Driver Drowsiness.. By Team 3

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Table of contents

ABSTRACT

1)Driver drowsiness is a critical issue that poses significant risks to road safety.

2) The purpose of this abstract is to provide an overview of research and technologies related to driver drowsiness detection and prevention.

3) Drowsy driving is a prevalent problem worldwide, contributing to a substantial number of accidents and fatalities on the roads.

4)According to the reports,drowsiness can impair a driver’s cognitive abilities, reaction times, and decision-making skills, making them more susceptible to accidents.

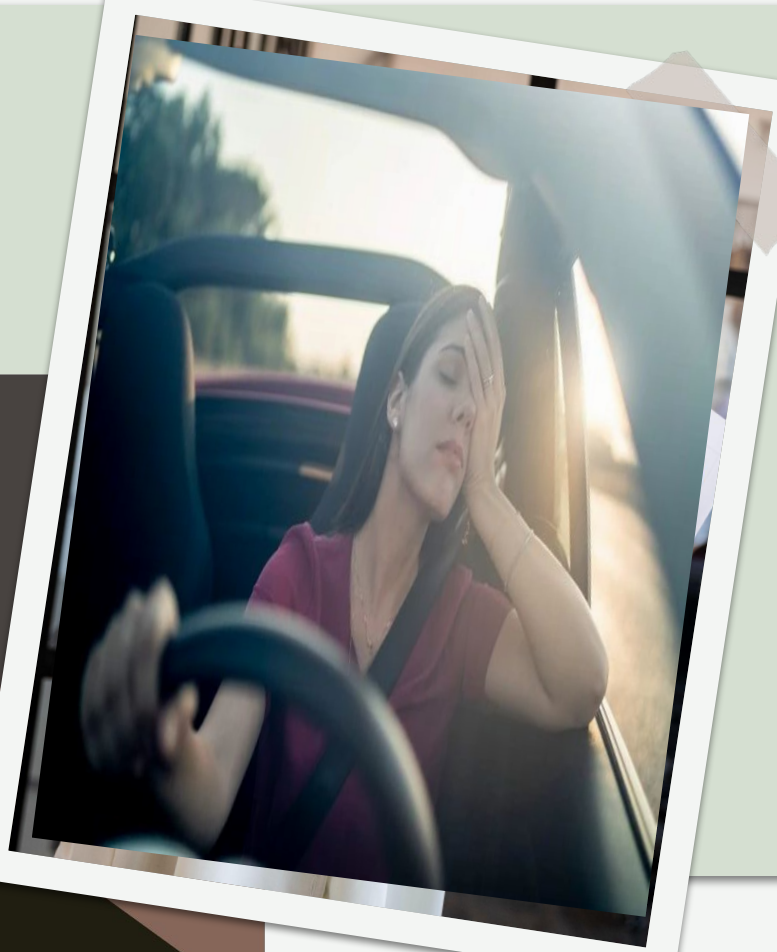
PROBLEM STATEMENT

1)The problem at hand is the detection and prevention of driver drowsiness, which poses a significant risk to road safety

2)Drowsy driving is a major cause of accidents worldwide, leading to injuries and fatalities.

3)The objective is to develop a robust and efficient system that can accurately detect signs of drowsiness in drivers and issue timely alerts to prevent potential accidents.

4)The existing solutions for driver drowsiness detection are often limited in their effectiveness or require specialized equipment that is not widely available.



01

What is unique in my project?

a)Driver drowsiness is a state between sleeping and being awake due to body fatigue while driving. This condition has become a common issue that leads to road accidents and death.

b)Driver drowsiness detection systems can use cameras, eye tracking sensors and other hardware to monitor visual cues, where drowsiness can be detected through yawning frequency, eye-blinking frequency, eye-gaze movement, head movement and facial expressions.

c)According to the eye closure degree, blink frequency, the degree of mouth opening and the nodding frequency, the driver is judged to be in a fatigue state. If it is fatigued, an alarm is issued.

