NARCOTICS IDENTIFICATION AND INTERACTION CHECKER BASED ON IoT & MACHINE LEARNING TO MINIMISE FATALITIES

A PROJECT REPORT

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BONAFIDE CERTIFICATE

Certified that this project report titled "**NARCOTICS IDENTIFICATION AND INTERACTION CHECKER BASED ON IoT & MACHINE LEARNING TO MINIMISE FATALITIES"** is the bonafide work of **Harsh Tiwari [Reg No: RA1611008010201], Kush Deepak Sharma [Reg No: RA1611008010301], Sanal Singh Tomar [Reg No: RA1611008010509**], who under my direction conducted the project research. Furthermore, it has been confirmed that to the best of my knowledge the dissertation herein mentioned is not part of any other thesis or thesis in which the graduation or award for this or another nominee is presented on previous occasions.

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ABSTRACT

Usage and misuse of alcohol, tobacco and illicit medications and abuse of prescription drugs cost people billions of dollars a year, increasing the prices, violence and lost efficiency in healthcare. Every year, more than 300,000 worldwide people die from illegal drugs and alcohol, while tobacco and other smoke-consuming medications are correlated with an annual estimated 1.480,000 deaths. The problem scenario which is being analysed causes a lot of chaos and loss of not only monetary components of the economy but also the leaves a shattering damage to the manpower and the infrastructure and misguides the youth. Primary methods which are being congregated to stop or minimise the situation from deteriorating further are the use of IoT sensors like MQ-3 for alcohol and smoke detection, pulse and blood pressure sensor and further making it more precise by the use of some machine learning modules for face detection namely OpenCV which uses Python. It will help in law enforcement and safety of the people while driving and many other activities by breaking the circuit which will finally result in the shutting down of motor which will lead to automobiles or any other instrument to come to a stationary state. Also it could be majorly used in the field of sports to test the athletes and to assure that they do not consume any unauthorised or illegal stamina enhancers that break the normal physiological constraints of the human body. The future prospects and scopes of this tool are unlimited and this can be integrated within many bigger systems which have an intermediate state that requires checking the narcotic materials or any physiological anomalies in the user and can be of great use of different user groups of different communities. Therefore, would help in decreasing the unnatural death rate which is caused by the excessive consumption of alcohol or drugs and law enforcers to catch the defaulters easily so that they would not indulge in criminal activities and can be sent for rehabilitation.

ACKNOWLEDGEMENT

In this project we have made efforts. However, without the kind help and support of many people and organisations this would not have been possible. We would like to thank them all sincerely.
Dr. K. Kottilingam is dear to us for the encouragement and constant supervision, as well as the provision of necessary project information and his support in the project's completion.

We wish to express our thanks for the kind cooperation and encouragement our parents and members of the Institute of Science and Technology of SRM have given us to complete this project.

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We also thank our colleagues for creating the project and those who have supported us enthusiastically with their skills. We appreciate it.

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ABBREVIATIONS

NAS neonatal abstinence syndrome

DUI driving under the influence

BAC blood alcohol content

FFT fast Fourier transform

ODE ordinary differential equation

BSD Berkeley Software Distribution

LIST OF SYMBOLS

^ Conjunction

CHAPTER 1

INTRODUCTION

1.1 GENERAL

Teenagers who use drugs may act out and may do poorly or drop out of school. Using drugs as the brain continues to grow can cause permanent brain changes and put the patient at increased risk of dependency. Adults who use drugs can have trouble clearly thinking, recalling and paying attention. Because of their drug use they can develop poor social habits, and suffer from their work performance and personal relationships. Drug use by parents can mean dysfunctional homes full of pressures, and child abuse and neglect. Such conditions affect children's well-being and growth at home, and can set the stage for next-generation drug use. Babies exposed to drugs in the womb may be born premature and underweight. This exposure can slow the child's ability to learn and affect behavior later in life. They may also become dependent on opioids or other drugs used by the mother during pregnancy, a condition called NAS.

1.2 PURPOSE

The planet today faces an inevitable death from driving under the influence of narcotics and DUI. According to the Transport Research Wing survey, the main objective of this paper is to reduce road accidents globally, notably in our country, by 5% from 2019 to 2020. From these analyzes road accidents occur every day in India around 1,374 deaths. Among the data available, between the ages of 15-34, 54.1 per cent of people were killed.

According to the WHO report, under the influence of drunken driving, 70 per cent of total human road deaths were caused. The Internet model is closely associated with the automated detection, mitigation and policy of drug products. The IOT is only compatible with the hardware and software of the device.

An alcohol vapor detector is used for estimating BAC in the breath alcohol content (BrAC) to determine the rider's ethanol impairment.

Many experiments have been carried out to diagnose the driver's somnolence, which suggest various methods for calculating alcohol amounts. The research done here is special and proposes a far more reasonable and powerful structure with the implementation of algorithms that can easily be used as a prototype. The tools used for the development of this project is all available as open source and free download. The design also includes two open source embedded application development board Raspberry pi and Arduino Uno to speed up real time processing.

1.3 SUSTAINABLE TECHNOLOGY

- IOT(Internet of Things)
- Machine Learning

1.4 MOTIVATION AND PROBLEM STATEMENT

Human beings are spending billions of dollars annually in rising health expenses, violence and loss of productivity for the use and abuse of alcohol, nicotine and illicit drugs as well as the abuse of prescription drugs. Every year more than 300,000 people are killed by illegal drugs and alcohol, and the additional 1,480,000 deaths are caused each year by tobacco and other smoke-ingested products. The problem scenario which is being analyzed causes a lot of chaos and loss of not only monetary components of the economy but also the leaves a shattering damage to the manpower and the infrastructure and misguides the youth. Primary methods which are being congregated to stop or minimize the situation from deteriorating further are the use of IoT sensors like MQ-3 for alcohol and smoke detection, pulse and blood pressure sensor and further making it more precise by the use of some machine learning modules for face detection namely OpenCV which uses Python. It will help in law enforcement and safety of the people while driving and many other activities by breaking the circuit which will finally result in the shutting down of motor which will lead to automobiles or any other instrument to come to a stationary state. Also it could be majorly used in the field of sports to test the athletes and to assure that they do not consume any unauthorized or illegal stamina enhancers that break the normal physiological constraints of the human body. The future prospects and scopes of this tool are unlimited and this can be integrated within many bigger systems which have an intermediate state that requires checking the narcotic materials or any physiological anomalies in the user and can be of great use of different user groups of different communities. Therefore,

would help in decreasing the unnatural death rate which is caused by the excessive consumption of alcohol or drugs and law enforcers to catch the defaulters easily so that they would not indulge in criminal activities and can be sent for rehabilitation.

1.5 RESEARCH OBJECTIVE

This section shows the steps towards achieving the objective of detection of drowsiness and alcoholic intoxication. Detection of drowsiness can be done in several ways like remotely measuring the heart rate or facial expression of the person to be tested. This work is the combination of face detection, eye region detection and eye closing rate detection in real time environment. OpenCV is open source software for creating computer vision related task and it is available as an extension for C, C++, Java and Python programming languages. Making a computer vision application in real time is a challenging task and it needs efficient processing power. Raspberry-pi is an ARM11 controller based small sized open source CPU with 512 MB RAM and supports 700 MHz processing speed. It supports interfacing of various low level and high level peripherals including digital camera and GPIO's. It can work with light weight Linux based operating system Raspbian which is loaded with Python-IDLE programming software. OpenCV linux version is installed to Raspberry-pi. Haar Featurebased Cascade Classifier technique [23] is used for the detection face region and eye region. It is a learning based approach where a function is trained from lots of similar and dissimilar images. It is then used to detect objects in other images. Open CV is packed with a trainer as well as detector. The trainer is used to create our own classfier for an object. For proper detection 1000 eye closing images has been put as similar images and 1000 dissimilar images are also included. The resulting classifier is stored in a file with .xml extension which is used in the programming environment. On the other hand to detect the alcohol intake bye the person, an alcohol gas sensor or breathalyzer MQ-3 is interfaced with the Arduino system board which will scan whether the person in driving seat is drunken or not. Based on the detection of drowsiness or alcoholic intoxication, an alarm will be turned on or the car the car's power source can be cut down through a relay to stop the car or preventing the driver to start the car.

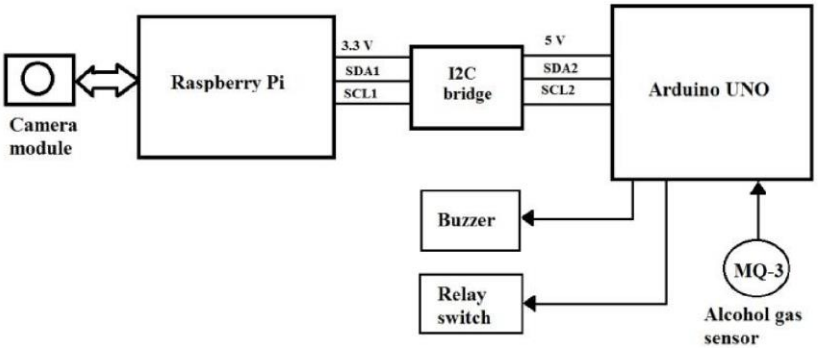
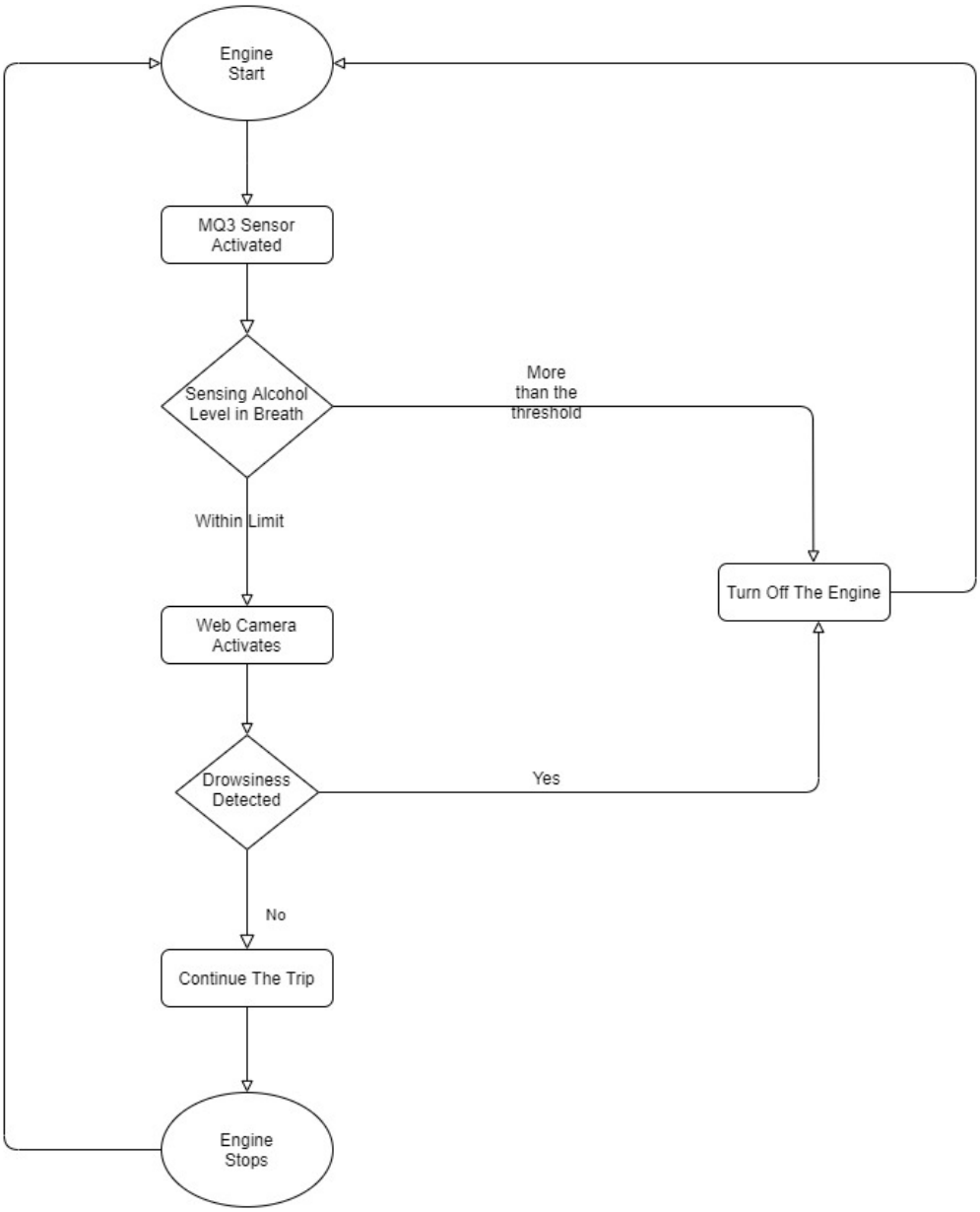

Raspberry Pi
3.3 V
SDA1
SCL1
I2C bridge
5 V
SDA2
SCL2
Arduino UNO
Camera module
Buzzer
Relay switch
MQ-3
Alcohol gas sensor

Figure 1


Engine Start
MQ3 Sensor Activated
Sensing Alcohol Level in Breath
More than the threshold
Within Limit
Turn Off The Engine
Web Camera Activates
Drowsiness Detected
Yes
No
Continue The Trip
Engine Stops

CHAPTER 2

LITERATURE REVIEW

EXISTING SYSTEM

It talks about 2029, about 35 years on, and at the current time, the planet, its population and the gadgets are linked in a manner that the Internet can never ever conceptualize its noteworthiness. The problem relates to fuel emission and the degree to which air pollution occurs due to the red signal of the engine. It explains the traffic signal's waiting time unintentionally even though there are no congestion automobiles moving on the roads, even then you have to standby and thus by changing the road communication signals to the quantity of automobiles at standby. The automatic driving car is represented by cameras to recognize the white lines and signs.

