi and Open Cv. Safety system applied in this project meet the characteristics of a perfect rider and the application should be highlighted. The project is expected to improve safety and reduce accidents, especially fatal to the motorcyclist.

INTRODUCTION

Two-wheelers, the mode of transport most Indians use, continue to be the most vulnerable to accidents. Indian roads were at their deadliest in 2014 claiming more than 16 lives every hour on average. Over 1.41 lakh people died in crashes, 3% more than the number of fatalities in 2013. Accidents involving two-wheelers and accounted for nearly half of the lives lost in road crashes. While 13,787 two-wheeler drivers were killed in crashes, 23,529 other people were killed in accidents involving these vehicles, while close to 1.4 lakh people were left injured in them.

The top five states - Uttar Pradesh, Tamil Nadu, Maharashtra, Karnataka and Rajasthan - accounted for over 40% of the fatalities. Among 53 mega cities, Delhi registered the highest number of fatalities at 2,199 and Chennai recorded 1,046 such deaths. Bhopal and Jaipur ranked third and fourth with the city roads claiming 1,015 and 844 lives respectively. A motorcycle’s helmet is a type of protective headgear used by the motorcyclist. The main purpose is for safety, which is to protect the rider's head from the impact during an accident. It protects the rider’s head as the helmet provides ventilation system. Speeding and not wearing a helmet are the main reasons of fatalities and injuries. Here we are implementing a model which uses DC Motor, Relay and Raspberry Pi which in real time system is related to the ignition system of the Motorcycle.

BLOCK DIAGRAM

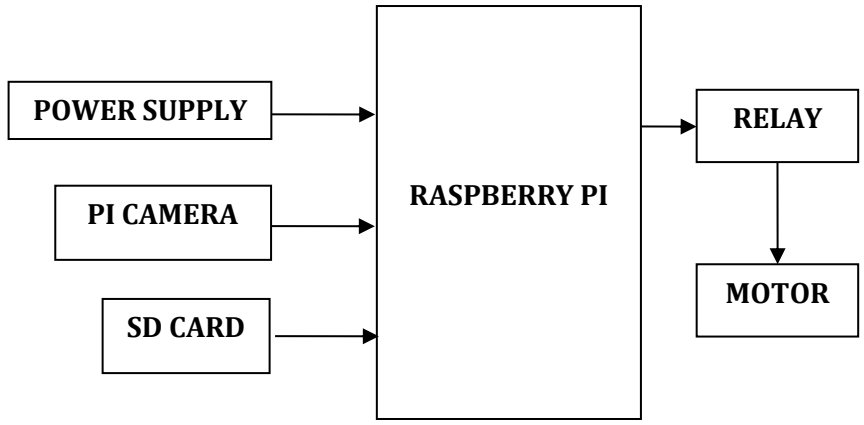


Fig. 1 Block Diagram

LITERATURE SERVEY

The system automatically detects motorcycle riders and determines that they are wearing safety helmets or not. The system extracts moving objects and classifies them as a motorcycle or other moving objects based on features extracted from their region properties using K-Nearest Neighbour (KNN) classifier. The heads of the riders on the recognized motorcycle are then counted and segmented based on projection profiling. The system classifies the head as wearing a helmet or not using KNN based on features derived from 4 sections of segmented head region. Experiment results show an average correct detection rate for near lane, far lane, and both lanes as 84%, 68%, and 74%, respectively [3].

The helmet is the main safety equipment of motorcyclists, but many drivers do not use it. If an motorcyclist is without helmet an accident can be fatal. This paper aims to explain and illustrate an automatic method for motorcycles detection and classification on public roads and a system for automatic detection of motorcyclists without helmet. For this, a hybrid descriptor for features extraction is proposed based in Local Binary Pattern, Histograms of Oriented Gradients and the Hough Transform descriptors. Traffic images captured by cameras were used [4].

It is known that head gesture and brain activity can reflect some human behaviours related to a risk of accident when using machine-tools. The research presented in this paper aims at reducing the risk of injury and thus increase worker safety. Instead of using camera, this paper presents a Smart Safety Helmet (SSH) in order to track the head gestures and the brain activity of the worker to recognize anomalous behavior. Information extracted from SSH is used for computing risk of an accident (a safety level) for preventing and reducing injuries or accidents. The SSH system is an inexpensive, non-intrusive, non- invasive, and non-vision-based system, which consists of an Inertial Measurement Unit (IMU) and dry EEG electrodes. A heptic device, such as vibrotactile motor, is integrated to the helmet in order to alert the operator when computed risk level (fatigue, high stress or error) reaches a threshold.