1. **Multi-Sensor Fusion:** Integrating data from multiple sensors provides a more comprehensive and accurate understanding of the driver's alertness.
2. **Real-time Emotion Analysis:** Combining drowsiness detection with emotion analysis adds a new layer of insight into the driver's mental state.
3. **Personalized Alerts:** Tailoring the alert mechanism to individual driver preferences enhances user experience and responsiveness.
4. **Machine Learning Interpretability:** Focusing on explaining the system's decisions enhances transparency and trust.
5. **Predictive Analytics:** Anticipating drowsiness before it fully manifests adds a proactive element to the system.

Hardware Requirements:

Camera(s): Cameras are used to capture the driver's facial features and expressions. These cameras can be integrated into the dashboard, rearview mirror, or other suitable locations to monitor the driver's eyes, head position, and facial cues.

Display and Alerts: If the system provides real-time alerts to the driver, it would require a display screen and possibly audio output components (speakers) to convey alerts effectively.

Data Storage: Storage components, like memory cards or onboard storage, might be needed to log data for analysis and future improvements.

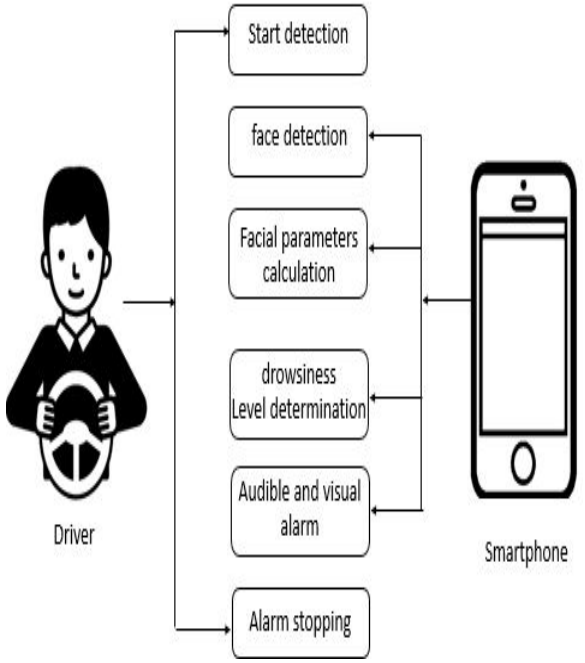
Power Supply: Reliable power supply sources are essential to ensure the system operates without interruptions. This might involve integrating with the vehicle's electrical system or using batteries.

Connectivity: For systems that need to communicate with external devices or servers (for updates or data sharing), connectivity options such as Wi-Fi or cellular modules could be required.

Mounting Hardware: Proper mounting hardware is needed to securely install cameras and sensors within the vehicle's interior without obstructing the driver's view or compromising safety.

