

Intelligent Driver Phone Distraction Alert System

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Abstract: Road traffic crashes are a continued significant global menace with distracted driving as a major contributor of death and injury. Your driver who gets distracted from the road due to distractions like phone calls and text messages, fiddling with in-car systems or chatting with other passengers would likely increase. Conventional education, policing and enforcement practices have been proven ineffective, but a smart and autonomous systems that monitor and respond to dangerous behaviors in the moment are desperately needed. This study presents Intelligent Driver Phone Distraction Alert System, an AI-powered system that classifies and monitors driver activities using sophisticated models for deep learning. The framework recognizes ten categories of driver behavior, including safe driving, texting (left/right), phone usage (left/right), drinking, operating the radio, reaching behind, personal grooming, and talking to passengers. For accurate and effective real-time object identification, The system integrates transfer learning models such as VGG16, convolutional neural networks (CNN), and ResNet50, and the YOLOv8 algorithm. The State Farm Distracted Driver Detection dataset from Kaggle was used for training and testing.

A Flask-based web application with webcam integration was developed to deliver live monitoring, prediction, and alert mechanisms. The system's performance was validated using accuracy, precision, recall, and F1-score, and it demonstrated exceptional effectiveness in real-time scenarios. By providing timely alerts when risky behaviors are detected, this approach offers a proactive solution for reducing road accidents, with strong potential for integration into modern vehicles and fleet management systems.

Keywords: Driver monitoring system, distracted driving, deep learning, CNN, transfer learning, VGG16, ResNet50, YOLOv8, real-time detection, computer vision, road safety, Flask web application