It says that the spotting appliance is mounted within the automobile to track the rider if the rider follows regulation, such as the stop sign brake and driving. Describes wearable glass that alerts the driver to the situation by using cloud storage and directing drivers. Today, one day road accidents are becoming a major issue for public safety. The annual report on transportation mischance in our country in the year of 2019 released by Transport Research Wing. Our country is one among the world's highest motorization growth countries, but now the impact of safe road levels is significant. In road incidents, the figures rose by 2.5% to 5,01,423 in 2015, from 4,89,400 in 2014.

Likewise, from 1.39,671 in 2014 to 1,46,133 in 2015, the multitude of population deceased in transportation mishaps racked up 4.8%. Lesions rose as 4,93,474 in 2014 to 5,00,279 in 2015, by 1,4%. Injury also rose.

The frequency of road accidents will be calculated by an rise from 28.5 in 2014 to 29.1 in 2015 in the number of people killed in 100 accidents. The 2015 road accident report shows that approximately 1,374 injuries and 400 fatalities occur every day, leading to an average of 57 incidents in our country and 17 lives lost every hour.

In 2019 alone, more than 100,000 deaths in the transport sector were specifically related to drivers who met the legal limit. Many collisions occur because of the driver's carelessness. Most people are

drinking and driving, a felony. Such drivers pose a threat to safety and should be quickly apprehended. While drunken driving laws exist, the successful enforcement of drunk driving laws still needs to be addressed and in some cases even controversial.

We design a program for this purpose that will allow traffic police officers to assess whether or not they are eligible to drive.It is essentially an integrated device that incorporates software and hardware that can accomplish those specific functions with the Avr- ATmega 16 microcontroller. The Alcohol sensor will send the analog resistive output to the microcontroller to detect the concentration of alcohol and then display more alcohol detection message on an LCD.

A L293D engine circuit that is responsible for working the DC engine is controlled by the microcontroller. The car will thus be halted when the alcohol level is detected and related information is passed via GSM to the nearby site.
Some of the authors suggested their ideas among them, as per previous research on alcohol detection.

- The controller and ethanol detector was used as key part for automated ethanol detection based on the drug sensor mq-3 and Internet Of Things. The author is used with the alcohol level in the same breath as the breath analyzer, the Liquid Crystal Display, the module General Packet Radio Service in the automobile. When ethanol is measured above the mark, the sound is immediately prompted. the sound is immediately relocated.

- Second, the Android Phone has been used to determine whether or not the user is drunk with the acelerometer and direction monitor. A sudden braking system android software is installed into the computer with acceleration data of the car. When the vehicle hits the speed limit. Then the system gets starter alert activated. Braking Fast

- The third approach involves the intoxicated person's physiological behavior and physical changes that can be identified with the aid of special sensors. Sudden rise in heart rhythm is the biggest changes in the body.

- Drinking exhaustion and alcohol is a grievous complication, resulting in 1000s of transportation mishaps annually. The precise amount of injuries including slumber and alcoholism is difficult to accurately estimate, but road surveys show that driver tiredness may be up to 20 percent a contributing factor and about 31 percent of all road accidents because of alcohol. The goal of this project is to take another step to solve this serious problem. The paper is a modern concept for detecting the driver's drowsiness and alcohol intake and taking appropriate steps in real time. The architecture is based on the concepts of machine view and integrated device implementation. For closed eye detection is used the hair feature-based cascade classificatory process. In comparison, an alcohol gas sensor system that acts as the breathing alcoholic and measures the alcohol content of the blood (BAC) from breathing alcohol concentration (BRAC) is used to detect the driver's alcohol poisoning. There is a lot of literature that reports driver drowsiness detection. offers a number of methods for calculating alcohol volumes. The experimentation carried out here differs and provides a more reliable as well as efficient architecture, quickly used as a test and implementation of the algorithm. This project provides free distribution and open source code. The architecture is also made up of two modules compliant with Raspberry pi and Arduino Uno Open Source to boost actual-time care. Consequently, the new concept is economic and does not impair performance. Pi device board Raspberry is interfaced with a 5-megapixel CMOS Color OV5647 that is capable to capture images and video on real time. Raspberry pi should be used to process the captured frame. With its Free CV, Raspberry pi algorithm, the Python programming language is introduced. The near eye identification is based on the hair case classification methodology and contrasts many similar picture databases. The closing rate of the eye is determined every five seconds and the Raspberry pi sends the alert data over the I2C serial bus to the Arduino Uno slave computer, when reaching the predefined threshold value. When the warning message is received, the Arduino does a series of tasks, such as sending buzzers or disabling relays to pause the automobile. The Arduino coding interfaces severally with the alcohol sensor, the buzzer and the relay. Meanwhile, Arduino is obtaining alert data from the Raspberry pi, which enables some pre-defined tasks to be performed; it constantly analyses and measures the alcohol content of the air in the blood (percent BAC). Once the measured BAC percent exceeds the threshold, the same buzzer is given again and the relay is switched off.

- The steps to achieve the target of drowsiness identification and drug poisoning are listed here. Dizziness identification can be achieved in different ways, such as remote monitoring of a person's heart rate or facial expression. This work incorporates the identification of the face, eye area and lashes flapping rate with actual-time scenarios. OpenCV is one of the free available firmware to build a function associated with computer vision, it is abundant on the net in form of a utilities library for the languages like Cpp, Java, JavaScript and even for the Python language. Making a proper time machine learning is a task and needs strong processing resources. ARM11 control-based Raspberry-pi serves a compact open source CPU with a maximum speed of 1024 GB of Random Access Memory with 1700 GHz. It supports connectivity between different high and low-level peripherals, including digital and GPIOs. It is possible to use Raspbian operating system with Linux light weight loaded with programming tools from Python-IDLE, OpenCV.

- We design a program for this purpose that will allow traffic police officers to assess whether or not they are eligible to drive.It is essentially an integrated device that incorporates software and hardware that can accomplish those specific functions with the Avr- ATmega 16 microcontroller. The Alcohol sensor will send the analog resistive output to the microcontroller to detect the concentration of alcohol and then display more alcohol detection message on an LCD.

  The detection system is triggered and operated when the driver taps the start / stop button. Now our cars are becoming smarter and a new safety technology to protect against drunk driving is being created. Blood alcohol below the skin surface is read in the touch based technology. In the car ignition button or in the transmission light, touch sensors are mounted. Touch sensors. The light-beam on the finger is used to measure the level of alcohol in the blood by using infrarot radiation spectroscopy. By tests the lights intensity, alcohol absorbs those light wavelengths and can reliably detect the blood alcohol level of the driver.

- The third process concerns both the drunken person's physiological behavior and the physical changes that can be detected with specially designed detectors. The humongous differences

in the physiology are the blink of the eye, drowsiness, reddening of the nose. The heartbeat unexpectedly rises. We use pulse sensors, face detection, eye detection camera to solve those problems.

- The fourth approach was based on the MQ-135 alcohol sensor and GPS and GSM monitoring and warning system. The main fault was the gas sensor and the data analysis was not satisfactory.

DRAWBACKS OF THE SYSTEM

- The entire system relies solely on the mq-3 detectors if the detectors ha no discrepancy.
- Static system ceiling stats.
- For all test conditions a single algorithm is used.
- The method depends on smartphone alone, and this method will fail if the phone does not work correctly.
- These sensors can work inefficiently for long periods of time.
- The use of such sensors can cause driving distractions.

PROPOSED SYSTEM

The current major issue drunken driving identification was proposed using various techniques, but we were not given sufficient measurements by this. We suggest therefore a new way of integrating a variety of variables and individualizing people rather than standard methods for research.

For the proposed project the specific parameters considered are:

• Pressure of Blood and Heartbeat
• Content of alcohol
• Smoke content
• Expressions of the face

The detection system is triggered and operated when the driver taps the start / stop button. Now our cars are becoming smarter and a new safety technology to protect against drunk driving is being created. Blood alcohol below the skin surface is read in the touch based technology. In the car ignition button or in the transmission light, touch sensors are mounted. Touch sensors. The light-beam on the finger is used to measure the level of alcohol in the blood by using infrarot radiation spectroscopy. By tests the lights intensity, alcohol absorbs those light wavelengths and can reliably detect the blood alcohol level of the driver.

If The machine counts '1,' if not '0,' when the blood alcohol content increases above the legal limit. At the same time the device switches to other sensors, i.e. breath-based device, heart beat sensor and facial recognition system (using the alcohol sensor MQ-3). If the sensors go over the acceptable alcoholic mark, they would register as '1' if not '0.' Automatically the ignition would be off if the device matches three of the sensors.

CHAPTER 3

MACHINE LEARNING

3.1 Introduction

This approach primarily aims to establish how long the eyes of a given person are closed due to unconsciousness induced by the interaction between drugs. If eyes were shut for some time, let's assume they start to dust and be alarmed to wake them up and take care that they can avoid accidents and keep the person safe.

To accomplish this task it is necessary to setup the camera in the car near the steering wheel where the face could be in the range of the camera and easily be detected and it should be easier to apply facial landmark localization to monitor the eyes. Hence, we could determine and demonstrate the implementation of drowsiness detection using **OpenCV, Dlib and Python.**

Figure 2

The camera that has been used for this project is the simple webcam of the laptop device. Otherwise we could also use Logitech C920. It is very compatible as it has the following features:

• It's fairly inexpensive.
• Can fire 1080p in complete.
• It is compatible with almost all devices (e.g. Raspberry Pi, Arduino Uno and Geniuno)

3.2 Packages and Libraries

3.2.1 SciPy

SciPy is required in the measurement of eye aspect ratios so that we are able to measure the Euclidean distance between face markers (not strictly a necessity but if it was intended to do some function in computer viewing, image processing, or machine training space in a particular way with an intensive learning algorithm). This package SciPy includes modules to optimize the image processing modules, linear algebra algorithm , integration process, interpolation (insertion of the objects into other for the merging purpose) , FFT, ODE solvers and other. scientific and technical tasks.

The SciPy library is licensed under the BSD and developed with the support of an open development community. NumFOCUS, a collective initiative to encourage reproductive and open research, is also sponsored.

3.2.2 Imutils

We will need the imutils kit, computer vision series and image processing features to make it easier to work with OpenCV. It helps to recognize the face and to show the face tools in the continuous video integration.

3.2.3 Playsound Library and Thread

The thread class is also imported in order that our warning can be played in a thread isolated from the main thread so we don't avoid running our script when the signal sounds. The playound library, a pure Python, cross platform implementation is needed for playing easy sounds to actually play out our WAV / MP3 alarm.

The sound alarm feature needs to be specified to accept a path to the audio file that exists on a disk.

It is also important to determine the word "eye aspect ratio," to measure the ratio of distance between the vertical eye points and the distances between the horizontal eye-points.

When the eye is open, the value of the look ratio is roughly constant. After a blink, the value then reduces rapidly to zero.

If the eye is closed, the amount of presentation will be the steady again, but when the eye is open, will be even lower than the average.

3.3. Implementation and Algorithm

Step 1:

First, the camera needs to be programmed to track fluxes.

Step 2:

When a face is identified, face landmarks are detected and areas of the eye are removed.

Step 3:

The Eye Aspect Ratio (EAR) can be calculated easily to determine whether the eye is closed now that the eye regions have been reached.

Step 4:

The sound of an warning would be lifted to alert the driver if the eye look ratio suggests that the eyes have been closed for enough time.

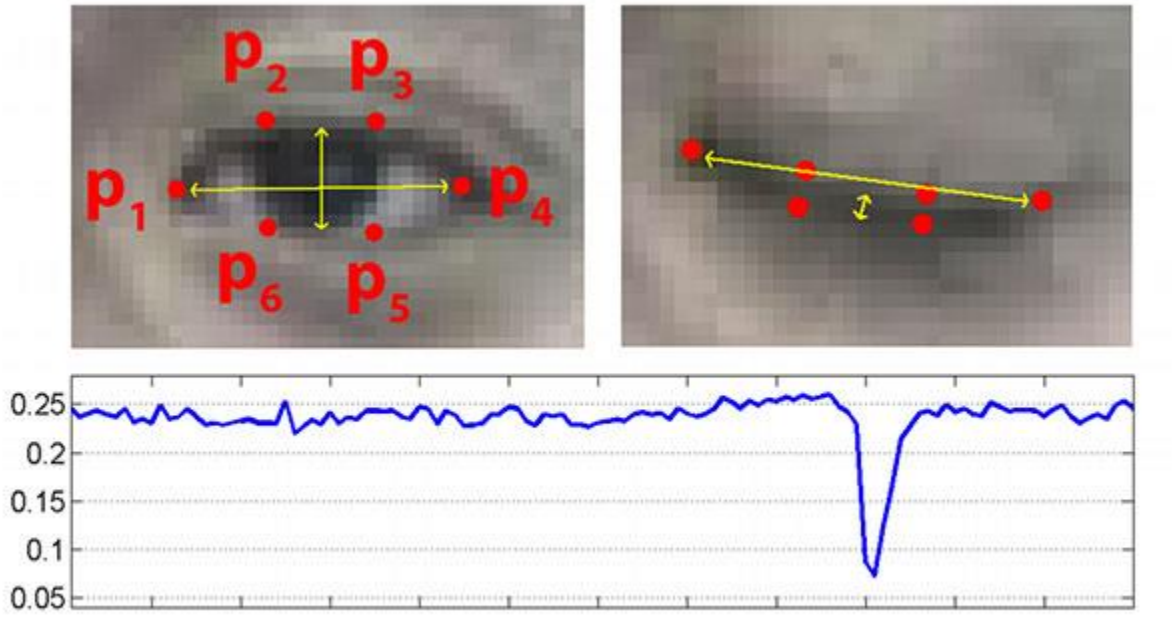


Figure 3

At the top-left there is an eye which is completely open with markings of the eye. Then there is a closed eye on the top right. The underside then draws the ratio of eye appearance over time.
As can be seen, the ratio of the eyesight is constant (that indicates that the eye is open), and falls quickly to zero.
In this case, a drowsiness scanner completely tracks the aspect ratio of the eye in order to see if it drops but does not lift again.

