Road Lane Line Detection

Project presented under "**Mini Project on Web Based on ML"**

By

Mr. Shubham Gajarushi 11
Ms. Dnyaneshwari Hande 22
Mr. Gaurav Parab 43

Class

TE

Project Domain

WEB BASED APPLICATION on ML

Department of Information Technology

Pillai HOC College of Engineering & Technology

2022-2023

Pillai HOC College of Engineering & Technology,
Rasayani
Year: 2022-2023
INFORMATION TECHNOLOGY

Certificate

This is to certify that the project entitled **“”** is successfully completed by the following students:

Student Name	Roll No
Shubham Gajarushi	11
Dnyaneshwari Hande	22
Gaurav Parab	43

As per the syllabus & in partial fulfillment for the completion of the **Road Lane Line Detection** A Mini project in Third Year Information Technology is prepared , it is also to certify that this is the original work of the candidate done during the academic year 2022-2023.

Ms. Komal Golimbade
(Mini Project Coordinator)

Ms. Poonam Pathak
(Project Guide)

(Internal Examiner)

(External Examiner)

Project Report Approval

This project report entitled ROAD LANE LINE DETECTION from domain name by **Shubham Gajarushi, Dnyaneshwari Hande and Gaurav Parab** studying in **TE** is been approved which is carried under "**Mini Project Based on Web Based on ML".**

| --- | --- | --- |
| **(Signature)** | **(Signature)** | **(Signature)** |
| **Shubham Gajarushi** | **Dnyaneshwari Hande** | **Gaurav Parab** |

Mini Project Guide Name & signature

Ms. Poonam Pathak

Date:

Place: Panvel, Rasayani

Acknowledgement

It is a privilege for us to have been associated with **Ms. Poonam Pathak**, our guide, during this project work. We have been greatly benefited by her valuable suggestions and ideas. It is with great pleasure that we express our deep sense of gratitude to them for their valuable guidance, constant encouragement, and patience throughout this work.

I am also indebted to **Dr. Divya Chirayil** (Head of Department of Information Technology), **Ms. Komal Golimbade** (Mini Project Coordinator) for extending the help to academic literature.

We express our gratitude to **Dr. J.W.Bakal** (Principal) for their constant encouragement, co-operation and support.

We take this opportunity to thank all our classmates for their company during the course work and for useful discussion we had with them. We would be failing in our duties if we do not make a mention of our family members including our parents for providing moral support, without which this work would not have been completed.

Submitted By,

Shubham Gajarushi

Dnyaneshwari Hande

Gaurav Parab

INDEX

1. INTRODUCTION:

- Road lane line detection is a crucial task for autonomous driving to ensure safe and efficient transportation. Road lane line detection using Machine Learning (ML) algorithms has gained significant attention in recent years due to its effectiveness in accurately detecting lane lines on roads.
- The ML algorithms used for road lane line detection include semantic segmentation, Hough Transform, and Template Matching. These algorithms enable autonomous vehicles to detect lane lines, stay within their lanes, and avoid accidents.
- In this report, we will explore the techniques used for road lane line detection using ML and their applications. The advancements in ML algorithms and hardware will continue to improve road lane line detection, making transportation systems safer and more efficient.

