

## **Develop an AI model for real-time traffic sign recognition**

Traffic sign recognition is an important part of building smart vehicles and driver-assistance systems. The goal of this project is to create a system that can detect and recognize traffic signs in real time, even in tough conditions like low light or blur. To do this, we combined two deep learning techniques: YOLOv4 for detecting signs in full images or video frames, and a lightweight CNN to classify the detected signs more accurately. This setup allows our system to first find where the traffic signs are and then identify what they are. We used OpenCV to capture live video from a webcam, just like how a camera would work in a real car. Each frame is passed through the YOLOv4 model, which gives the location of traffic signs. These parts of the image are then cropped and sent to the CNN for classification. To make the system more user-friendly, we added a text-to-speech feature that announces each sign out loud, like “Stop sign ahead” or “Speed limit 50,” giving the driver an instant alert. We also tested the system by adding effects like fog and blur to check if it still works well in bad conditions. Compared to the two research papers we studied one that only focused on classifying signs using CNN, and another that only detected signs using YOLOv4—our model combines the best of both. It not only finds and identifies signs in real time but also interacts with the user through voice alerts. This makes our project more practical and closer to a real-world solution. In the end, we built a simple, fast, and accurate system that can help drivers or smart vehicles recognize traffic signs more easily and safely.