Then the arguments on the command line are analysed:

the DMD needs a statement on a command line followed by two alternative ones.

- --shape-predictor
  That's the road to the facial detector of the pre-trained dlib. --alarm
  Optionally, the path to an audio input file to be used as an alarm can be specified here.

- --webcam

The integrated webcam / USB camera index is controlled with this integer.

Now that the arguments of the command line have been checked, a variety of essential variables have to be defined:

EYE AR THRESH is a constant variable. If the eye aspect ratio goes below the absolute, the number of frames for which you have closed your eyes will continue to be counted.
Where more than EYE AR CONSEC FRAMES are present, the number of frames the individual has blinked his eyes, it sounds an alarm.

EYE AR THRESH 0.3 performs well in a lot of different circumstances (although the code needs to be qualified in specific scenarios).

The EYE AR CONSEC FRAMES was set to 48, which means we play the warning sound whenever a person shuts his eyes for 48 consecutive frames. In order to prevent the alarm from being blinked by the eyes.

Through reducing the value of EYE AR CONSEC FRAMES, the somnolence detector could be made more sensitive — it might have become less sensitive through increasing this value.
Total number of consecutive frames identified by COUNTER is below EYE AR THRESH. The Boolean AALARM is to be modified if COUNTER reaches EYE AR CONSEC FRAMES.

Dlib's facial characteristics are an indexable list:

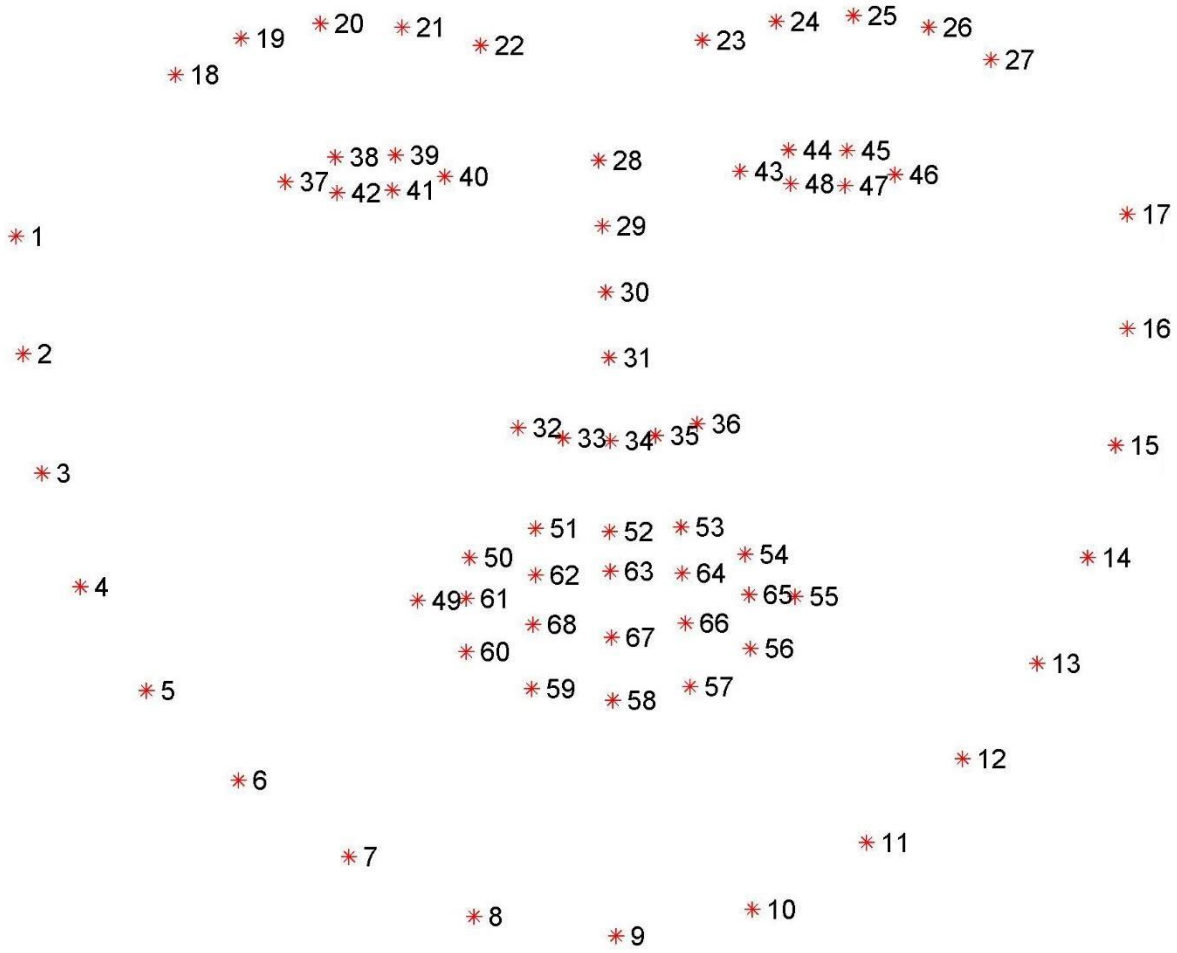


Figure 4

The eye regions are then derived from a variety of facial scales, it is simply needed to know the correct array slice indexes.

Using these indexes, it will be easy to extract the eye regions via an array slice.

The Video Stream is instantiated with the given webcam index. Then the camera sensor is stopped for a second to be warmed up. Then the video stream starts to loop across frames. The next frame is then read and pre-processed by resizing it to 450 pixels width and turning it into white. The face detector of Dlib is then applied to find the face of the image and to find it.

That one of the observed face is operating on a loop — it is presumed that there is only one side of the application (specifically with respect to drowsiness), so it is left in a loop only if you want to extend this strategy to more than one-face footage.
The dlib facial symbol detector is implemented on each of the observed faces and translated to a NumPy array. The slicing (x, y) of the right as well as the left eye of the NumPy array will be used to extract the effect. Owing to the (x, y), their eye presence ratios can be accurately determined for both eyes.

This is often helpful if we try to debug our script and ensure that eyes are correctly recognized and located. We can also visualize our frame eye with the cv2.drawContours Function.

Finally, the eye presence ratio is tested for below EYE AR THRESH, the 'blink/closed' threshold. If so, the number of frames consecutively closed in the eyes of the individual increases the COUNTER variable. If COUNTER is more than EYE AR CONSEC FRAMES, then the individual starts dusting.
This time, a further search would be made to see if the alarm is on — if not, it is manually switched on. The following block handles the sound of the alarm while the script was running, providing a — Alarm direction. Particular attention shall be paid to the creation of a separate thread to make sure sound alarm is not blocked until the sound ends.

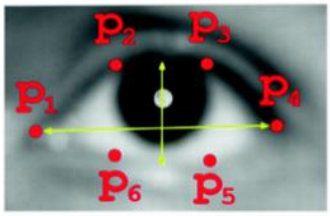
ALERTE DROWSINESS! Draw the text on our screen — this is always useful again to debug, particularly if you don't use the playback library. In the final line, the eye look ratio is greater than EYE AR THRESH, showing that the eyes are open. We reset COUNTER when the eyes are open to ensure that the alarm is shut down. In our somnolence detector the final code block shows the output frame on our computer.

3.4 Feature Extraction

As previously stated, we have established suitable features for our classification model based on the facial features we have taken from the images of the videos. Whilst several features were hypothesized and tested, for our final models the four main features were eye-aspect ratio, mouth aspect ratio, pupils' circularity and, finally, mouth aspect-aspect ratio.

Ratio of Eye Features (Eye Aspect Ratio)

EAR is the ratio of eye length to eye width, as the name implies. Averaging two vertical lines between the eyes as shown in the below figure measures the length of the hair.



$$\mathrm{EAR} = \frac{\|p_2 - p_6\| + \|p_3 - p_5\|}{2\|p_1 - p_4\|}$$

3.5 Feature Normalization

To normalize each person's features, we took the first three frames for an warning video for each individual and used them for standardisation purposes. For these three items, each function was measured for a mean and standard deviation and used to normalize individual features for each participant. This is the statistical dimension of the normalization equation:

$$\boldsymbol{Normalised\ Feature}_{n,m} = \frac{\boldsymbol{Feature}_{n,m} - \boldsymbol{\mu}_{n,m}}{\boldsymbol{\sigma}_{n,m}}$$

where:
n is the feature
m is the person
$\mu_{n,m}$ *and* $\sigma_{n,m}$ *are taken from the first 3 frames of the "Alert" state*

Because each of the four core features now standardised, our set of features had eight features and each core feature has its standardized version. All 8 features in our models were tested and our results were greatly improved.

CHAPTER 4

IOT

4.1 MQ-3 Alcohol Sensor

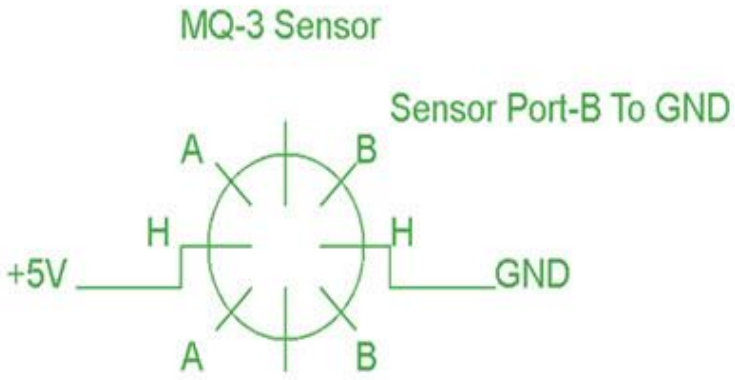
A miniature heating device with an electro-chemical detector which is responsive to a variation of vapours at standard pressure and temperature is used in the series of the MQ sensor used.

The showing up of alcoholic gasses in the atmosphere is measured by the alcohol sensor and the analog voltage is a read. The power supplied is less than 0.150 Amperes / 5Volts, the sensor can be triggered at temperatures between -10 ° and 50 ° C. The range of sensors for breathhalysers ranges between 0.000004 g per Litre to 0.004 g per Litre.

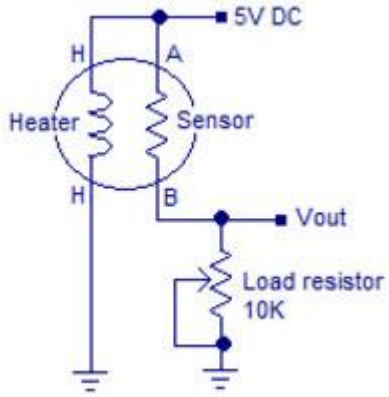
Figure 5

There are a total of 6 pins namely the A, the H and the B pins in the MQ-3 alcohol gas sensor, all the three above mentioned pins are two each in quantity adding upto a total of 6 pins, mostly we only use the 4 of pins available. A and the H pins are used for heating purposes and the rest of the two are used for earthing and electrical conduction. The sensor includes a heating system composed of aluminum oxide, tin dioxide. Heat bobbins are used to create warmth and are used

for the fulfilment of the heat sensing purposes. The pin graph diagram given beneath displays the configuration of theMQ-3 alcohol sensor.



The alcoholic sensor MQ-135 consists of an inside tube (electrode measurement) and a perspective layer of a tubular tube (SnO2), the alcohol sensor. A steel net is connected to the end side of the sensor, with contact terminals on the back side. Breathable ethyl alcohol is oxidized to the heat portion by an acetic acid. The resistance decreases with alcohol with the common name ethanol is deluge on the layer of SnO (Sn->Tin and O->oxygen) discern. The obtained aversion variation is converted into an appropriate voltage variation using the external load resistance. Below you can see the loop diagram with all connections of the system for an alcohol MQ 3 Detector.



The MQ3 gas detector is a spirit detector which measures the residence of ethanol present in your breath. This sensor offers an alcohol-based analog resistive output. The dynamism of the detector decreases with the spike in the gas engrossment when alcohol gas occurs. The detection of alcohol

at various concentrations is suitable for various applications. It is typically used in warning gases, industrial alcohol detectors and portable alcohol sensors.

4.2 Heart Beat Detector

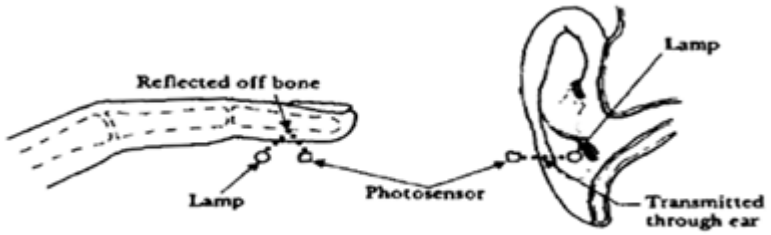
The working of the heartbeat detector is mainly based on the photography theory. The sensor computes the variation in blood concentration in any part in the human body due to which the indicator to shift across the organ (a vascular region). The pulse rate of the heart is tracked by noting down the gap or the time between two consecutive pulses. The flow of blood is dictated by pulse rate of the user, and the input sent to the detector is a photonic input which is same to the pulse because the blood hinders some of the light to pass by blocking the transmission path.

