ANNA UNIVERSITY REGIONAL CAMPUS COIMBATORE

INTERNET OF THINGS(IoT)

TOPIC: DROWSINESS DETECTION AND ALERTING SYSTEM

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TABLE OF CONTENTS:

INTRODUCTION

PROJECT OVERVIEW:

Drowsiness detection is the most necessary procedure to prevent any road accidents. The main aim of this project is to construct a smart alert technique for building intelligent vehicles that can automatically avoid drowsy driver impairment. Hence, it is required to design a robust alert system to avoid the cause of the mishap. In this project, we address a drowsy driver alert system that has been developed using such a technique in which the Video Stream Processing (VSP) is analysed by the eye blink concept through an Eye Aspect Ratio (EAR) and Euclidean distance of the eye. The face landmark algorithm is also used as a proper way to eye detection. When the driver's fatigue is detected, the IoT module issues a warning message along with the impact of collision and location information, thereby alerting with the help of a voice speaking.

PURPOSE:

Many people drive on highway day and night. Bus drivers,truck drivers and people traveling long distance. This causes lack of sleep. Driving sleepy is very dangerous. Most of the accidents occur due to drowsiness of the driver. So to prevent these accidents we build a system using python. The objective of this python project is to built a drowsiness detection system that will detect that a person's eye are closed for few seconds. The system will alert the driver when drowsiness is detected. The purpose of this system is to aid in the prevention of accidents passenger and commercial vehicles.

It detects the early symptoms of drowsiness before the driver has fully lost all attentiveness and warn the driver that they no longer capable of operating the vehicle safely.

CODING & SOLUTIONS

Code:

```
import cv2
import dlib
import numpy as np
import pyttsx3
import sys
from scipy.spatial import distance
from imutils import face_utils
import ibmiotf.device
import pygame

#Provide your IBM Watson Device Credentials
organization = "2w8p10"
deviceType = "Drowsy"
deviceId = "12052001"
authMethod = "token"
authToken = "03121975"

def ibmstart(x):

    def myCommandCallback(cmd):
        print("Command received: %s" % cmd.data['command'])
        print(cmd)
```

```
    try:
      deviceOptions = {"org": organization, "type": deviceType, "id":
deviceId, "auth-method": authMethod, "auth-token": authToken}
      deviceCli = ibmiotf.device.Client(deviceOptions)
      #.....................................


    except Exception as e:
      print("Caught exception connecting device: %s" % str(e))
      sys.exit()


    deviceCli.connect()
    data = { 'Status' : x}
    #print data
    def myOnPublishCallback():
        print ("Published Status = %s" % x, "to IBM Watson")


    success = deviceCli.publishEvent("DD", "json", data, qos=0,
on_publish=myOnPublishCallback)
    if not success:
        print("Not connected to IoTF")



    deviceCli.commandCallback = myCommandCallback
    deviceCli.disconnect()
```

```
# INITIALIZING THE pyttsx3 SO THAT
# ALERT AUDIO MESSAGE CAN BE DELIVERED
engine = pyttsx3.init()

# SETTING UP OF CAMERA TO 1 YOU CAN
# EVEN CHOOSE 0 IN PLACE OF 1
cap = cv2.VideoCapture(0)

# FACE DETECTION OR MAPPING THE FACE TO
# GET THE Eye AND EYES DETECTED
face_detector = dlib.get_frontal_face_detector()

# PUT THE LOCATION OF .DAT FILE (FILE FOR
# PREDECTING THE LANDMARKS ON FACE )
dlib_facelandmark =
dlib.shape_predictor("C:/Users/kowsa/AppData/Local/Programs/Pyt
hon/Python311/shape_predictor_68_face_landmarks.py")

# FUNCTION CALCULATING THE ASPECT RATIO FOR
# THE Eye BY USING EUCLIDEAN DISTANCE FUNCTION
def Detect_Eye(eye):
  poi_A = distance.euclidean(eye[1], eye[5])
  poi_B = distance.euclidean(eye[2], eye[4])
  poi_C = distance.euclidean(eye[0], eye[3])
  aspect_ratio_Eye = (poi_A+poi_B)/(2*poi_C)
```

```
  return aspect_ratio_Eye


# MAIN LOOP IT WILL RUN ALL THE UNLESS AND
# UNTIL THE PROGRAM IS BEING KILLED BY THE USER
while True:

  null, frame = cap.read()
  flag=0
  gray_scale = cv2.cvtColor(frame, cv2.COLOR_BGR2GRAY)

  faces = face_detector(gray_scale)

  for face in faces:
    face_landmarks = dlib_facelandmark(gray_scale, face)
    leftEye = []
    rightEye = []

    # THESE ARE THE POINTS ALLOCATION FOR THE
    # LEFT EYES IN .DAT FILE THAT ARE FROM 42 TO 47
    for n in range(42, 48):
      x = face_landmarks.part(n).x
      y = face_landmarks.part(n).y
      rightEye.append((x, y))
      next_point = n+1
```

