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DEPARTMENT OF CSO(INTERNET OF THINGS)

MINI PROJECT ON

WORK WELL: REAL TIME SLEEP DETECTION FOR ENHANCED PRODUCTIVITY

UNDER THE ESTEEMED GUIDANCE OF
Mr. K. Anil , Assistant Professor

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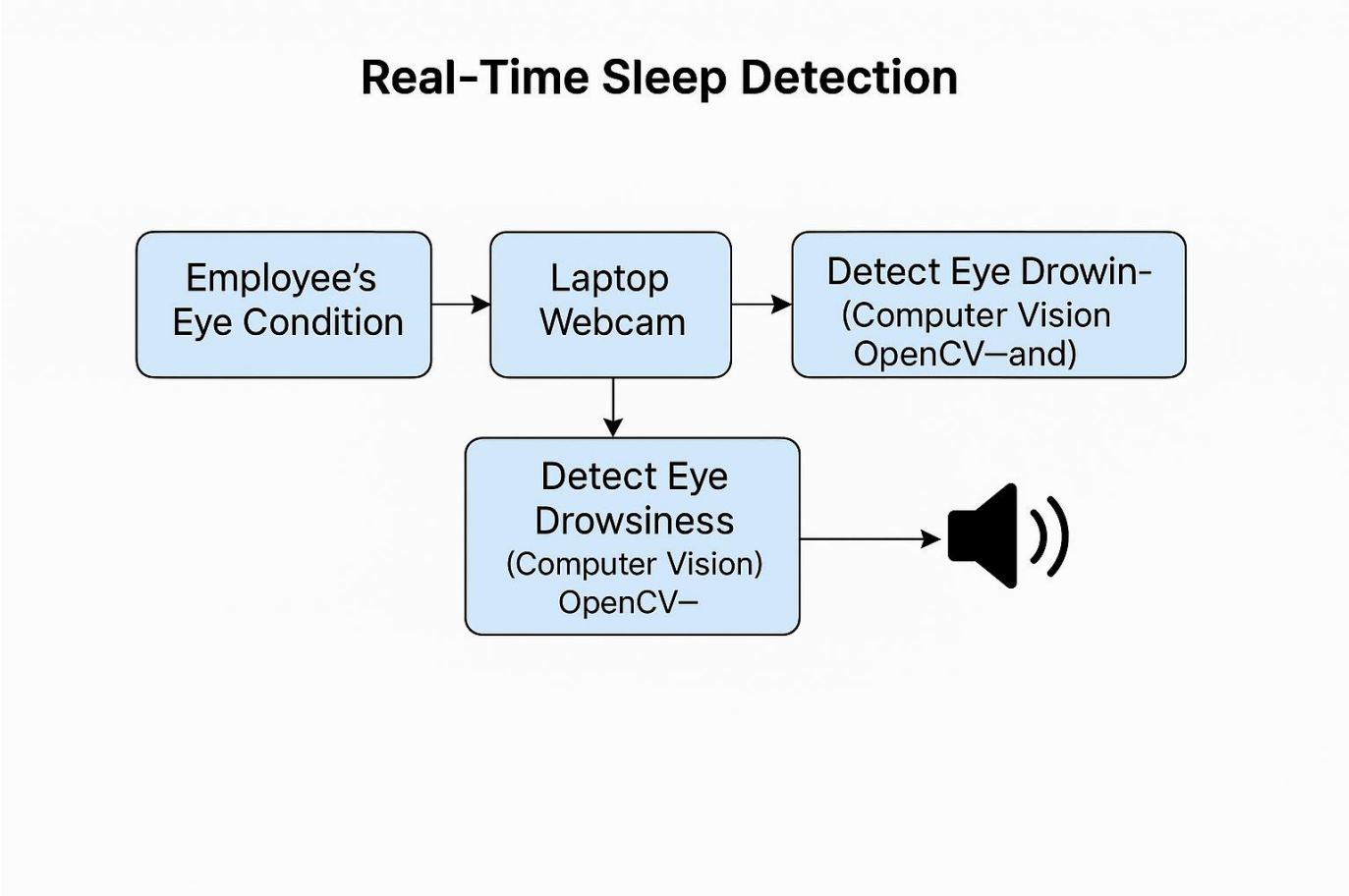
INTRODUCTION

- Employees working long hours on computers often face drowsiness, affecting productivity and safety.
- we propose a Real-Time Sleep Detection System using a laptop webcam and computer vision.
- It monitors eye activity (blinking, closure duration, EAR) to detect The system uses OpenCV for video processing and can be enhanced with CNN/LSTM models for accuracy.
- When drowsiness is detected, it triggers an audio alert to regain alertness.