Figure 6

Photophlethysmography is two types:

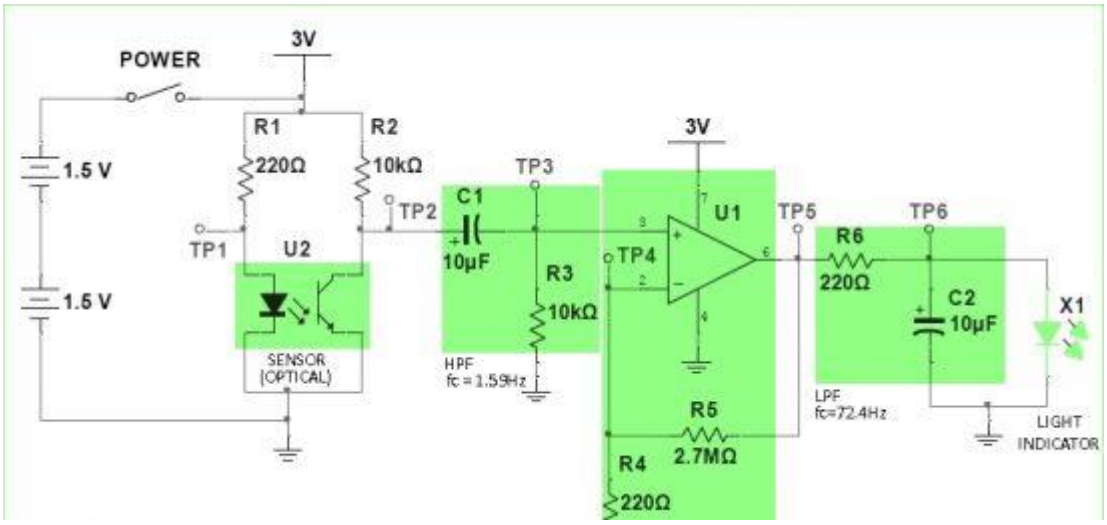
Transmission: The photons discharge from the light source is disseminated from every part of the human body, such as the fingers.

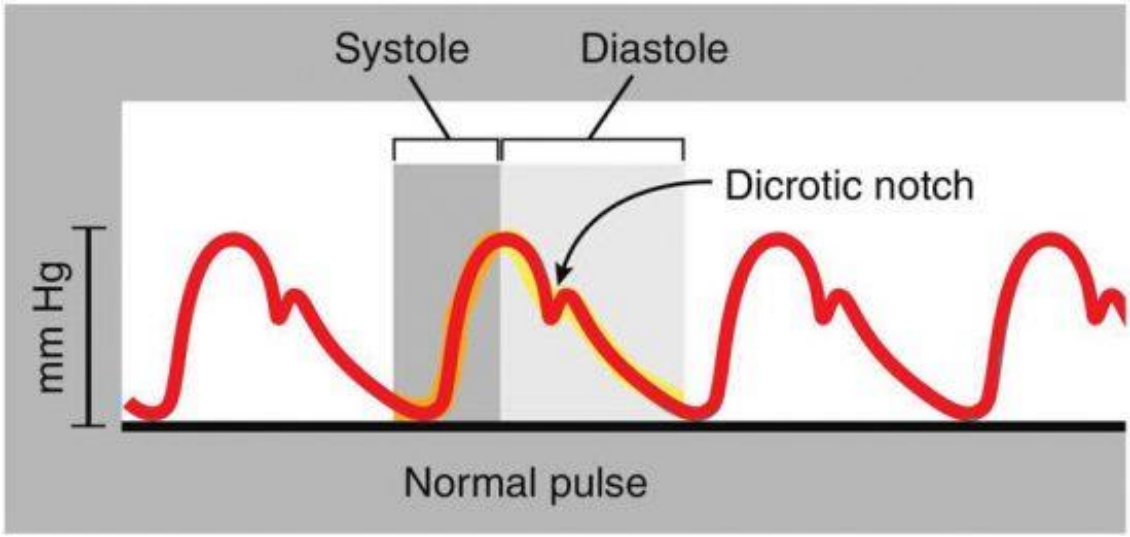
Reflection: The area reflects the photons discharge by the source.



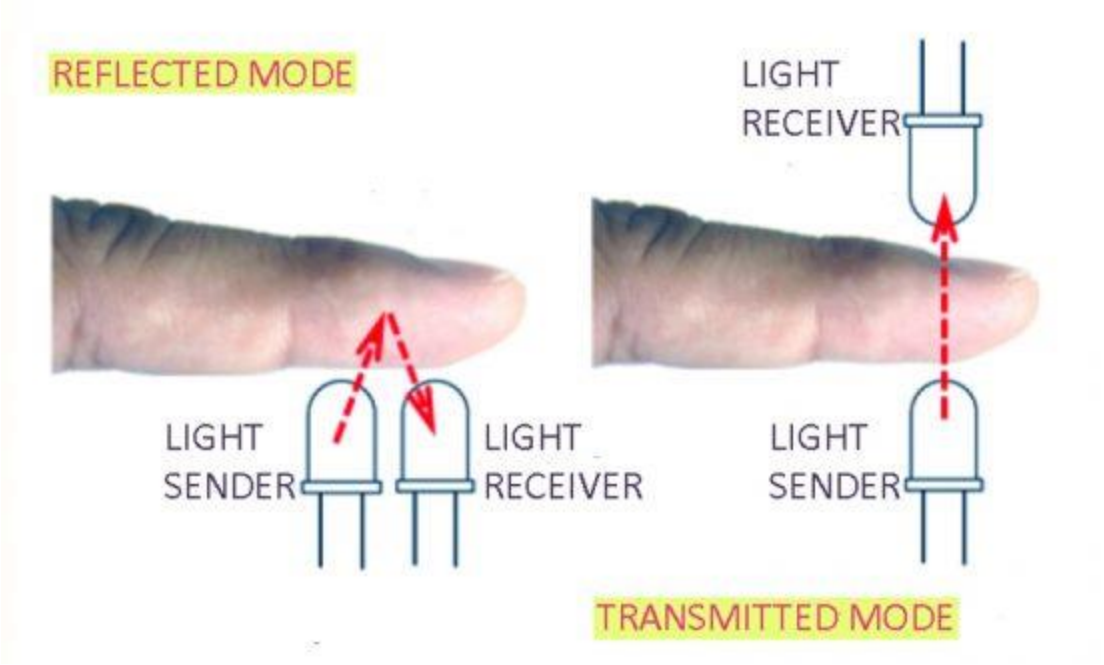
The main pulse detector is the light-emission diode, also known as a photo diode or a simple LED. The speed of pulse will vary in blood supply from one region to other regions of the body. Some areas will have greater blood flows as compared to other regions due to a lot of factors which lie beyond the scope of discussion at the current time. When a body tissue or a muscle fibre is placed in the path of transmission of the light by source, which will either blot up or let the light pass with a little absorption. The amount light which is blot up by the blood is overlooked and the light which is reflected is absorbed as the input for the senor. The quantity of light blotted up by the organ is directly proportional to the volume of blood. The detector performance is electric and is directly proportional to the rate of the pulse.

In fact, the emitted signal acts like a Direct current signal for tissue, blood volume, and the AC portion is superposed to the DC signal, which syncs with pulse and triggered by the pulse change of the blood flowing in the blood artery. The main demand is therefore to isolate the component of the AC as it is primarily important.





- The systolic phase, with a quick pressure increase to the peak and a fast decline. This stage starts with the aortic valve opening and corresponds to the left ventricular ejection.
- Dicrotic notch reflecting the aortic valve closure.
- The diastolic process, the blood flow into the peripheral circulation

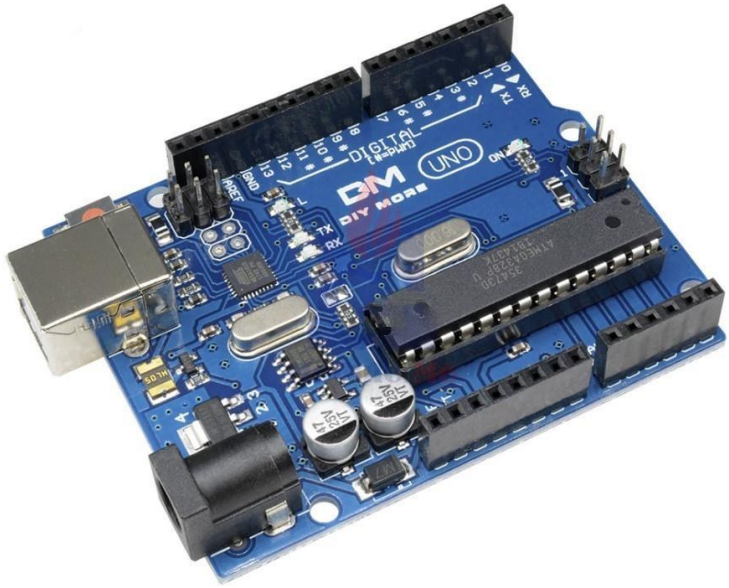


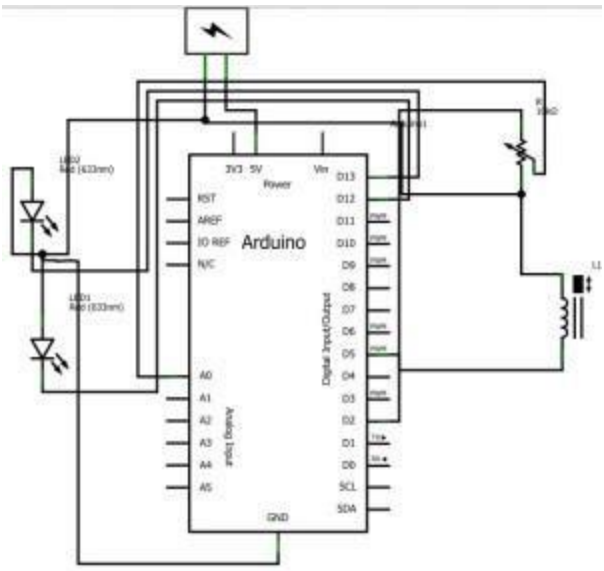
The optical heart rate sensor of a non-invasive type comprises an electronic device, which tracks the pulse by clicking on a finger tip. It does so by brightnessing the finger (or by) and by calculating the amount of light (or absorbing it). It goes up and down, as the finger pumps blood. Normal use is made for an intelligent combination of an infrared lighting transmitter and a light receiver. In order to improve the weak signal coming off from the optical sensor, an amplifying circuit is required in addition to the optical sensor assembly. Surprisingly its performance is strong enough to turn green light whenever the heart beats. The peak wavelength emitter of the TCRT5000L is 950 nm. This should be noted. For the purposes of biologic measurement the light beam may reach the smallest portions of the body such as the bottleneck or earlobe or lower lip, and consumers usually use a range between 700 nm (red) and 1000 nm (infraround).

4.3 Arduino UNO

Arduino UNO is a microcontroller with a board built that makes the user more available with all the environment variables and the interactive objects. It uses open source technologies when it comes to hardware which is either a 32 bit Atmel ARM microcontroller or a 8 bit Atmel AVR. The latest versions of the Arduino UNO come with the benefits of 6 analog input pins with 14 digital input/output pins to allow the user to connect different boards to an extension and a USB port is attached to connect it to computers easily.

The Arduino Uno is a microcontroller based on ATmega328. The machine has fourteen electrical input-output connectors, six for the performance of the PWMs, an ICSP header, six analog inputs, a control box and the reset switch. The machine has a power supply. It includes all required support for the microcontroller. The cable or AC-to - DC converter or battery is easily attached for start up. The Arduino Uno board varies and does not serial chip with the FTDI USB on any other computer. To get the system up and running It was equipped with an Atmega16U2 as USB-to-serial converter.





Arduino Uno with Digital I/O

There are various kinds of Arduino boards, many of them being models compatible with third parties. Arduino UNO is the most official versions available. Both run a 16MHz Atmel ATmega328P which runs on 14 digital Input and output along with six analog microcontrollers , 32 KB and 8-bit RAM does not sound like its running an Operating system. Projects running on Arduino are mostly autonomous and work on a computer with the program. For example For example. Flash, Max / MSP, Processing). The board has a ceramic 16 MHz resonator with a USB power and communication link. For greater tasks, you can easily add SD / SD microcard storage.

The project Arduino began in Ivrea, Italy, at the Institute of Interaction Design Ivrea (IDII). The objective of the project was to develop simple, affordable tools for non-engineers' digital projects. A printed Circuit Board (PCB) with a microcontroller ATmega168, a processing-based IDE and library functionality made the Wiring platform easily scheduling the microcontroller. Massimo Banzi added support in 2003 to Wiring for the cheaper ATmega8 microcontroller. However, they forked on the project and renamed it Arduino UNO instead of working on the wiring of the microcontroller. The USB to serial chip driver were used by early arduino boards. The Uno was different from all of the previous boards because of the USB-to-serial adapter ATmega328P and Atmega16U2 (Atmega8U2 to R2).

4.4 LCD Display

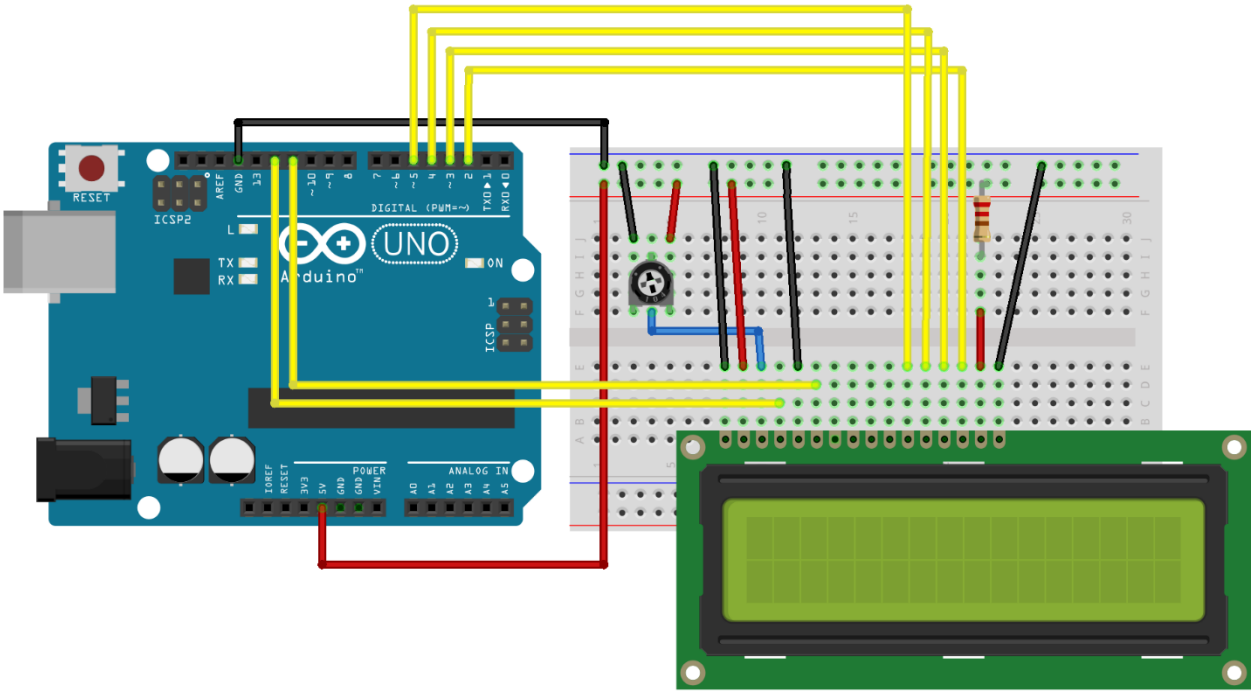
The flat screen display otherwise known as LCD, which uses the photo-generating properties of liquified crystals in combination with polarizers, is a flat panel display which is electrically generated optical screen. Liquid crystals do not specifically send out light, but rather create colored or monochrome images with the backlight or reflector.