Once the risk level of accident breaks the threshold, a signal will be sent wirelessly to stop the relevant machine tool or process [5].

A smart helmet is a special idea which makes motorcycle driving safer than before. This is implemented using GSM and GPS technology. The working of this smart helmet is very simple, vibration sensors are placed in different places of helmet where the probability of hitting is more which are connected to microcontroller board. So when the rider crashes and the helmet hit the ground, these sensors sense and gives to the microcontroller board, then controller extract GPS data using the GPS module that is interfaced to it. When the data exceeds minimum stress limit then GSM module automatically sends message to ambulance or family members [6].

This project is specially developed as to improve the safety of the motorcycle's rider. Motorcyclist will be alarmed when the speed limit is exceeded. A Force Sensing Resistor (FSR) and BLDC Fan are used for detection of the rider's head and detection of motorcycle's speed respectively. A 315 MHz Radio Frequency Module as wireless link which able to communicate between transmitter circuit and receiver circuit. PIC16F84a is a microcontroller to control the entire component in the system. Only when the rider buckled the helmet then only the motorcycle's engine will start. A LED will flash if the motor speed exceeds 100 km/hour [7].

PROPOSED SYSTEM

Here we are implementing a model which uses DC Motor which in real time system is related to the ignition system of the Motorcycle. In our proposed system the DC Motor turns on only when the rider is wearing the helmet from which Standard symbol is detected with the use of Pi camera, which in turn will be connected to Raspberry Pi. 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.