Software Requirements

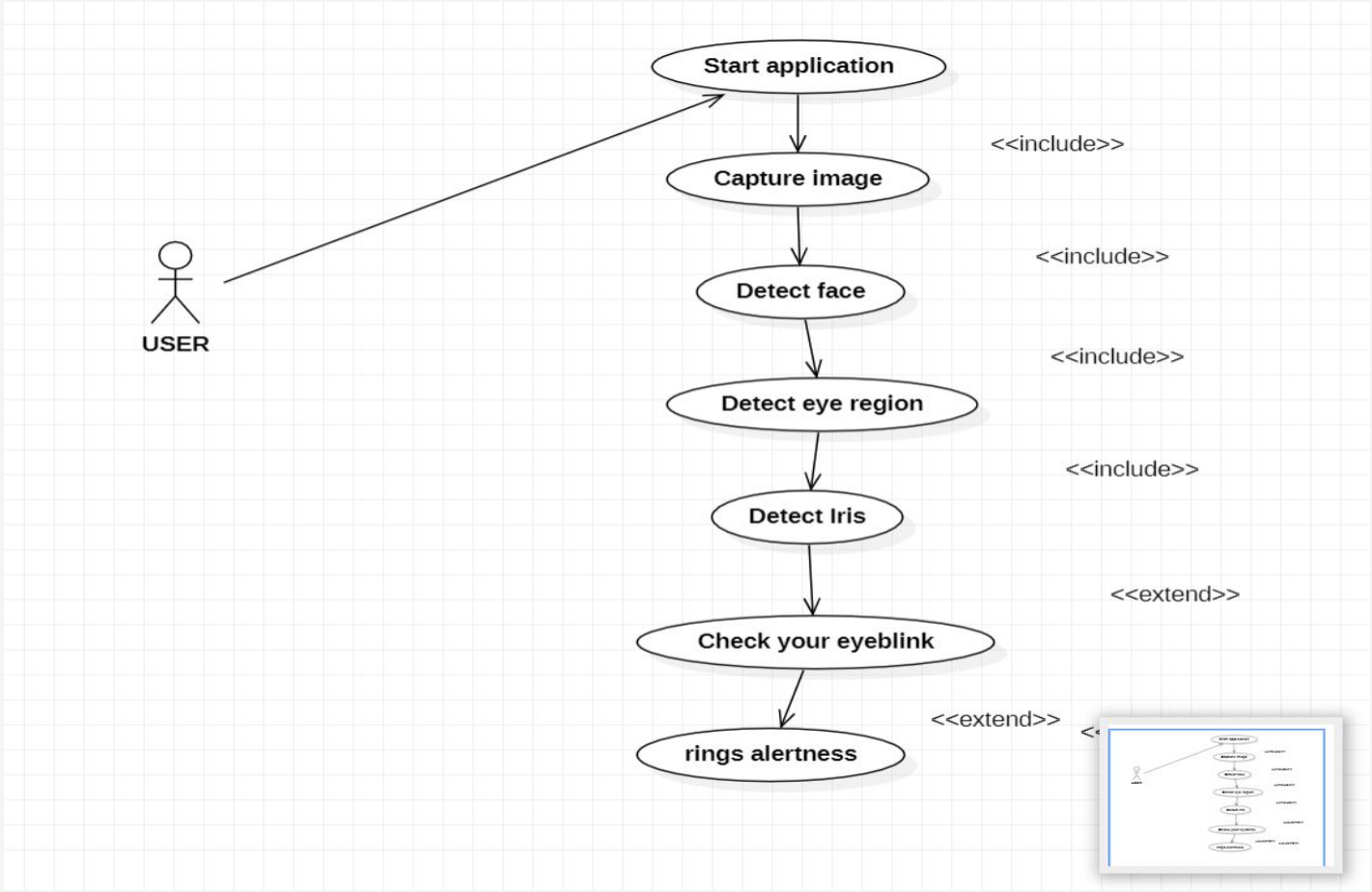
1)To revent these accidents we will build a system using Python, OpenCV, and Keras which will alert the driver when he feels sleepy.
2)Open Cv-pip .install opencv-python(Face and eye detection)
3)Imutils-pip install imutilis(To get landmarks of eye).
4)Pygame-pip install pygame(To play alarm sound).
5)Dlib -pip install dlib
6)Python (3.6 version)



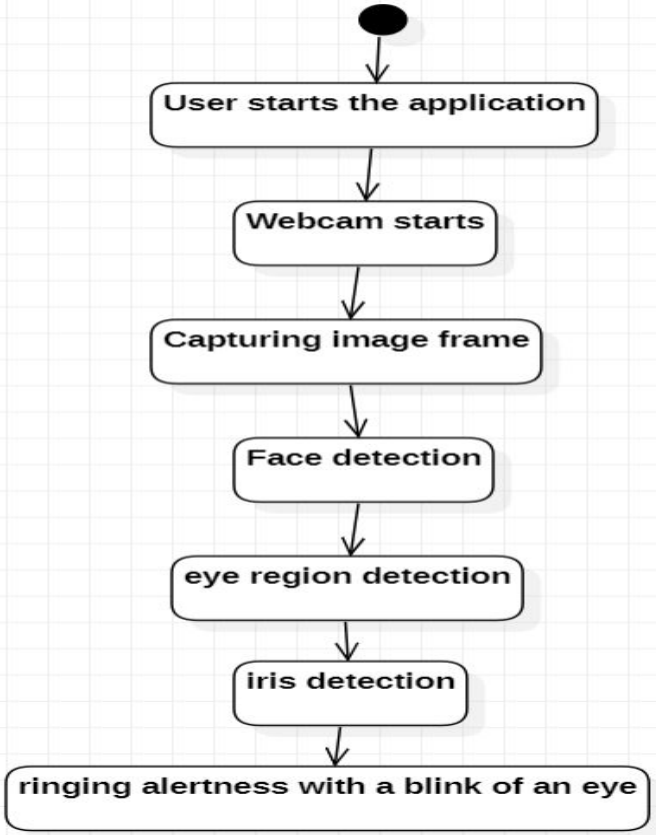
STAR UML DIAGRAMS

1)USE CASE DIAGRAMS
2)STATE CHART DIAGRAMS
3)ACTIVITY DIAGRAMS
4)CLASS DIAGRAMS
5)SEQUENCE DIAGRAMS
6)ER DIAGRAMS
7)DFD DIAGRAMS