They use the same basic technologies, with the exception of arbitrary pictures from a matrix of tiny pixels and larger elements for other displays. Based on the polarizer configuration, LCDs can be either usually on (positive) or off (negative). For example, a positive LCD character with backlight will have a black mark on the background of a backlight color, and a black background with the letters of the backlight colour. Optical filters on blue LCDs are applied white to make them look distinctive.

In other cases LCDs are used, which include LCD-TVs, computer monitors, instrument panels, cockpit screens for aircraft and indoor and outdoor signaling. Small LCD displays widely used on portable electronic devices such as cameras, smart watches, digital watches, pagers, computation devices, tablets and mobiles and many other electronic devices. LCD screen items like Blu-Ray players, console gaming devices or digital stopwatches are used in consumer electronics as well. In almost all applications, LCD displays substituted heavy bulk cathode ray (CRT) displays.

The LCDs are replaced gradually by OLEDs which can be readily converted into various shapes. The response time is lower; wide range of colours, almost infinite color contrast and viewing angles; the weight of the panels is lower than the weight of the given display and the profile slimmer (considering that OLEDs have one single glass or plastic panel, while LCDs are equipped

with two glass panel; Yet OLEDs, due to very costly materials or phospheres they use, are more costly for a certain display size. OLEDs are also affected by phosphors and there is currently no way of recycling OLED displays, although LCD panels can be recycled, although the technology essential for recycling LCDs is still not widely utilized. Quantum dot displays that provide similar performance to OLED displays are attempts to increase the lifetime of LCDs but the Quantum dot sheet which provides these displays can not be recycled.



The Liquid Crystal Library helps you to monitor the Hitachi HD44780 driver-compatible LCD displays. Many of them exist, and normally you can say them using a 16-pin gui.

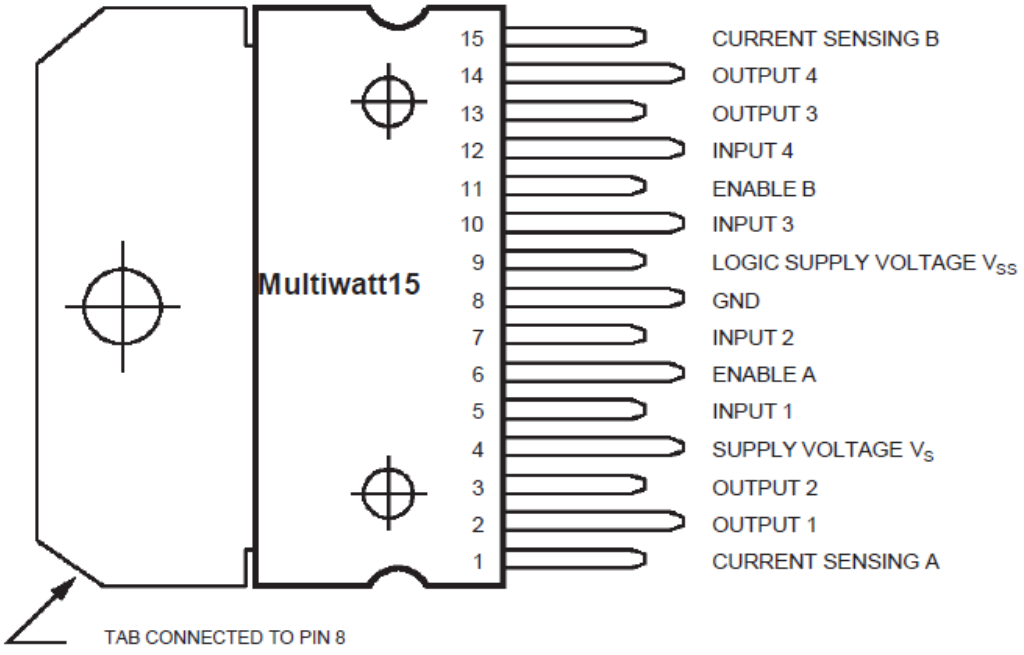
This diagram illustrates how display() and noDisplay() methods can be allowed and deactivated. When using noDisplay(), the text that is to be displayed is still stored so that it is quick to clear the display without losing it all.

4.5 DC Motor

The most common type of engine is the direct current or DC motor. DC engines typically only have two leads, one positive and one negative. The engine is rotating if we connect the two conduits directly to the battery. The engine rotates in the opposite direction when we switch the lead.

You can use a circuit to control the direction of the spin of the DC engine without altering the way that the leads are related this circuit is nomenclated as the H Bridge Circuit. An H bridge is an electrical circuit capable of driving the motor both ways. For several different applications, the H-bridges are used, one of the most common for robot control. It has four linked transistors so that the schematic diagram is like a "H." It is called H-bridge.

The L298 will be able to control the speed and path of DC motors and step-motors and can control two engines simultaneously, but we must use the L298 H-Bridge IC to create this circuit. For each engine, its current rating is 2A. But we must use heat sinks at these currents.



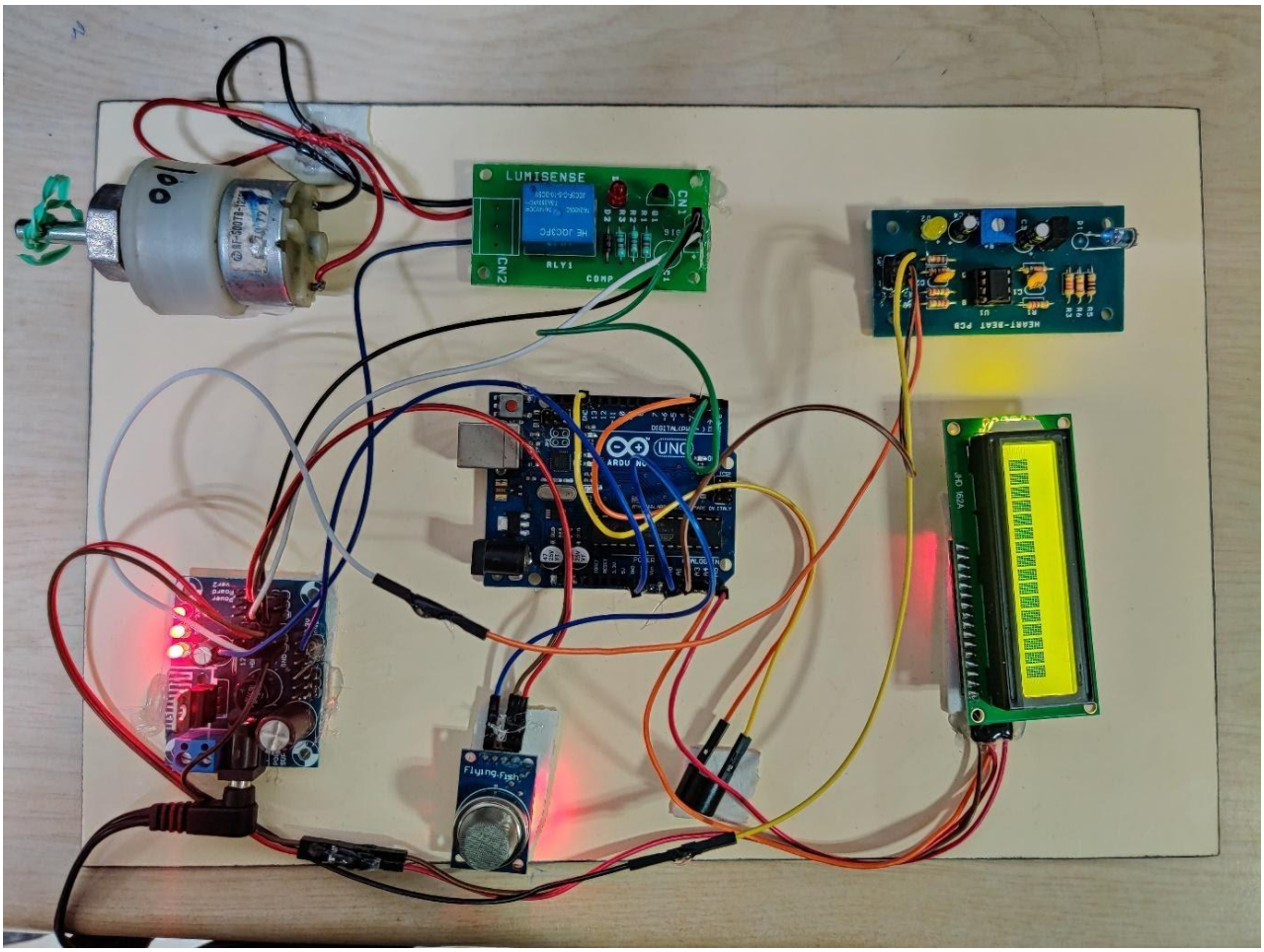


Figure 7

CHAPTER 5
CONCLUSION

This is a system intended to regulate drunken driving efficiently. A secure motorway route can also decrease the accident rate due to drinking by implementing this design. This design requires drunken drivers to be monitored so that injuries resulting from drunken driving can take place. The government must apply legislation to install such circuits in any car and must require all car companies, when manufacturing the car itself, to pre-install such mechanisms. The deaths of drunken drivers will then be minimized to a minimal amount if this is done. With this system, future scope can be securely removed from cars without disturbing other vehiclesThe program is a revolutionary technology to identify and warn drowsiness in drivers. The focus of this program is on driving safety. The performance of the alcohol sensor has been connected to a relay and an SMS network is also designed to alert the driver's family. The sensors of the behavior and physiology supported appropriate safe driving steps. The project was designed and the Arduino microcontroller was implemented on Arduino board. Hardware and programming have been developed to work successfully. The purpose of this project was to detect and alert the driver to drowsiness. This was accomplished by evaluating this system. The results show a good performance because the prototype is progressive. This research project has researched and applied various sensor styles and modules. This quick to comprehend and run program was a user friendly approach. We use the phrase "Prevention is better than cure" that healthy and secure our lives. We described our concept as the proverb in this paper that enables the riders should abide by the regulations of the road to ride the automobile. The Government has implied the riders to abide the rules of traffic, but riders have failed to abide to the road laws such as hopping seatbelt, not drinking and driving, stop at the red light. If the described method are implemented in this current world, accidents will surely be contained and be reduced. Also, If the concept is implemented in the real time world, than it is necessary to implement this project further to make this world fully meaningful. For ambulances, fire trucks and so forth, we have to repair RFID tag to allow signals to identify an emergency, and when the traffic signals identify the RFID tag, the signal will be converted from a red to green. The warning will again move from green to red if the RFID tag gets out of control. But we will make signs in this project to echolocate with one another to change

from danger to safe only when another symbol indicates an emergency. Likewise, in the context of toxicity detection the prompt has to be sent to the neighboring car belongs to the same person. In the heartbeat method, the cardiac treatment will support the patient, and it will be useful to drive as a starting aid if the passenger is there. A decade back, cardiac drivers were subjected to constant driving and stress, which in turn caused them to experience many accidents. Different factors like personal origin, working stress, etc. can contribute to anxiety, leading to cardiac arrest accidents. Stress can be increased for 16-20 hours without resting because of continuous driving. With the help of our Heartbeat sensor project, we can solve these problems / accidents. The Pulse system begins tracking while the driver is wearing the seat belt, and when an irregular heart movement happens, speed reduces progressive and the vehicle immediately stops as light begins. It will contribute to the car halting in front of us. Where petrol is empty, the nearest gas station should be looked at, which would waste our time in this fast-moving environment. Our concept can be used to measure our gas level before we start traveling. This saves time, so we can reach our destination in due course. If the gasoline isn't sufficient to reach our destination, the nearby gas station can be easily identified using Google Maps. The system uses very low power and less complexity, so that it can be used for road vehicles. This system has a broad scope since it is a highly focused problem to improve safety for vehicles. The long-distance IR sensor can deliver promising results in eye closures.

