# TrackMyLane - Project Documentation

TrackMyLane is a real-time lane detection system using computer vision and Python.

It detects lane boundaries, provides visual feedback, and supports optional voice control to simulate lane departure and recovery.

# Features

* Real-time video processing with OpenCV
* Lane detection using Canny edge detection and Hough transform
* Two operation modes: Auto Lane Detection and Voice-Controlled Detection
* Dynamic instruction display: 'Stay in Lane', 'Drifting Out of Lane', etc.
* Color-coded overlay (green/red) for lane status
* Voice command support: 'Drift out of lane', 'Stop drifting'
* Text-to-speech feedback

# Tech Stack

* Python
* OpenCV
* NumPy
* Pyttsx3 (text-to-speech)
* SpeechRecognition (voice input)
* Threading (background voice command listener)

# How It Works

1. Convert video frames to grayscale and apply Gaussian blur.
2. Detect edges using Canny edge detection.
3. Apply a mask to focus on region of interest.
4. Detect lane lines using Hough Transform.
5. Overlay instructions and provide feedback.
6. Optionally listen for voice commands and respond accordingly.

# Modes of Operation

1. Auto Mode: Automatically detects and highlights lanes. Shows instruction based on lane status.
2. Voice-Controlled Mode: Listens for 'drift out of lane' or 'stop drifting'. Changes visuals and speaksfeedback.

# Future Improvements

* Add Deep Learning models (UFLD, LaneNet)
* Integrate with GPS or vehicle sensors
* Add traffic sign and vehicle detection
* Real-time monitoring dashboard

# Author & Credits

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