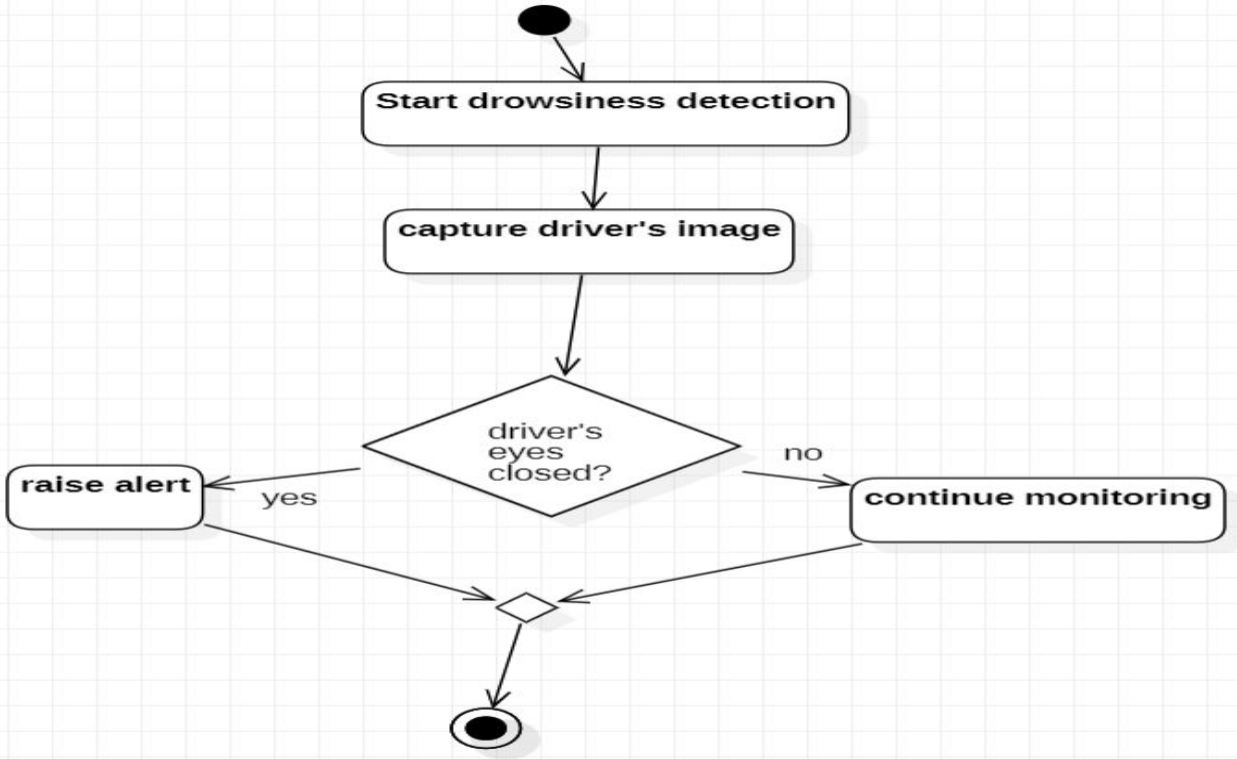
USECASE DIAGRAMS



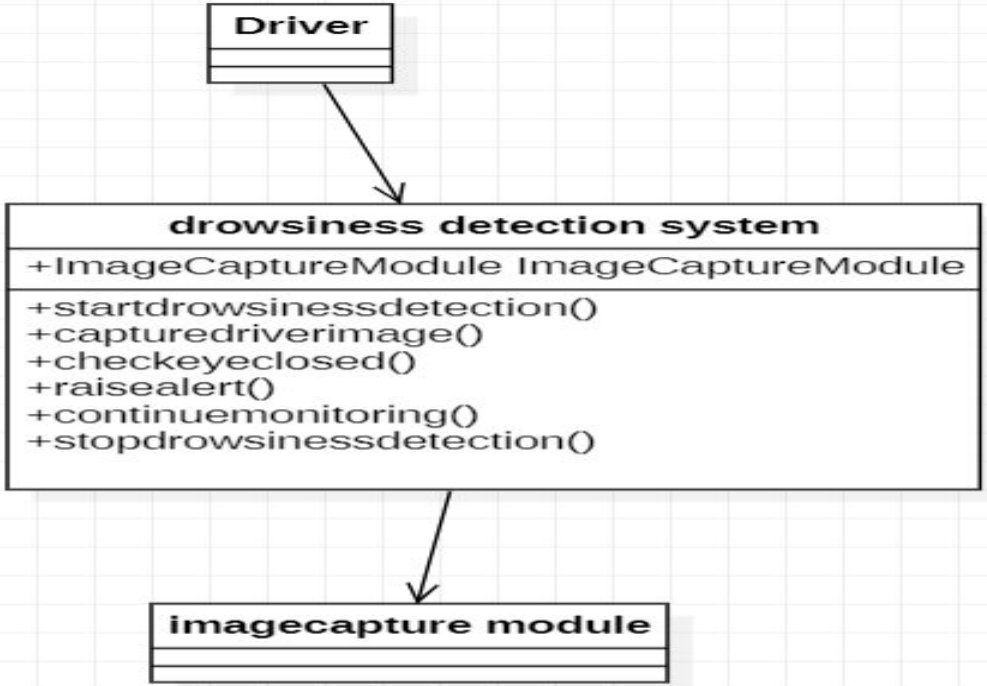
State chart diagrams