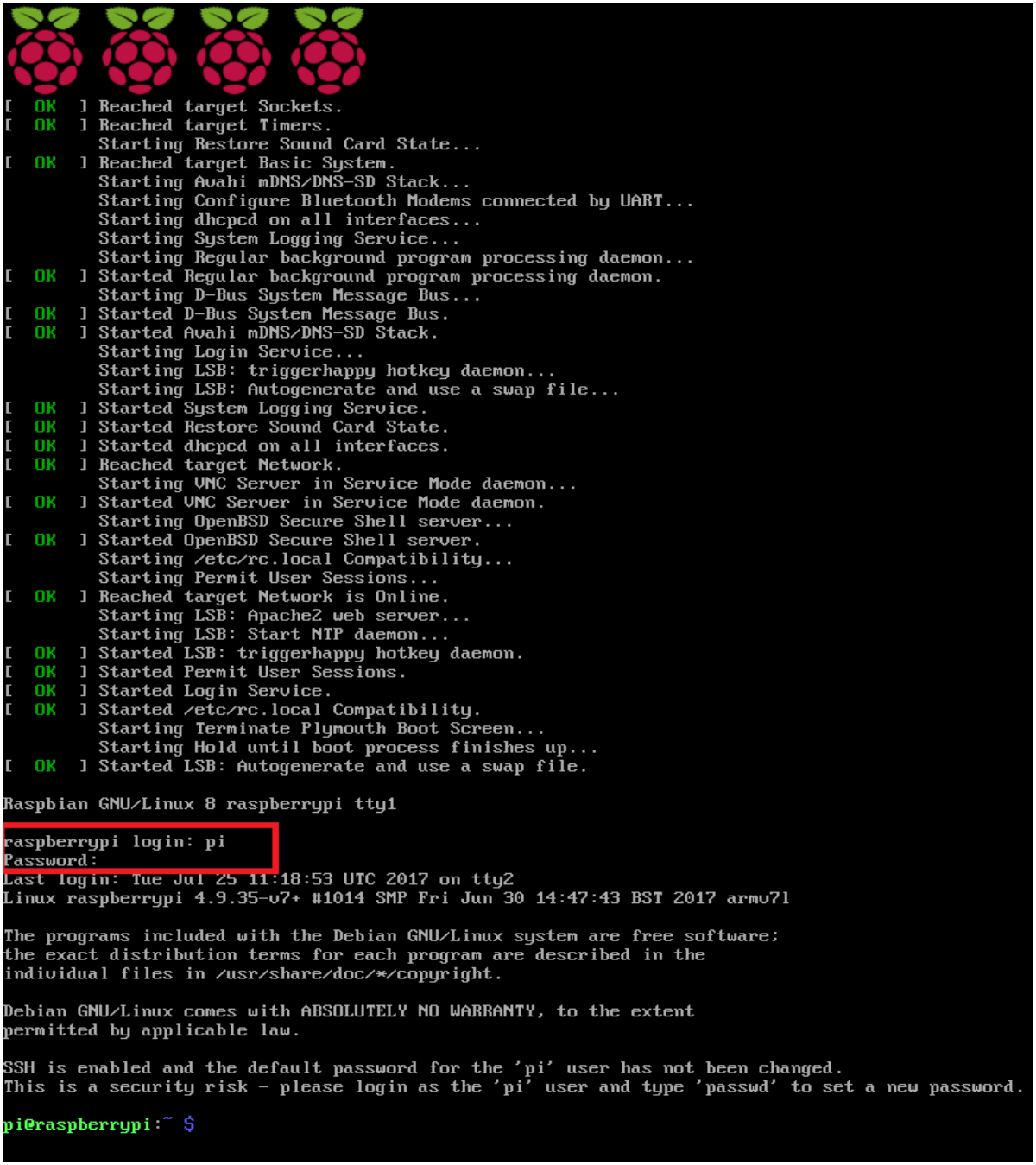
HDMI Cable

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

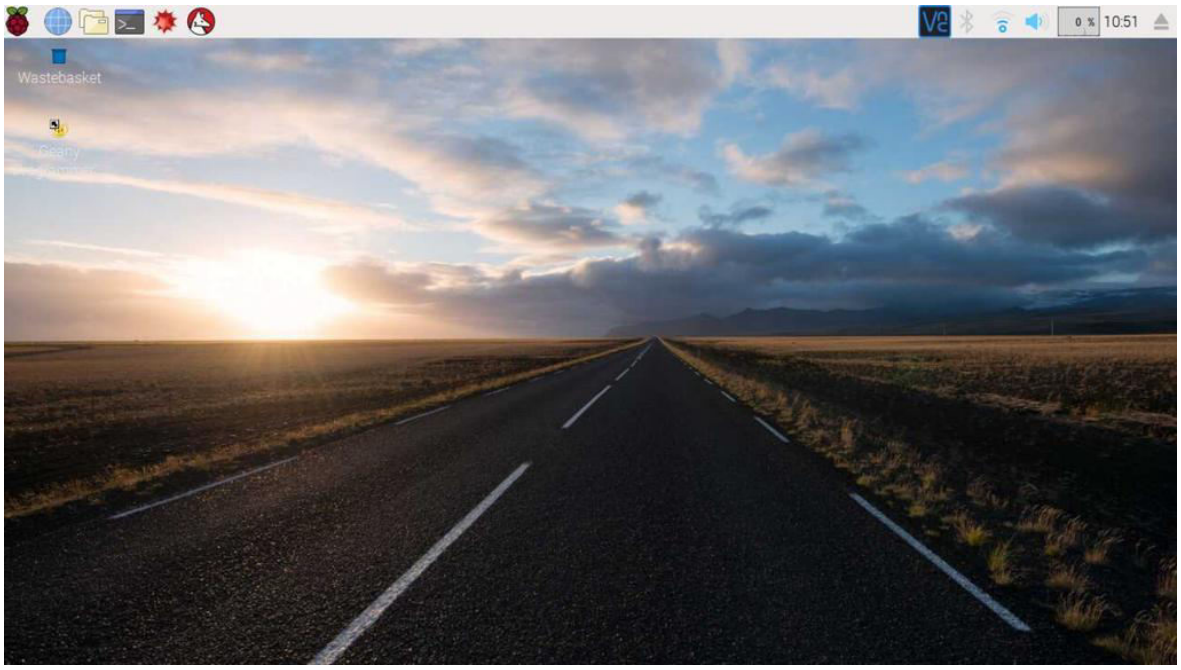
This is the default user name and password. You can change the password after the first login.