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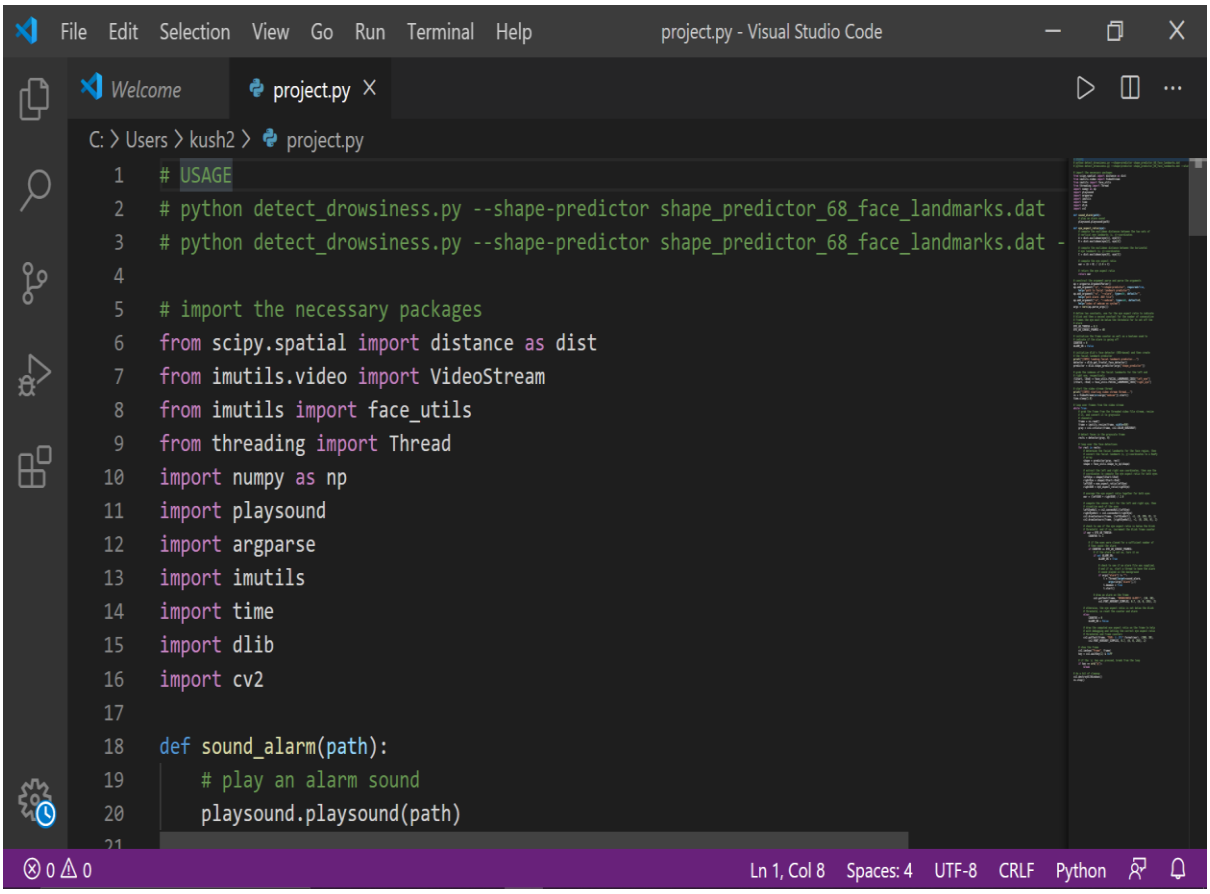
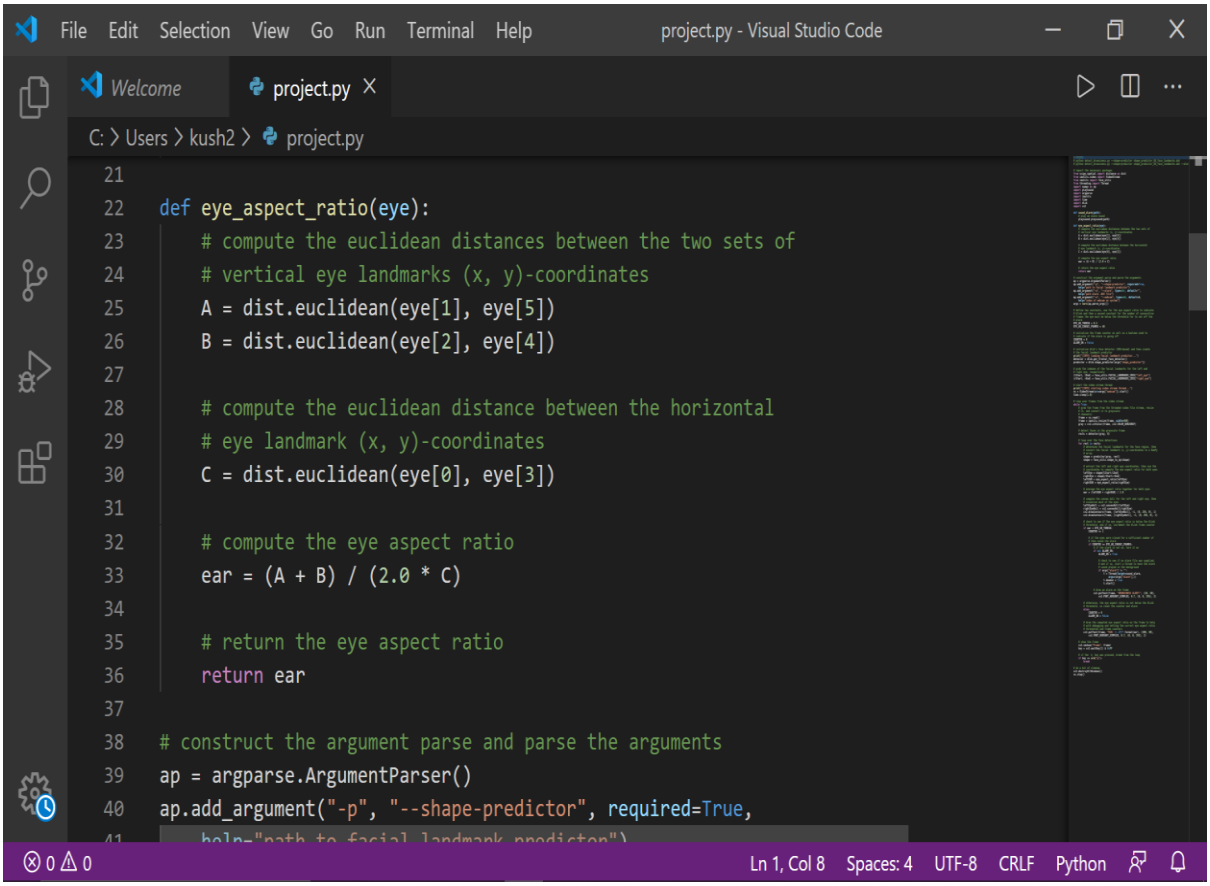
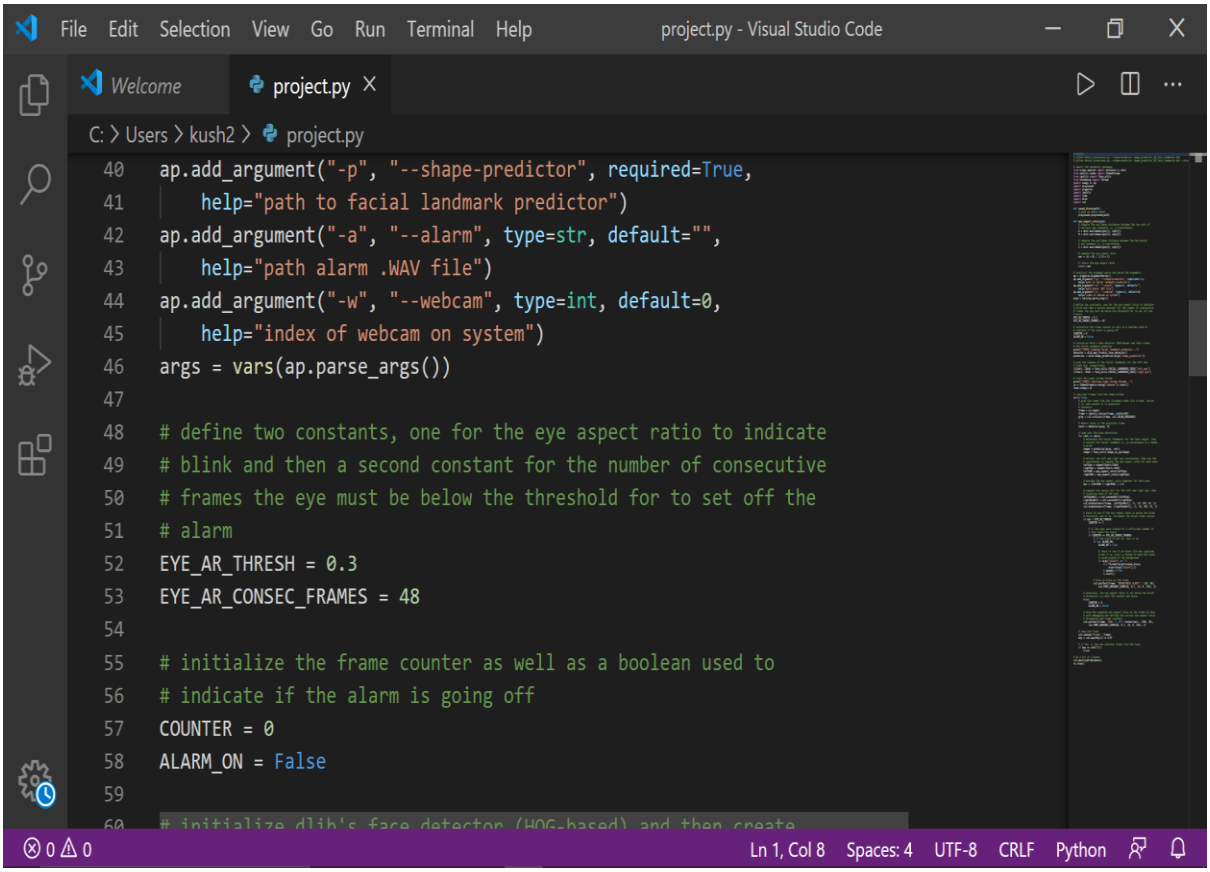
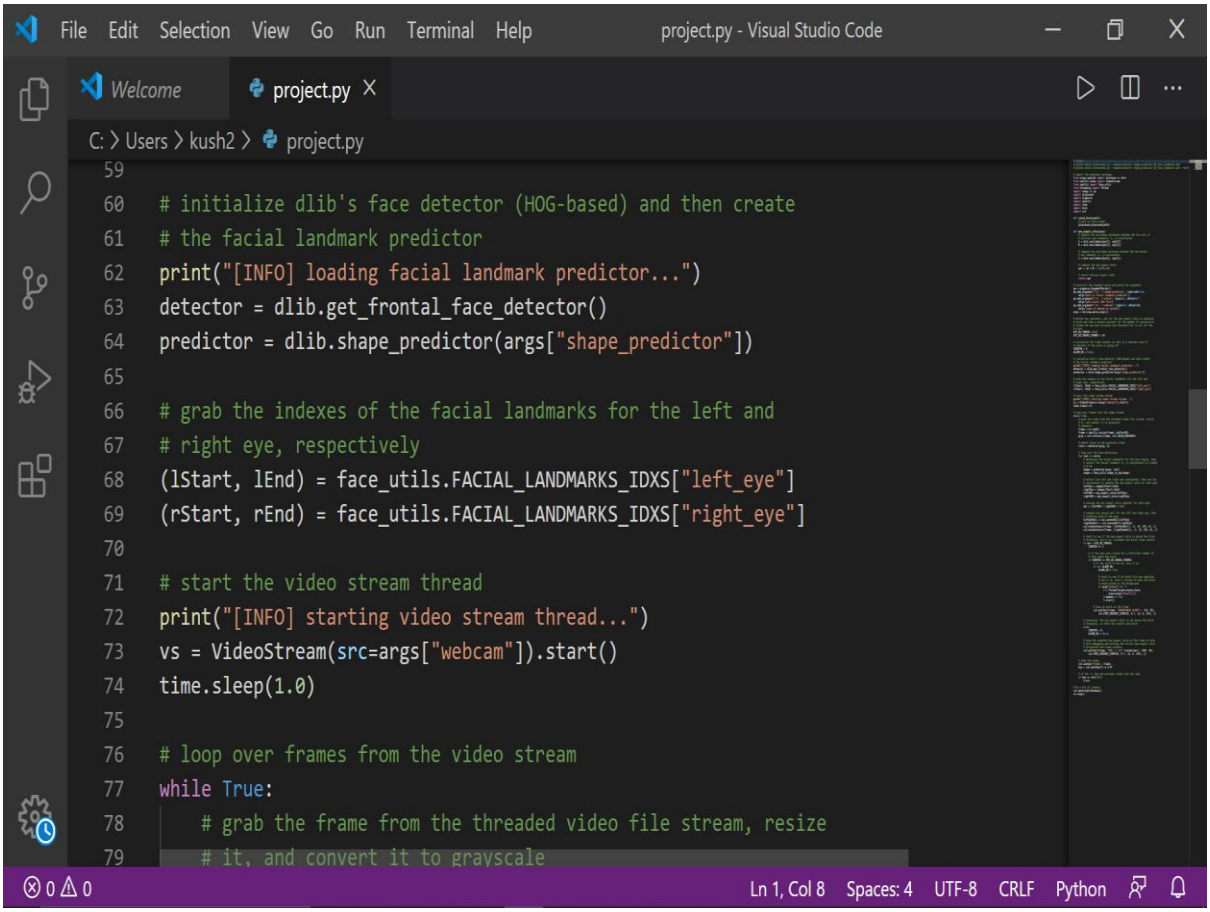
APPENDIX