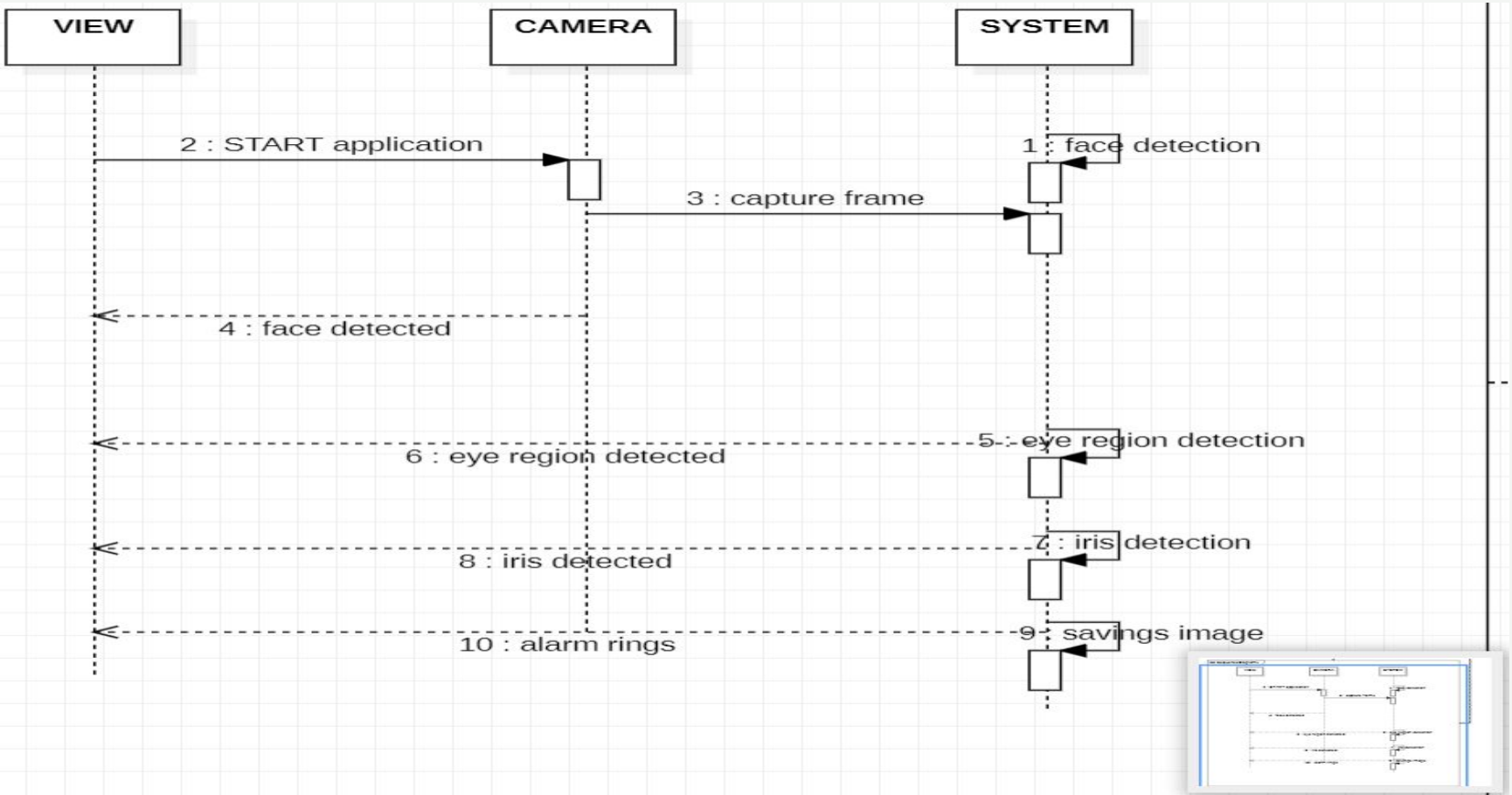
Activity diagram



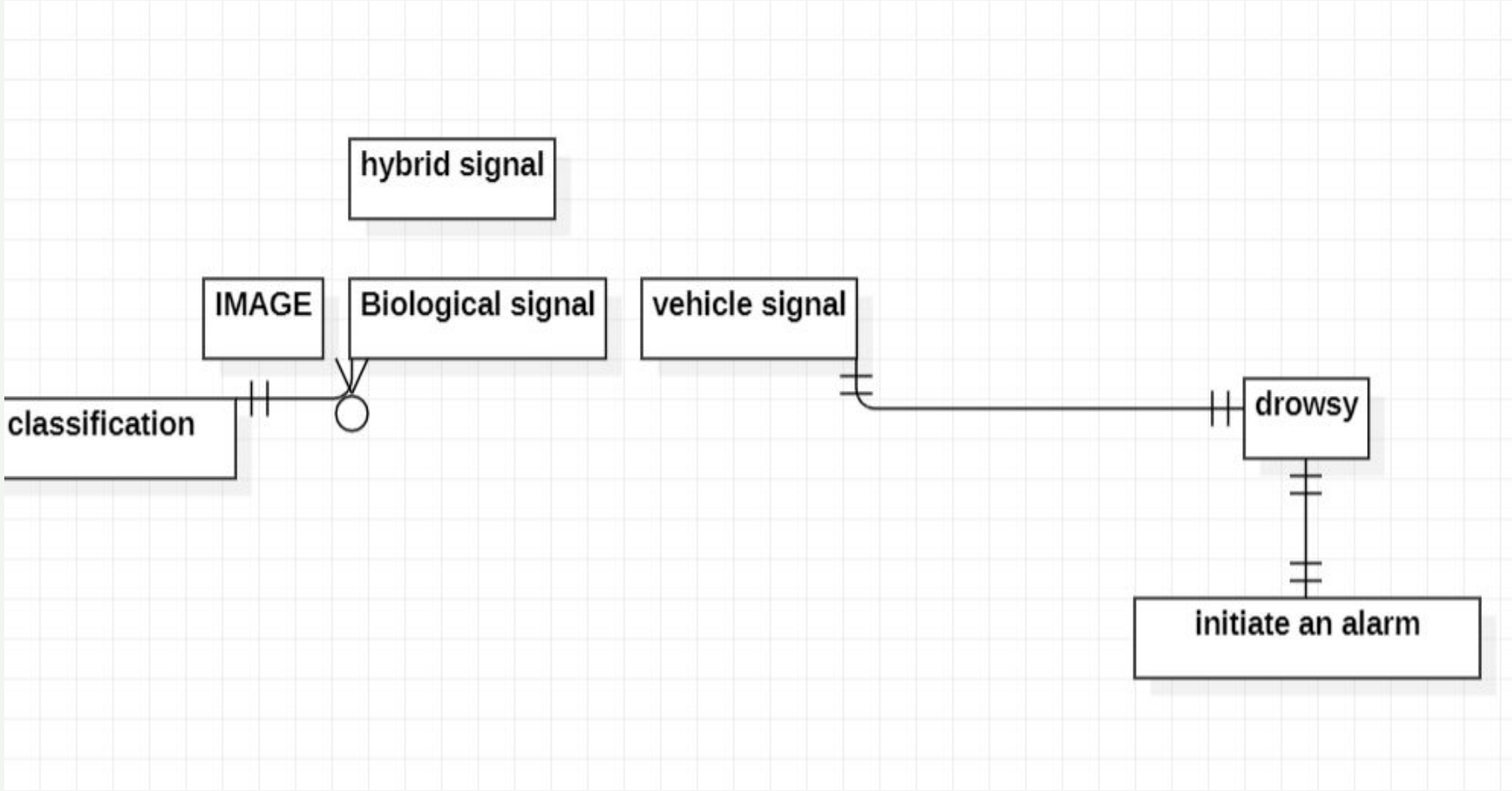
Class diagram



SEQUENCE DIAGRAM



ER DIAGRAM


hybrid signal
IMAGE
Biological signal
vehicle signal
classification
drowsy
initiate an alarm

