**Objective-**

A real-time web-based as well as hardware based solution for detecting driver drowsiness to prevent road accidents

**Technical Requirements-**

HARDWARE:- Arduino UNO, Buzzer, Connecting wires, LCD, i2c connector

SOFTWARE:- WebCam, Python 3.6+ , NodeJS 14+, Modern web browser with web socket handling capabilities

**Theory-**

This system uses Eye Aspect Ratio (EAR) algorithm to monitor a driver's eyes and detect signs of drowsiness in real-time.

When the driver's eyes remain closed for a prolonged period, the system identifies this as drowsiness and triggers alerts to prevent potential accidents.

**Features-**

* Real-time monitoring: Live video feed with facial landmark detection
* Drowsiness alerts: Visual and audible alerts when drowsiness is detected
* EAR score visualization: Graphs showing Eye Aspect Ratio over time
* Historical data: Log of drowsiness events for analysis
* Responsive design: Works on various screen sizes
* Statistics dashboard: Overview of detection metrics

**Working-**

1. The system accesses the webcam feed to capture the driver's face.
2. Facial landmarks are detected and the Eye Aspect Ratio (EAR) is calculated.
3. The EAR is monitored over time:
   * High EAR values indicate open eyes (alert state)
   * Low EAR values indicate closed eyes (potential drowsiness)
4. When the EAR remains below the threshold for a certain period, the system identifies this as drowsiness and triggers alerts.

**Future Enhancements**

* Integration with mobile apps for broader accessibility
* Cloud-based analytics for long-term pattern analysis
* Integration with vehicle systems for automatic safety measures