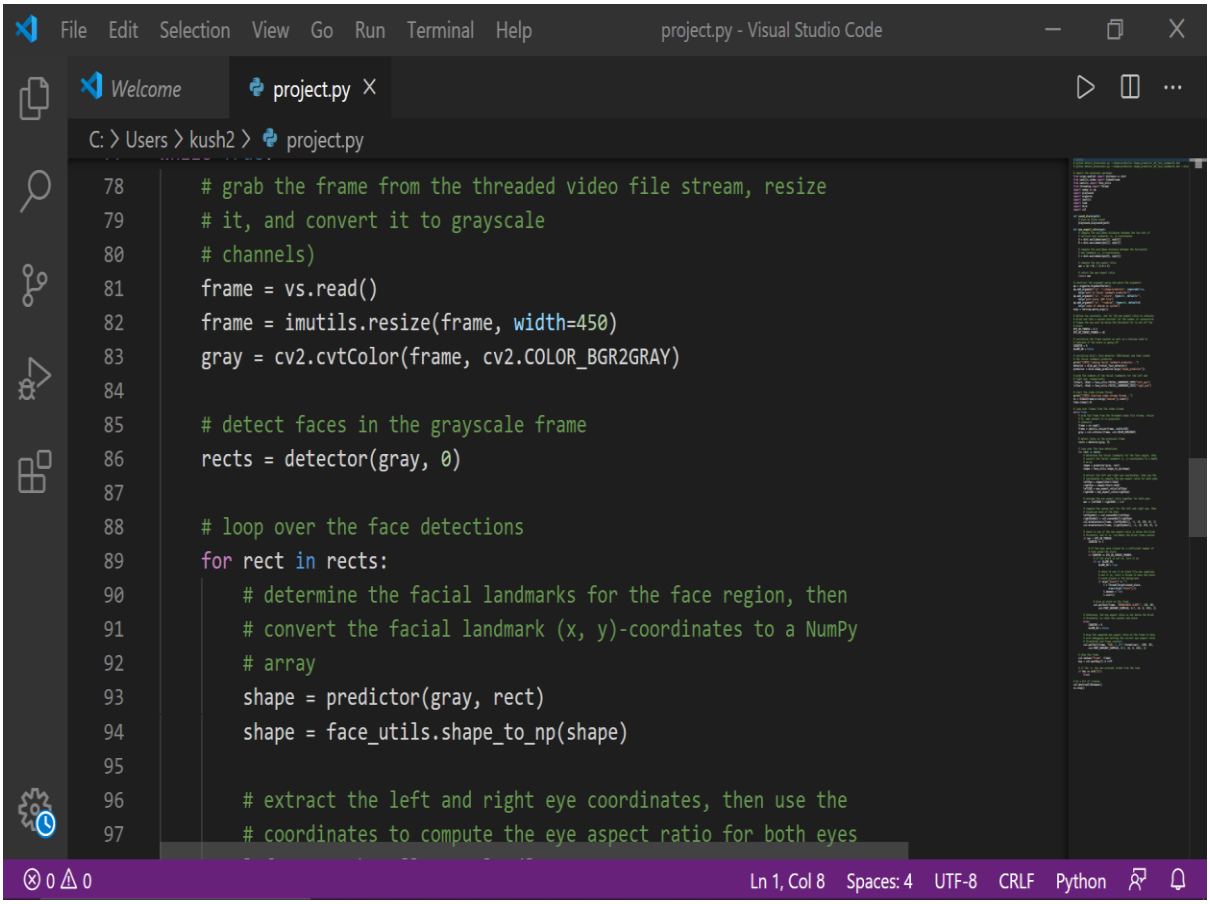
SOURCE CODE

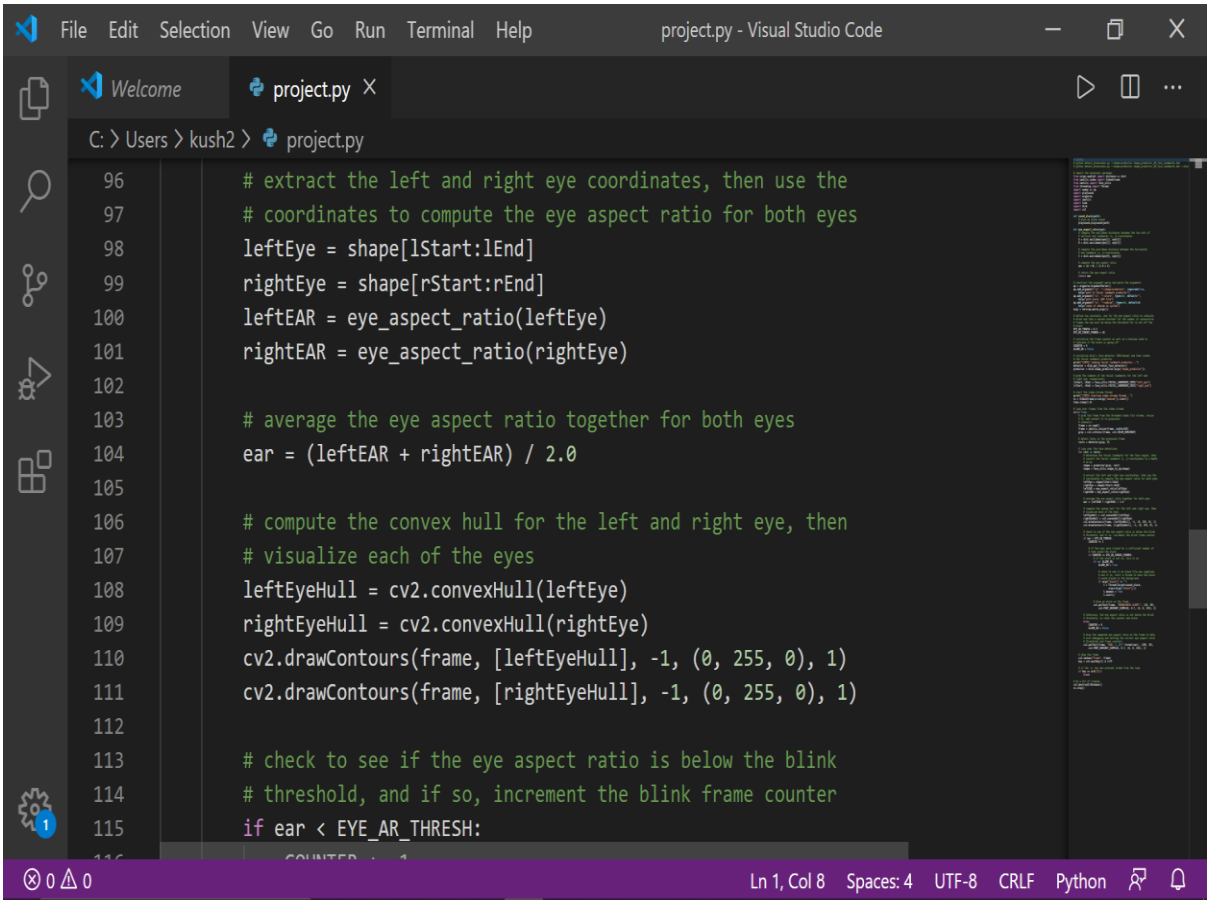


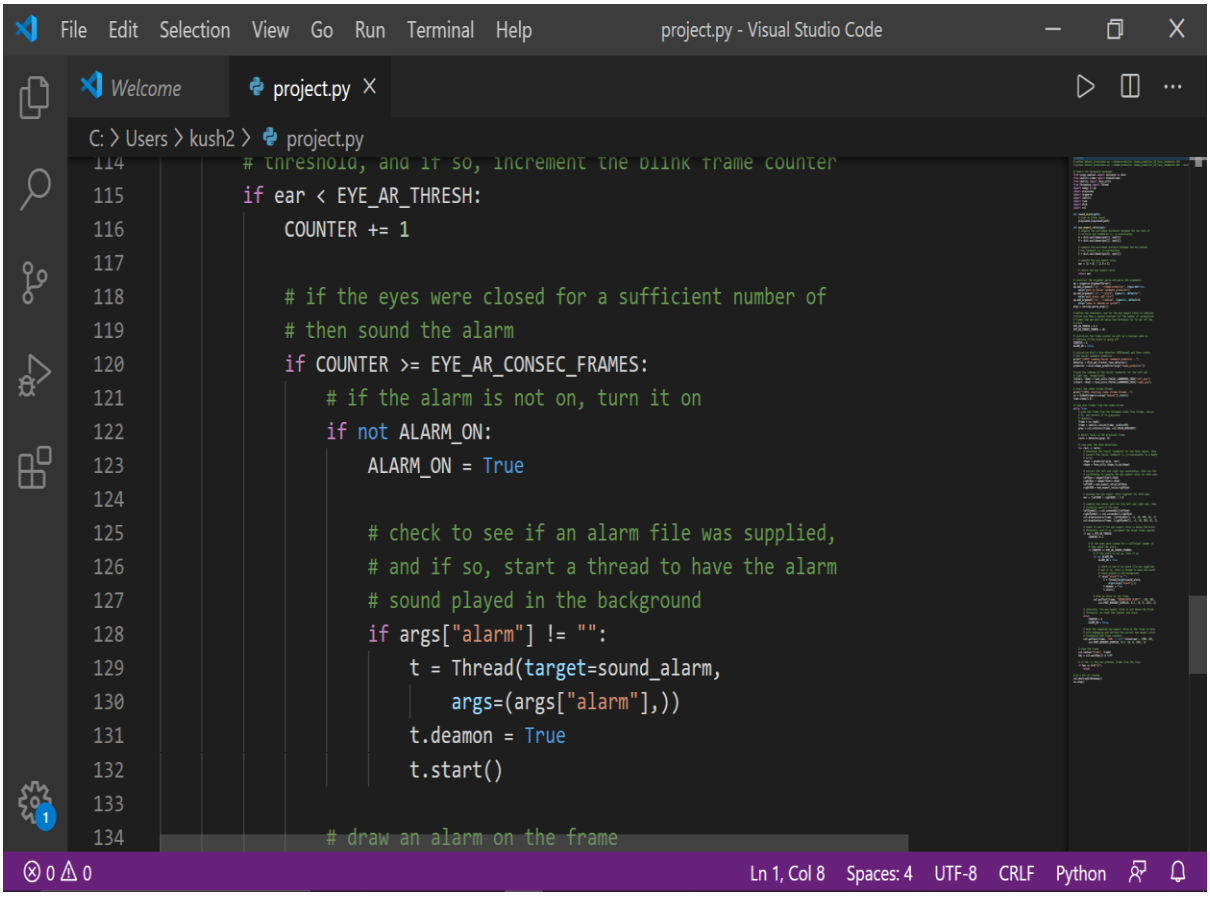

File Edit Selection View Go Run Terminal Help
project.py - Visual Studio Code
Welcome
project.py
C: > Users > kush2 > project.py
21
22 def eye_aspect_ratio(eye):
23 # compute the euclidean distances between the two sets of
24 # vertical eye landmarks (x, y)-coordinates
25 A = dist.euclidean(eye[1], eye[5])
26 B = dist.euclidean(eye[2], eye[4])
27
28 # compute the euclidean distance between the horizontal
29 # eye landmark (x, y)-coordinates
30 C = dist.euclidean(eye[0], eye[3])
31
32 # compute the eye aspect ratio
33 ear = (A + B) / (2.0 * C)
34
35 # return the eye aspect ratio
36 return ear
37
38 # construct the argument parse and parse the arguments
39 ap = argparse.ArgumentParser()
40 ap.add_argument("-p", "--shape-predictor", required=True,
Ln 1, Col 8 Spaces: 4 UTF-8 CRLF Python

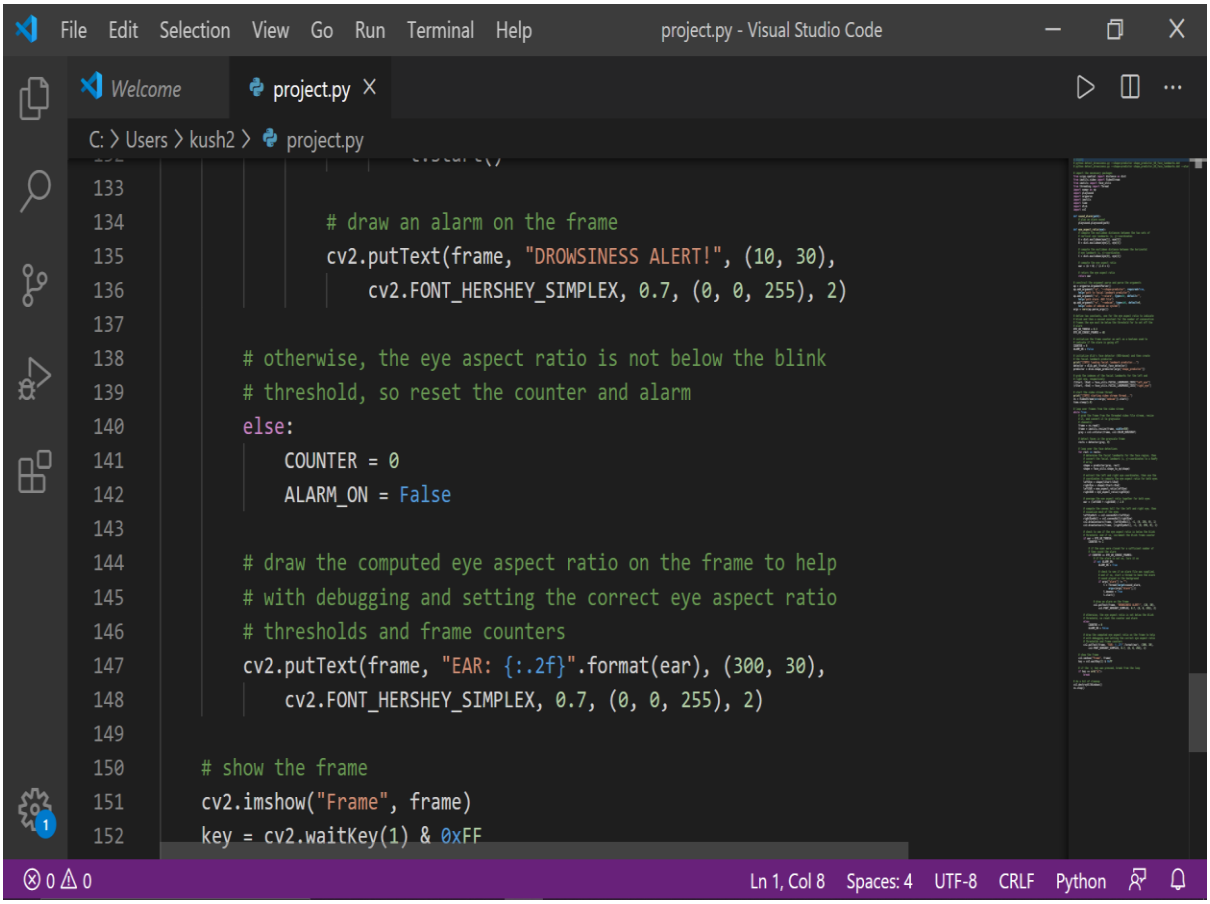

File Edit Selection View Go Run Terminal Help
project.py - Visual Studio Code
Welcome
project.py
C: > Users > kush2 > project.py
ap.add_argument("-p", "--shape-predictor", required=True,
help="path to facial landmark predictor")
ap.add_argument("-a", "--alarm", type=str, default="",
help="path alarm .WAV file")
ap.add_argument("-w", "--webcam", type=int, default=0,
help="index of webcam on system")
args = vars(ap.parse_args())
# define two constants, one for the eye aspect ratio to indicate
# blink and then a second constant for the number of consecutive
# frames the eye must be below the threshold for to set off the
# alarm
EYE_AR_THRESH = 0.3
EYE_AR_CONSEC_FRAMES = 48
# initialize the frame counter as well as a boolean used to
# indicate if the alarm is going off
COUNTER = 0
ALARM_ON = False
Ln 1, Col 8 Spaces: 4 UTF-8 CRLF Python