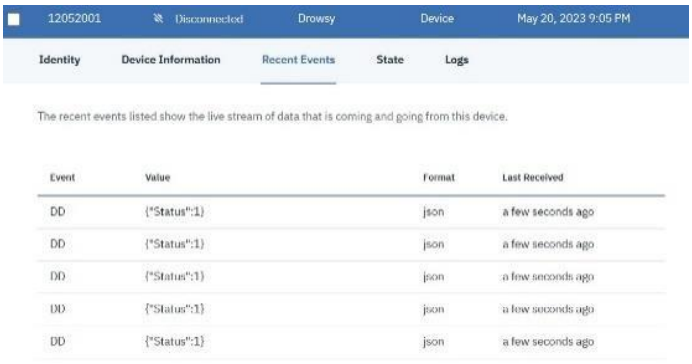
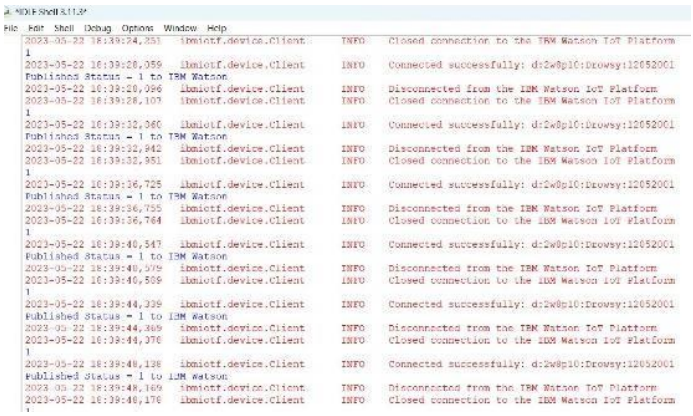
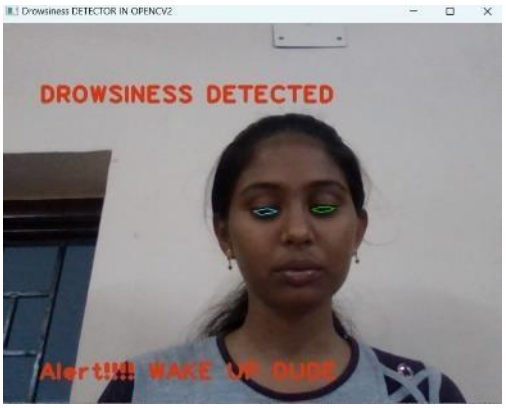
```
  if n == 47:
    next_point = 42
  x2 = face_landmarks.part(next_point).x
  y2 = face_landmarks.part(next_point).y
  cv2.line(frame, (x, y), (x2, y2), (0, 255, 0), 1)

# THESE ARE THE POINTS ALLOCATION FOR THE
# RIGHT EYES IN .DAT FILE THAT ARE FROM 36 TO 41
for n in range(36, 42):
  x = face_landmarks.part(n).x
  y = face_landmarks.part(n).y
  leftEye.append((x, y))
  next_point = n+1
  if n == 41:
    next_point = 36
  x2 = face_landmarks.part(next_point).x
  y2 = face_landmarks.part(next_point).y
  cv2.line(frame, (x, y), (x2, y2), (255, 255, 0), 1)

# CALCULATING THE ASPECT RATIO FOR LEFT
# AND RIGHT EYE
right_Eye = Detect_Eye(rightEye)
left_Eye = Detect_Eye(leftEye)
Eye_Rat = (left_Eye+right_Eye)/2
```