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:

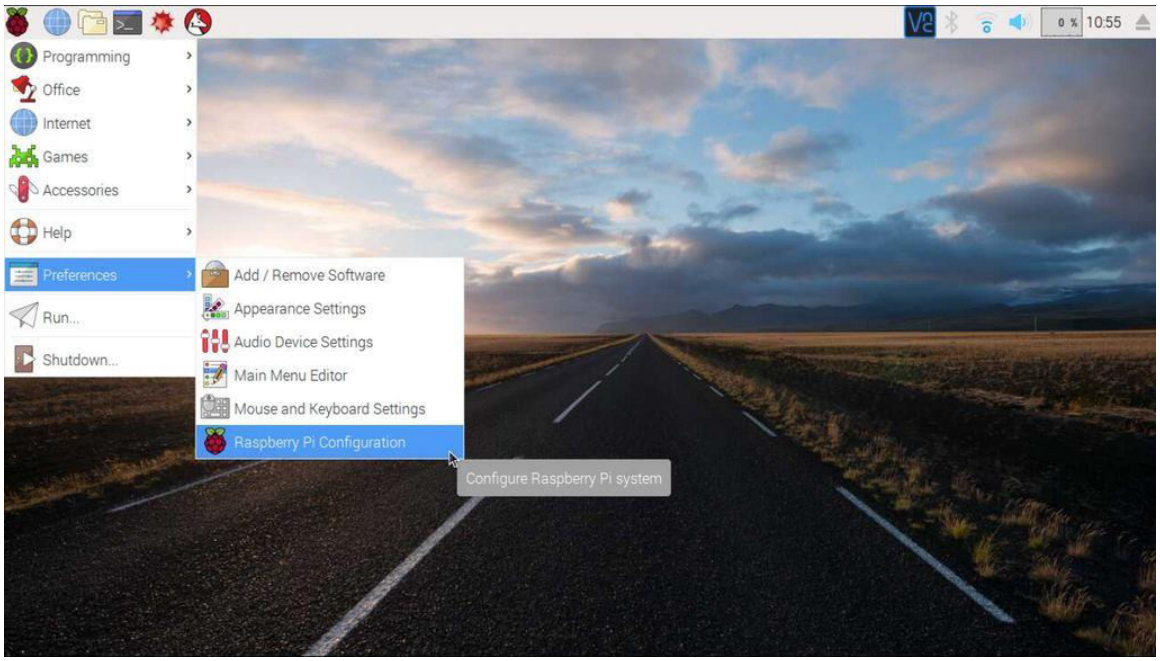


On display, there is a symbol of **raspberry** to the top-left corner of display. After clicking on it, we will get menu as shown below.

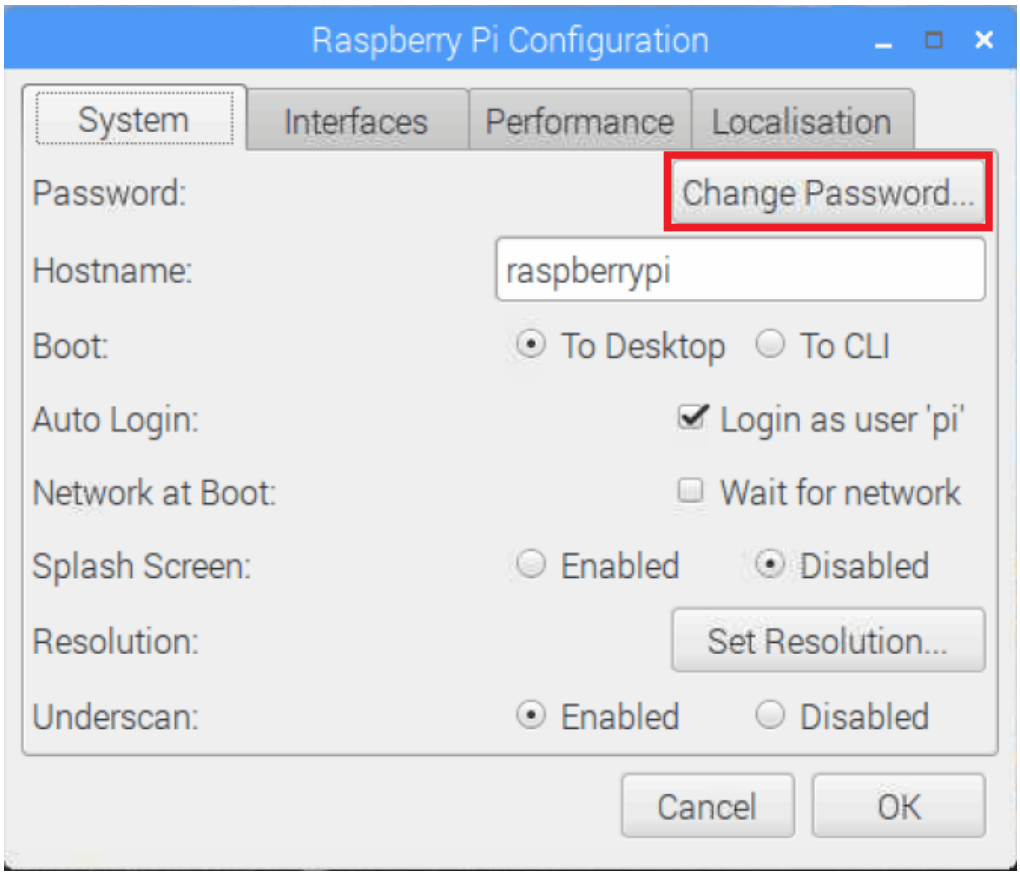
As we can see, the Raspbian OS has installed Python 2 & 3. It also has different programming IDE like Geany, BlueJ Java IDE, etc. As raspberry pi 3 has On-chip Wi-Fi, we can connect it to the network and will get access over Internet.