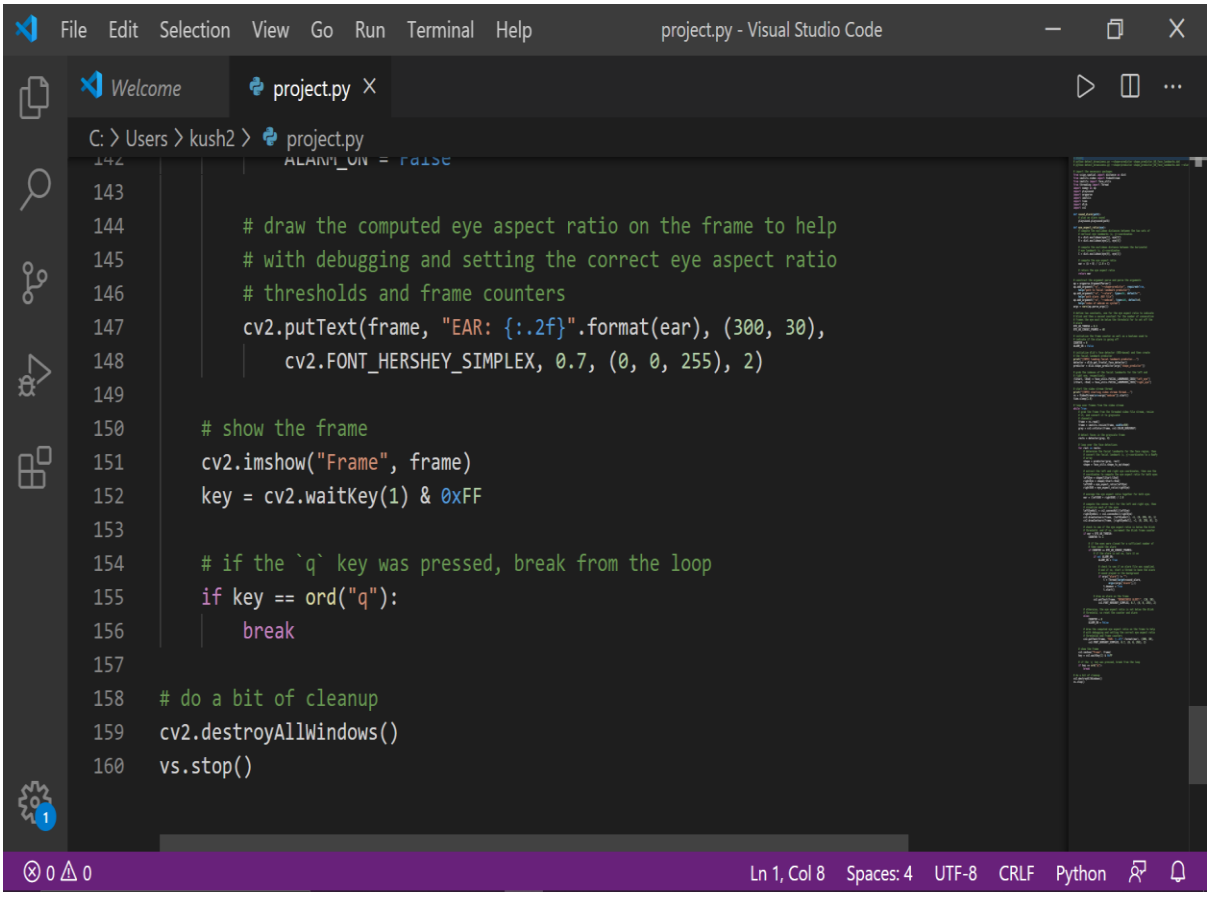

File Edit Selection View Go Run Terminal Help
project.py - Visual Studio Code
Welcome
project.py
C: > Users > kush2 > project.py
59
60 # initialize dlib's face detector (HOG-based) and then create
61 # the facial landmark predictor
62 print("[INFO] loading facial landmark predictor...")
63 detector = dlib.get_frontal_face_detector()
64 predictor = dlib.shape_predictor(args["shape_predictor"])
65
66 # grab the indexes of the facial landmarks for the left and
67 # right eye, respectively
68 (lStart, lEnd) = face_utils.FACIAL_LANDMARKS_IDXS["left_eye"]
69 (rStart, rEnd) = face_utils.FACIAL_LANDMARKS_IDXS["right_eye"]
70
71 # start the video stream thread
72 print("[INFO] starting video stream thread...")
73 vs = VideoStream(src=args["webcam"]).start()
74 time.sleep(1.0)
75
76 # loop over frames from the video stream
77 while True:
78 # grab the frame from the threaded video file stream, resize
79 # it, and convert it to grayscale
0 0
Ln 1, Col 8 Spaces: 4 UTF-8 CRLF Python


File Edit Selection View Go Run Terminal Help
project.py - Visual Studio Code
Welcome
project.py
C: > Users > kush2 > project.py
78 # grab the frame from the threaded video file stream, resize
79 # it, and convert it to grayscale
80 # channels)
81 frame = vs.read()
82 frame = imutils.resize(frame, width=450)
83 gray = cv2.cvtColor(frame, cv2.COLOR_BGR2GRAY)
84
85 # detect faces in the grayscale frame
86 rects = detector(gray, 0)
87
88 # loop over the face detections
89 for rect in rects:
90 # determine the facial landmarks for the face region, then
91 # convert the facial landmark (x, y)-coordinates to a NumPy
92 # array
93 shape = predictor(gray, rect)
94 shape = face_utils.shape_to_np(shape)
95
96 # extract the left and right eye coordinates, then use the
97 # coordinates to compute the eye aspect ratio for both eyes
0 0
Ln 1, Col 8 Spaces: 4 UTF-8 CRLF Python

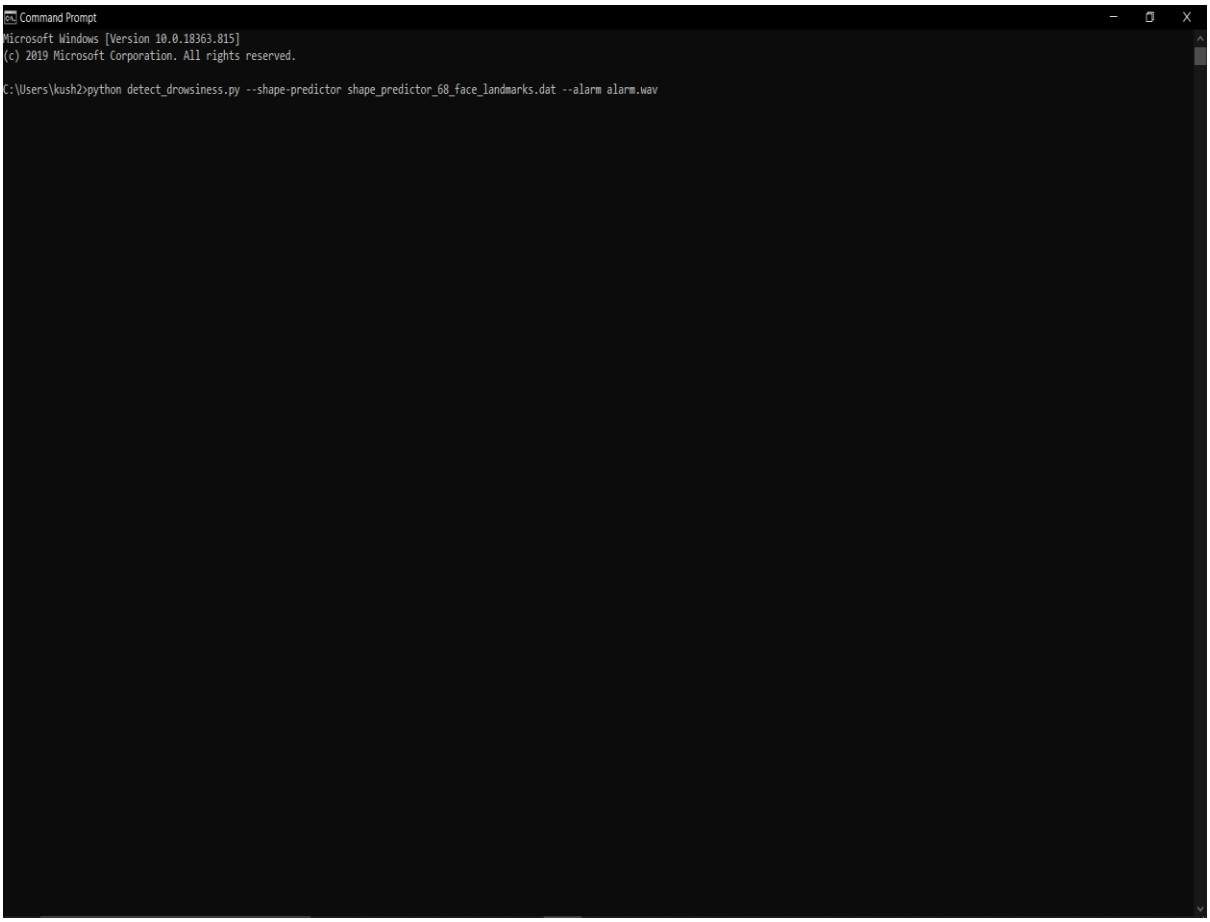

File Edit Selection View Go Run Terminal Help
project.py - Visual Studio Code
Welcome
project.py
C: > Users > kush2 > project.py
# extract the left and right eye coordinates, then use the
# coordinates to compute the eye aspect ratio for both eyes
leftEye = shape[lStart:lEnd]
rightEye = shape[rStart:rEnd]
leftEAR = eye_aspect_ratio(leftEye)
rightEAR = eye_aspect_ratio(rightEye)
# average the eye aspect ratio together for both eyes
ear = (leftEAR + rightEAR) / 2.0
# compute the convex hull for the left and right eye, then
# visualize each of the eyes
leftEyeHull = cv2.convexHull(leftEye)
rightEyeHull = cv2.convexHull(rightEye)
cv2.drawContours(frame, [leftEyeHull], -1, (0, 255, 0), 1)
cv2.drawContours(frame, [rightEyeHull], -1, (0, 255, 0), 1)
# check to see if the eye aspect ratio is below the blink
# threshold, and if so, increment the blink frame counter
if ear < EYE_AR_THRESH:
0 0
Ln 1, Col 8 Spaces: 4 UTF-8 CRLF Python


File Edit Selection View Go Run Terminal Help
project.py - Visual Studio Code
Welcome
project.py
C: > Users > kush2 > project.py
# threshold, and if so, increment the blink frame counter
if ear < EYE_AR_THRESH:
COUNTER += 1
# if the eyes were closed for a sufficient number of
# then sound the alarm
if COUNTER >= EYE_AR_CONSEC_FRAMES:
# if the alarm is not on, turn it on
if not ALARM_ON:
ALARM_ON = True
# check to see if an alarm file was supplied,
# and if so, start a thread to have the alarm
# sound played in the background
if args["alarm"] != "":
t = Thread(target=sound_alarm,
args=(args["alarm"],))
t.deamon = True
t.start()
# draw an alarm on the frame
0 0
Ln 1, Col 8 Spaces: 4 UTF-8 CRLF Python


File Edit Selection View Go Run Terminal Help
project.py - Visual Studio Code
Welcome
project.py
C: > Users > kush2 > project.py
draw an alarm on the frame
cv2.putText(frame, "DROWSINESS ALERT!", (10, 30),
cv2.FONT_HERSHEY_SIMPLEX, 0.7, (0, 0, 255), 2)
# otherwise, the eye aspect ratio is not below the blink
# threshold, so reset the counter and alarm
else:
COUNTER = 0
ALARM_ON = False
# draw the computed eye aspect ratio on the frame to help
# with debugging and setting the correct eye aspect ratio
# thresholds and frame counters
cv2.putText(frame, "EAR: {:.2f}".format(ear), (300, 30),
cv2.FONT_HERSHEY_SIMPLEX, 0.7, (0, 0, 255), 2)
# show the frame
cv2.imshow("Frame", frame)
key = cv2.waitKey(1) & 0xFF
0 0
Ln 1, Col 8 Spaces: 4 UTF-8 CRLF Python


File Edit Selection View Go Run Terminal Help
project.py - Visual Studio Code
Welcome
project.py
C: > Users > kush2 > project.py
ALARM_ON = False
# draw the computed eye aspect ratio on the frame to help
# with debugging and setting the correct eye aspect ratio
# thresholds and frame counters
cv2.putText(frame, "EAR: {:.2f}".format(ear), (300, 30),
cv2.FONT_HERSHEY_SIMPLEX, 0.7, (0, 0, 255), 2)
# show the frame
cv2.imshow("Frame", frame)
key = cv2.waitKey(1) & 0xFF
# if the `q` key was pressed, break from the loop
if key == ord("q"):
break
# do a bit of cleanup
cv2.destroyAllWindows()
vs.stop()
0 0
Ln 1, Col 8 Spaces: 4 UTF-8 CRLF Python

EXECUTING COMMAND



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