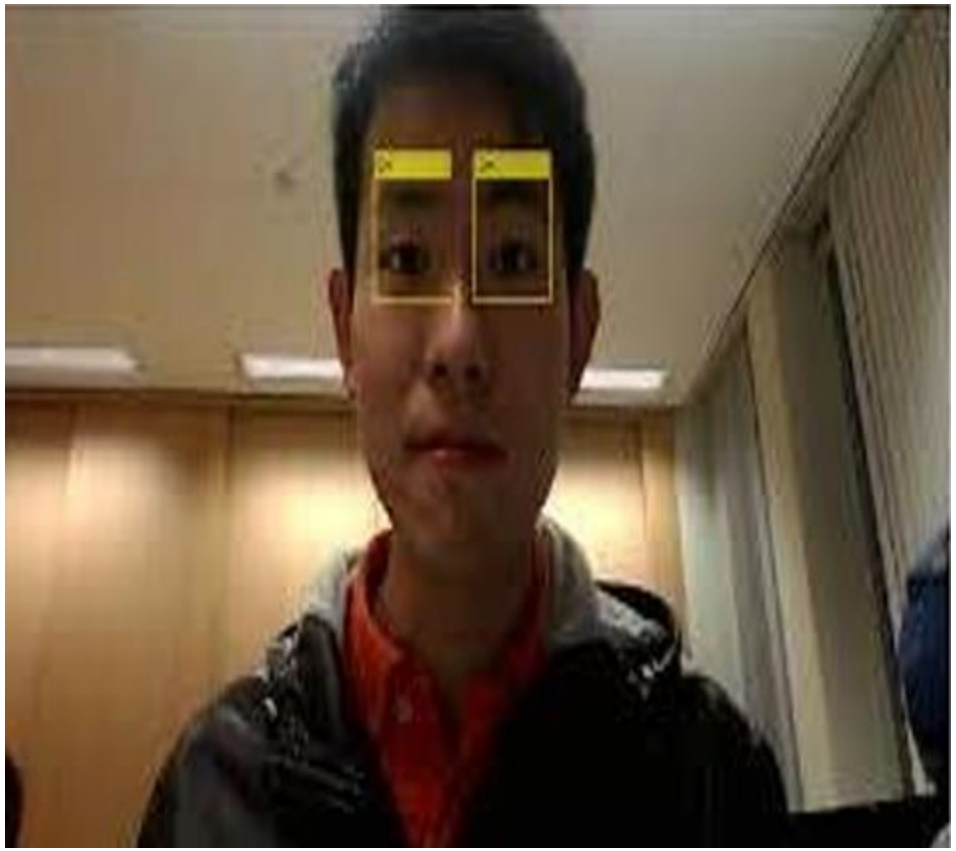
ARCHITECTURE



ALGORITHMS

1. Sleep detection Algorithm

- Detect face & eyes using OpenCV , Dlib .
- Measure Eye Aspect Ratio (EAR) → Closed eyes = Drowsiness.
- Track blinking rate & head pose tilt for sleep detection.
- Heart Rate Variability (HRV) → Sudden drop = Drowsiness.



2. Productivity Enhancement Algorithm

- Uses Pomodoro Technique with AI to adjust work-rest intervals.
- Reinforcement Learning (RL) optimizes work schedules based on alertness.
- Adjusts light, temperature, and sound for focus & alertness.

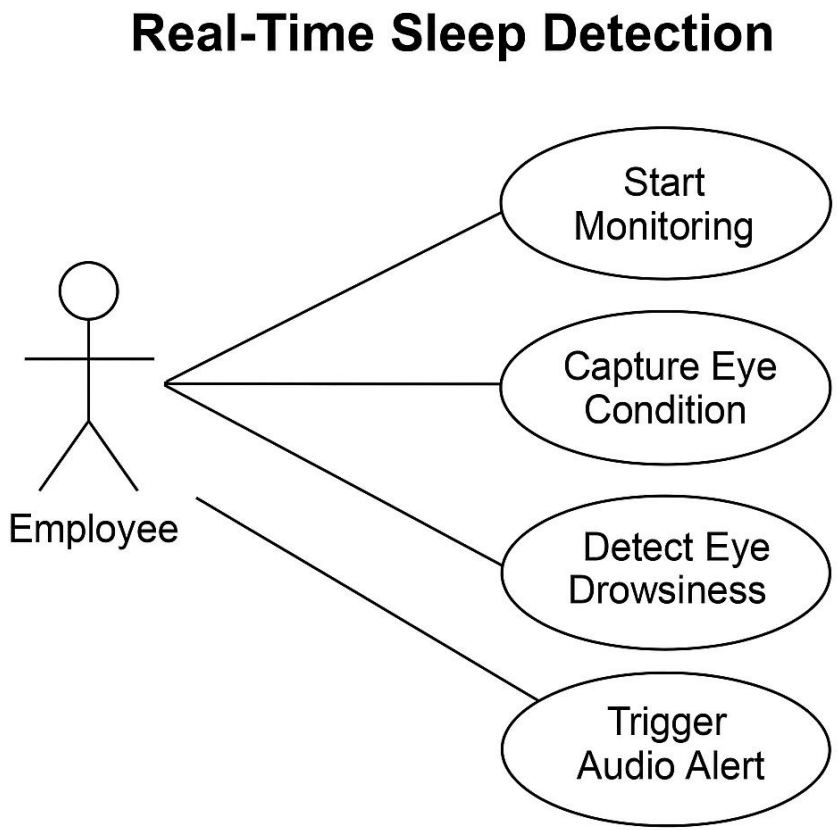
TOOLS

- Programming: Python
- Libraries: OpenCV, Deep learning
- Hardware: Laptop Camera
- Alert and Notification System: Audio Alert