DFD DIAGRAM

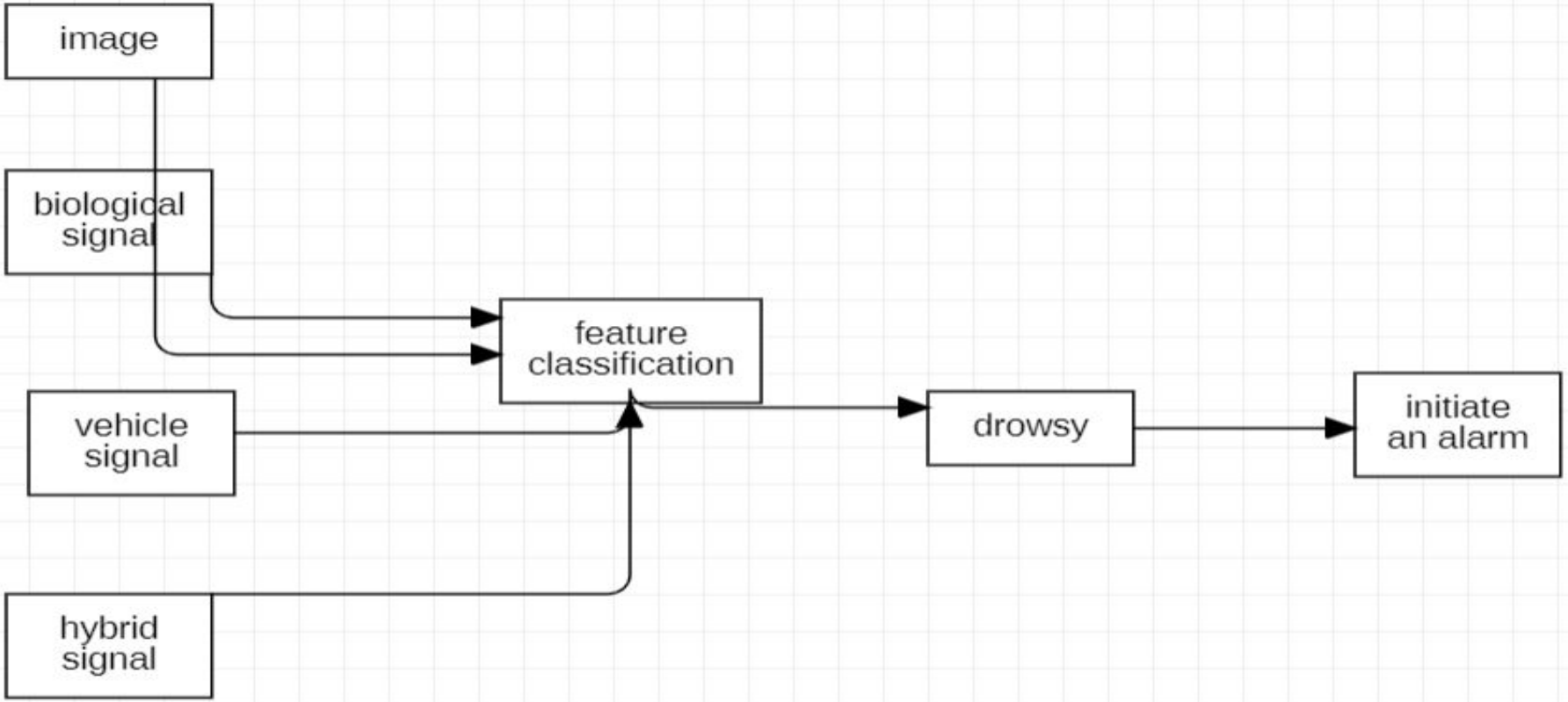


image
biological signal
vehicle signal
hybrid signal
feature classification
drowsy
initiate an alarm

02

Python code for our project

```
from scipy.spatial import distance
from imutils import face_utils
from pygame import mixer
import imutils
import dlib
import cv2


mixer.init()
mixer.music.load("music.wav")

def eye_aspect_ratio(eye):
        A = distance.euclidean(eye[1], eye[5])
        B = distance.euclidean(eye[2], eye[4])
        C = distance.euclidean(eye[0], eye[3])
        ear = (A + B) / (2.0 * C)
        return ear

thresh = 0.25
frame_check = 20
detect = dlib.get_frontal_face_detector()
predict =
dlib.shape_predictor("models/shape_predictor_
68_face_landmarks.dat")

(lStart, lEnd) =
face_utils.FACIAL_LANDMARKS_68_IDXS["left
_eye"]
(rStart, rEnd) =
face_utils.FACIAL_LANDMARKS_68_IDXS["rig
ht_eye"]
cap=cv2.VideoCapture(0)
flag=0
```

```
while True:
        ret, frame=cap.read()
        frame = imutils.resize(frame, width=450)
        gray = cv2.cvtColor(frame, cv2.COLOR_BGR2GRAY)
        subjects = detect(gray, 0)
        for subject in subjects:
                shape = predict(gray, subject)
                shape = face_utils.shape_to_np(shape)
                leftEye = shape[lStart:lEnd]
                rightEye = shape[rStart:rEnd]
                leftEAR = eye_aspect_ratio(leftEye)
                rightEAR = eye_aspect_ratio(rightEye)
                ear = (leftEAR + rightEAR) / 2.0
                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)
```

```
if ear < thresh:
                        flag += 1
                        print (flag)
                        if flag >= frame_check:
                                cv2.putText(frame, "****************ALERT!****************", (10, 30),
                                        cv2.FONT_HERSHEY_SIMPLEX, 0.7, (0, 0, 255), 2)
                                cv2.putText(frame, "****************ALERT!****************", (10,325),
                                        cv2.FONT_HERSHEY_SIMPLEX, 0.7, (0, 0, 255), 2)
                                mixer.music.play()
                else:
                        flag = 0
        cv2.imshow("Frame", frame)
        key = cv2.waitKey(1) & 0xFF
        if key == ord("q"):
                break
cv2.destroyAllWindows()
cap.release()
```

Conclusion:

Conclusion

This project looks at how to detect tiredness in a driver in real time by looking at eye closure and yawning. This technology has the advantage of detecting tiredness early on and sounding an alarm before an accident occurs. The use of OpenCV is considered to be more suitable for this application based on the design of the proposed work because it meets the relevant requirements such as cost, power, and size. Face, eye, and mouth are easily detected by this technology, and these are captured using a webcam. The technology can detect whether the eyes and mouth were open or closed during monitoring. A warning signal will be issued if the eyes have been closed for an extended period of time or if yawning is detected.

Reference:

1)https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3571819/#:~:text=These%20statistics%20suggest%20that%20driver,another%20vehicle%20or%20stationary%20objects.
2)https://ijcrt.org/papers/IJCRT2205363.pdf
3)https://data-flair.training/blogs/python-project-driver-drowsiness-detection-system/

THANK YOU!

BY TEAM 3