

An AI-Powered Real-Time Driver Monitoring and Safety Alert System

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Abstract: Driver distraction, fatigue, and unsafe practices are leading contributors to road accidents worldwide. This project introduces an AI-based Real-Time Driver Monitoring and Safety Alert System designed to improve road safety by continuously analysing the driver's behaviour. The system monitors facial expressions, head movements, eye state, and body posture to identify drowsiness, inattention, mobile phone usage, smoking, and improper seatbelt use. It integrates computer vision techniques, eye aspect ratio (EAR), head pose estimation, and YOLO-based object detection to detect risky behaviours with high accuracy in real-time. Upon detecting unsafe actions, the system issues immediate audio-visual alerts to help drivers stay attentive and avoid potential accidents. The solution is tailored for Indian vehicles and traffic conditions, providing an affordable and adaptable option for both personal and commercial vehicles. Its modular design, low-latency processing, and reliable detection contribute to a safer driving experience and reduced accident rates.

Keywords: Driver Monitoring, Real-Time Safety Alerts, Computer Vision, Deep Learning, Drowsiness Detection, Head Pose Analysis, Eye Aspect Ratio (EAR), YOLO Detection, Driver Distraction, Road Safety