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.

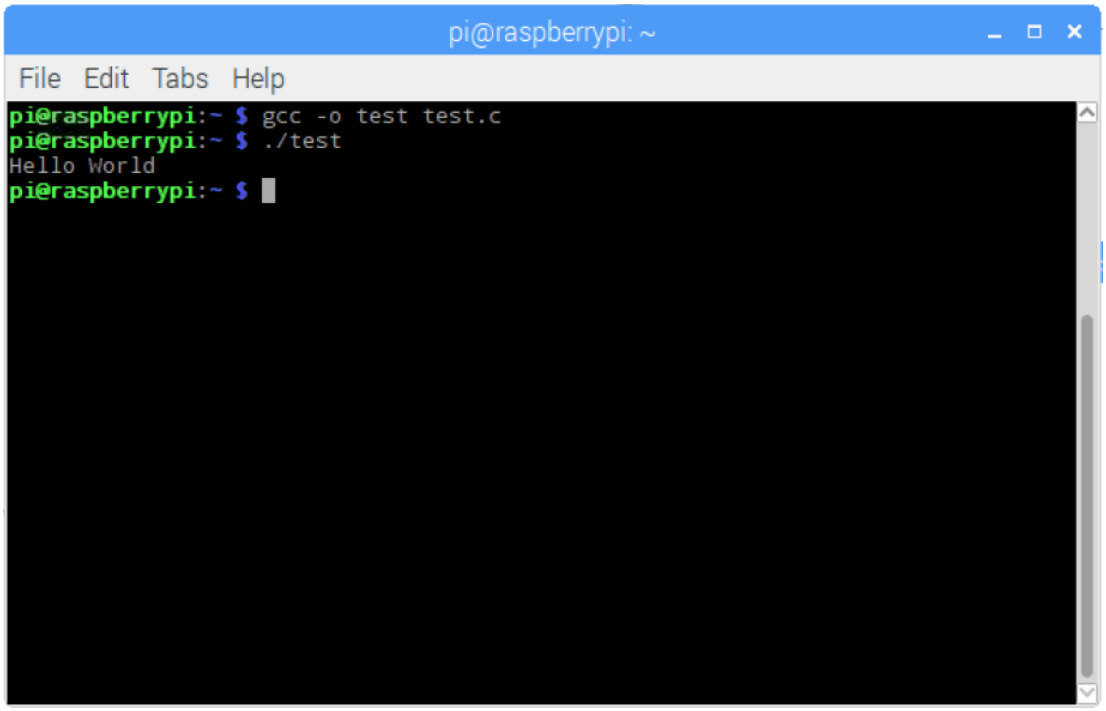
First Create Empty file and label it with .c extension.