LITERATURE REVIEW

- Microsleeps & drowsiness are major causes of reduced productivity and workplace accidents.
- Computer vision techniques (using OpenCV, Dlib) detect drowsiness by tracking eye closure, yawns, and head tilts.
- Machine learning models(like CNNs, SVM) enhance accuracy using facial features and behavior patterns.
- Real-time alerts help prevent lapses in focus, improving efficiency, safety, and productivity.

HOW IT WORKS?


Real-Time Sleep Detection
Start Monitoring
Capture Eye Condition
Detect Eye Drowsiness
Trigger Audio Alert
Employee

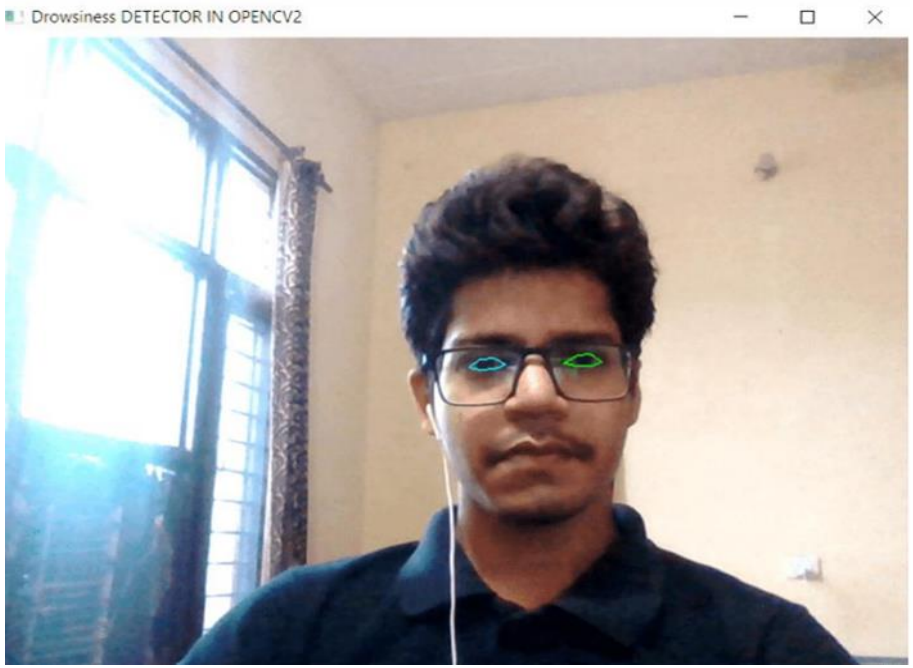
CODE SNIPPET

```
import cv2
import time
from sound_module import play_alarm_sound  # Import the play_alarm_sound function

# Load the cascade
face_cascade = cv2.CascadeClassifier('eye/haarcascade_eye.xml')  # Updated path
eye_cascade = cv2.CascadeClassifier('eye/haarcascade_eye.xml')  # Updated path
cap = cv2.VideoCapture(0)

closed_eye_duration = 0  # Timer for closed eyes
alarm_triggered = False  # Alarm state
sleep_warning_duration = 15
```

PROGREES



• Problem Statement Defined To aim is to detect sleep/drowsiness in real time to improve focus and safety.

• Studied existing methods like PERCLOS, machine learning, computer vision.

• Technology Stack Finalized
-OpenCV for facial and eye detection
-Dlib for facial landmarks
-Python for backend processing

CHALLENGES

- Faced difficulty in detecting eyes during rapid blinks or partial face visibility.
- Resolved by using Dlib’s 68-point facial landmark detection for accurate tracking.
- Detection accuracy dropped in low or uneven lighting conditions.
- Solved using image preprocessing techniques like histogram equalization.
- Normal blinking was sometimes wrongly detected as drowsiness.
- Reduced false alerts by applying the PERCLOS method based on eye closure duration.

CONCLUSION

The project "Real-Time Sleep Detection for Enhanced Productivity" successfully demonstrates how computer vision and facial landmark detection can be used to identify signs of drowsiness in real time. By using OpenCV the system effectively detects prolonged eye closure and provides timely alerts to the user. This contributes to enhancing focus, reducing fatigue-related risks, and improving productivity in work and driving environments. The project lays a foundation for future improvements using machine learning and wearable integration for higher accuracy and usability.

THANK YOU