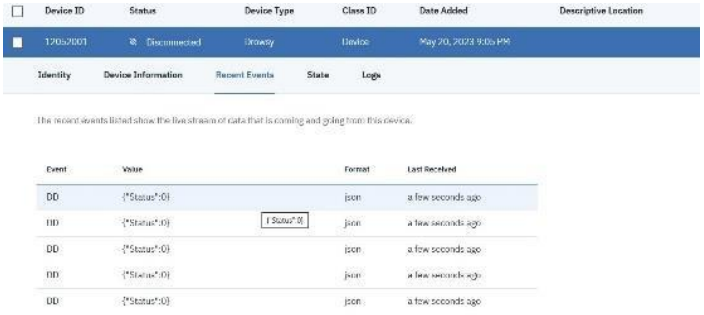
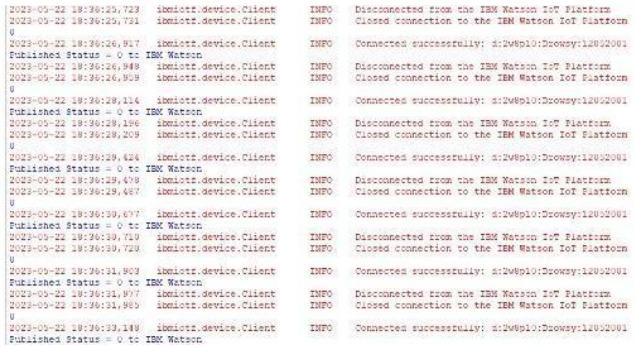
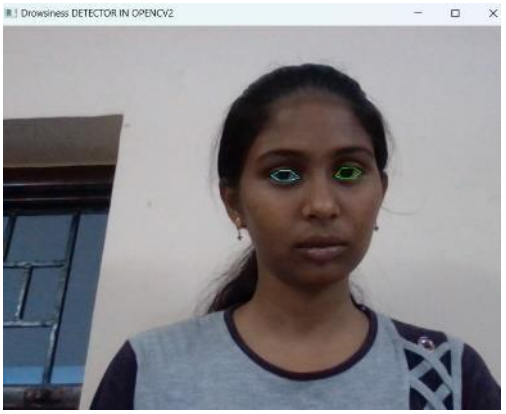
```
 # NOW ROUND OF THE VALUE OF AVERAGE MEAN
 # OF RIGHT AND LEFT EYES
 Eye_Rat = round(Eye_Rat, 2)

 # THIS VALUE OF 0.25 (YOU CAN EVEN CHANGE IT)
 # WILL DECIDE WHETHER THE PERSONS'S EYES ARE CLOSE OR NOT
 if Eye_Rat < 0.25:
   cv2.putText(frame, "DROWSINESS DETECTED", (50, 100),
       cv2.FONT_HERSHEY_PLAIN, 2, (21, 56, 210), 3)
   cv2.putText(frame, "Alert!!!! WAKE UP DUDE", (50, 450),
       cv2.FONT_HERSHEY_PLAIN, 2, (21, 56, 212), 3)

   # CALLING THE AUDIO FUNCTION OF TEXT TO
   # AUDIO FOR ALERTING THE PERSON
   engine.say("Alert!!!! WAKE UP DUDE")
   flag=1
   engine.runAndWait()



cv2.imshow("Drowsiness DETECTOR IN OPENCV2", frame)
print(flag)
ibmstart(flag)
'''
while True:
```

```
            data = { 'Status' : x}
            #print data
            def myOnPublishCallback():
               print ("Published Status = %s" % x, "to IBM Watson")

            success = deviceCli.publishEvent("DD", "json", data, qos=0,
on_publish=myOnPublishCallback)
            if not success:
               print("Not connected to IoTF")
            time.sleep(1)

            deviceCli.commandCallback = myCommandCallback
 '''
 #r1 =
requests.get('https://api.thingspeak.com/update?api_key=SEWZDEK
7APG3P0P8&field1='+str(flag))
 #print(r1.status_code)
 key = cv2.waitKey(9)
 if key == 20:
   break

# Disconnect the device and application from the cloud
#deviceCli.disconnect()
cap.release()
cv2.destroyAllWindows()
```

RESULTS

Performance Metrics:

Parameter	Values	Screenshot
Drowsiness detected	**IBM CLOUD OUTPUT**  **PYTHON OUTPUT** 	EYES CLOSED 

Not drowsy	**IBM CLOUD OUTPUT**  **PYTHON OUTPUT** 	EYES OPEN 

ADVANTAGES & DISADVANTAGES

ADVANTAGES:

- The drowsiness detection system is capable of detecting drowsiness in quickly. The system which can differentiate normal eye blink and drowsiness can prevent the driver from entering the state of sleepiness while driving.

DISADVANTAGES:

- Aging of sensors are main disadvantage of this system and misconception of eye movement may be a disadvantage of this system.

CONCLUSION:

Thus we conclude that, this drowsiness detection and alerting system is used if the drivers eyes are closed cumulatively more than a standard value, the system draws the conclusion that the driver is falling asleep, and then it will activate an alarm sound to alert the driver. A non-invasive system to localize the eyes and monitor fatigue was developed.

FUTURE SCOPE:

- The system can be made more accurate using various other parameters such as State of the Car, Detecting Foreign Substances on Face etc.
- An application can be developed where it can alert or prevent the user from sleeping.
- It can be used to develop an IOT device that can be installed in the car to detect driver's drowsiness.
- Similar models and techniques can be used for various other uses such as Netflix, Hotstar and other streaming service platforms can detect whether the person is sleeping and stop the video accordingly.

Demo Video link:

https://github.com/naanmudhalvan-SI/PBL-NT-GP--1585-1680517958/blob/fdacf0891ff88b76dd0424d28a40ba6617557b08/Final%20Deliveries/Project%20Report/Demo%20video.mp4