Now write a small program to print "Hello World"

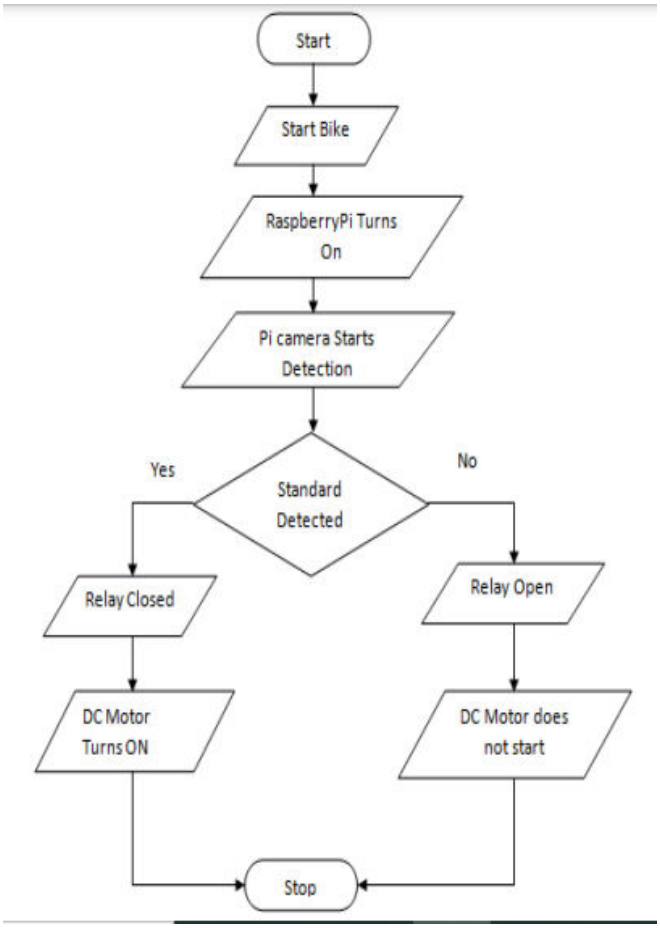
Program

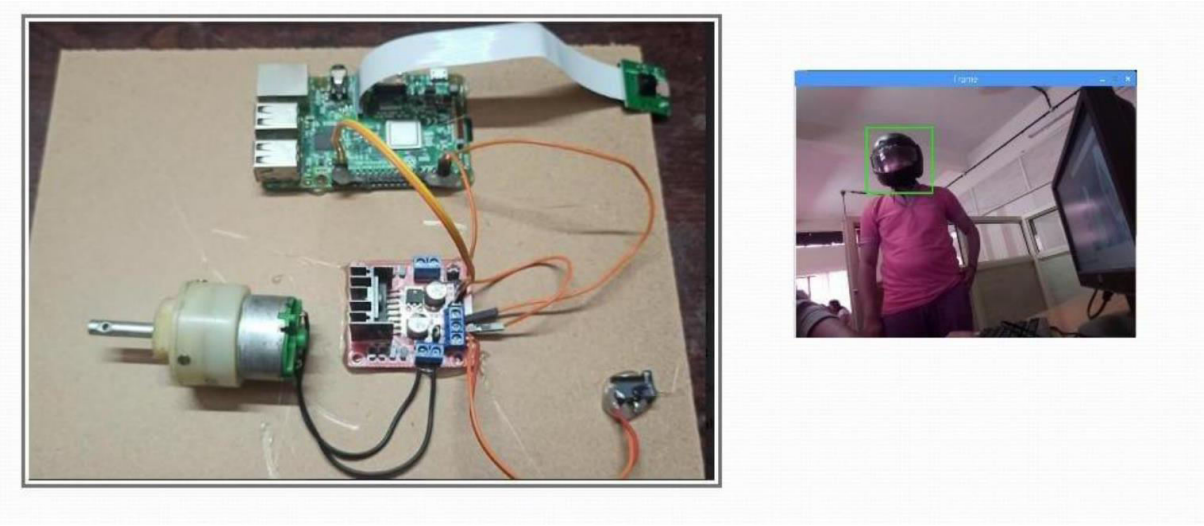
```
#include<stdio.h>

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.



6.3 FLOWCHART:





Proposed configuration

CONCLUSION

The scope of this project is a motorcycle rider that they care about their safety while riding. As we know, the motorcycle riders are now less concerned about their safety while riding, then the creation of this helmet safety rates can be increased and rate of road accidents can be reduced. The accident rates for motorcyclists are increasing from year to year, a Smart

Helmet for Motorcyclist using Raspberry Pi and openCV which in future will inspire safety features for motorcyclists.

LIMITATIONS

The algorithms used in this work are implemented in neural networks and neural networks has few limitations in real time. These are enlisted as:

- Process is slow.

- Result is not so accurate

- The methodology is complex.

Also the time after successful detection of face is indefinite. This time should be set according to user needs. This system has only one admin and this may propose a problem if that person is not available to add any other user in case of emergency.

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