2. OBJECTIVES:

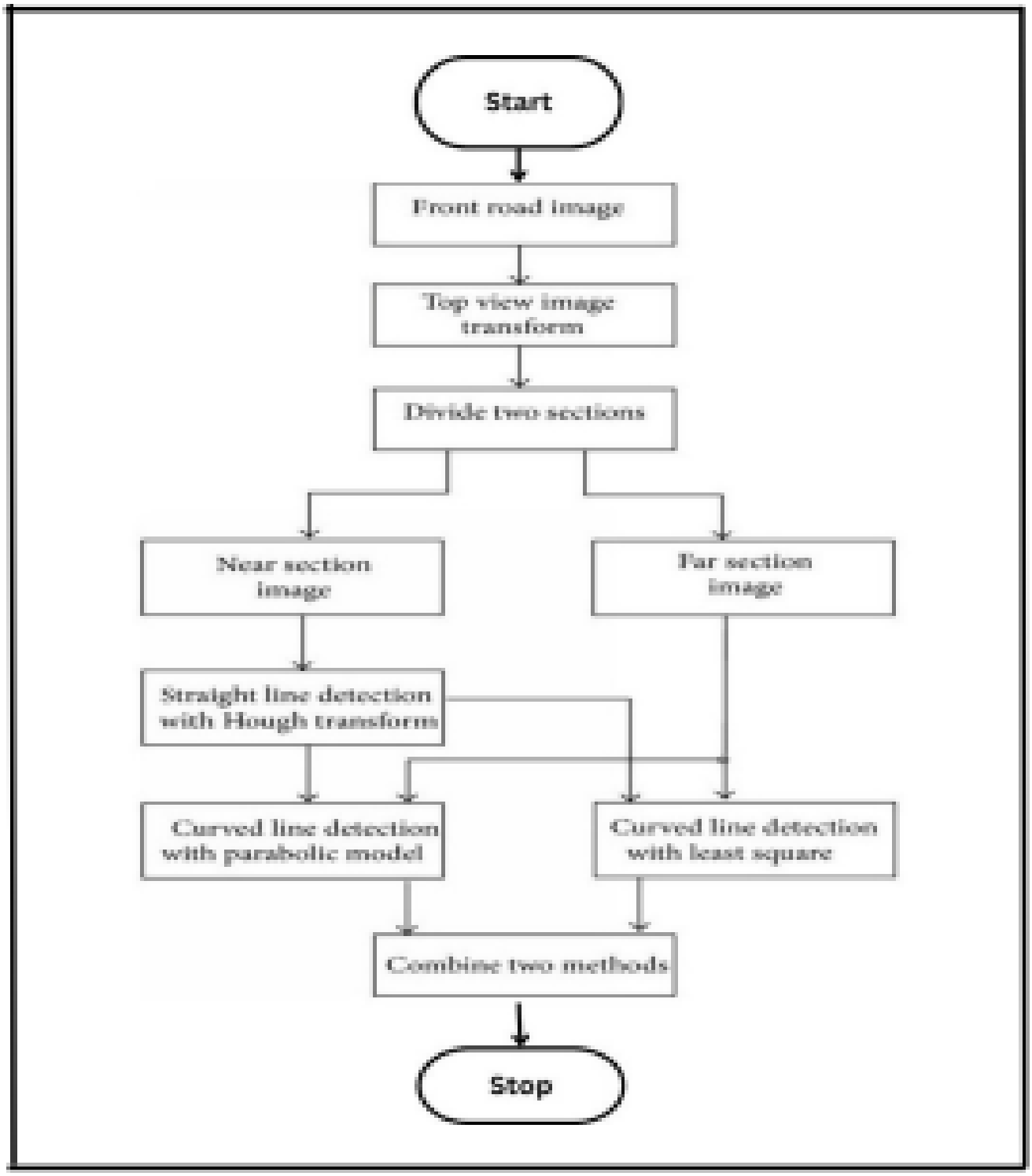
- The objective of road lane line detection using ML is to develop a robust and accurate system that can detect lane lines on roads for autonomous driving
- ML algorithms can be trained on labeled datasets to identify lane lines in real-time, providing drivers with lane departure warnings, lane keeping assistance, and other safety features.
- The objective is to improve road safety and traffic flow analysis while also identifying missing or faded lane lines that require maintenance.
- The ML algorithms used for road lane line detection should be efficient, accurate, and scalable to handle the vast amounts of data generated by modern transportation systems.
- The objective is to develop a system that can provide safe and reliable transportation for individuals and goods, while also improving the overall efficiency of transportation systems.

3.SCOPE:

- The scope of road lane line detection using ML is vast and has significant implications for transportation systems.
- The scope includes the development of ML algorithms that can detect lane lines accurately and efficiently.
- The algorithms can be applied to a wide range of scenarios, including highways, urban areas, and rural roads.
- The scope also includes the use of road lane line detection in autonomous vehicles to provide drivers with lane departure warnings, lane keeping assistance, and other safety features

4.Design and Implementation:

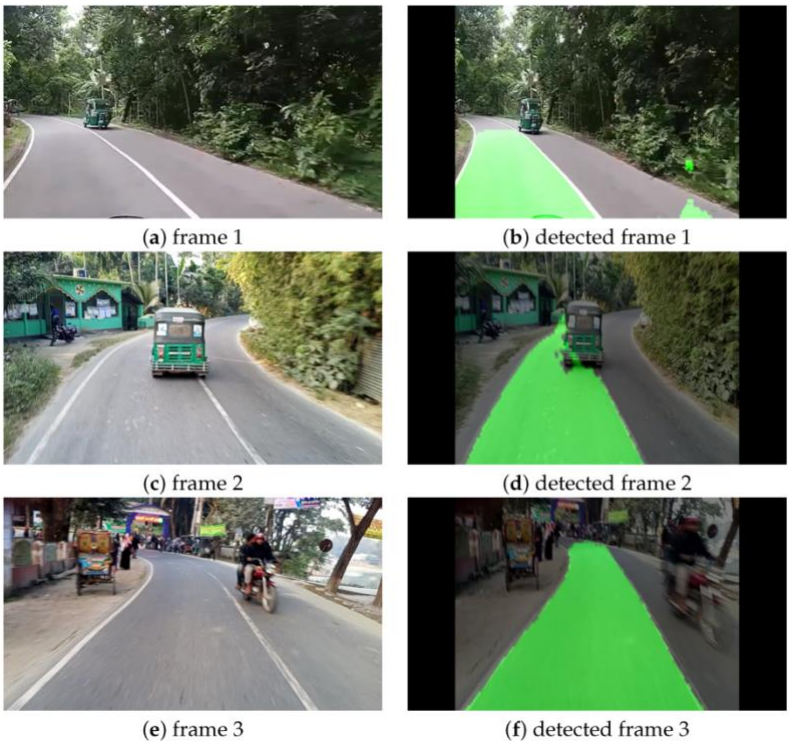
4.1 System Flow Diagram:



4.2 Working

1. **<u>Data Collection</u>: The first step is to collect a labeled dataset of road scenes with lane lines. The images should be labeled with the positions of the lane lines.**

2. **<u>Image Preprocessing:</u> The collected images are then preprocessed to remove noise and improve the image's quality. This is done by converting the images to grayscale, applying filters, and enhancing contrast.**



(a) frame 1 (b) detected frame 1

(c) frame 2 (d) detected frame 2

(e) frame 3 (f) detected frame 3

3. **<u>Region of Interest (ROI) Extraction</u>: The next step is to extract the region of interest (ROI) from the preprocessed image. This is done by defining a polygon that represents the area where the lane lines are expected to be present.**

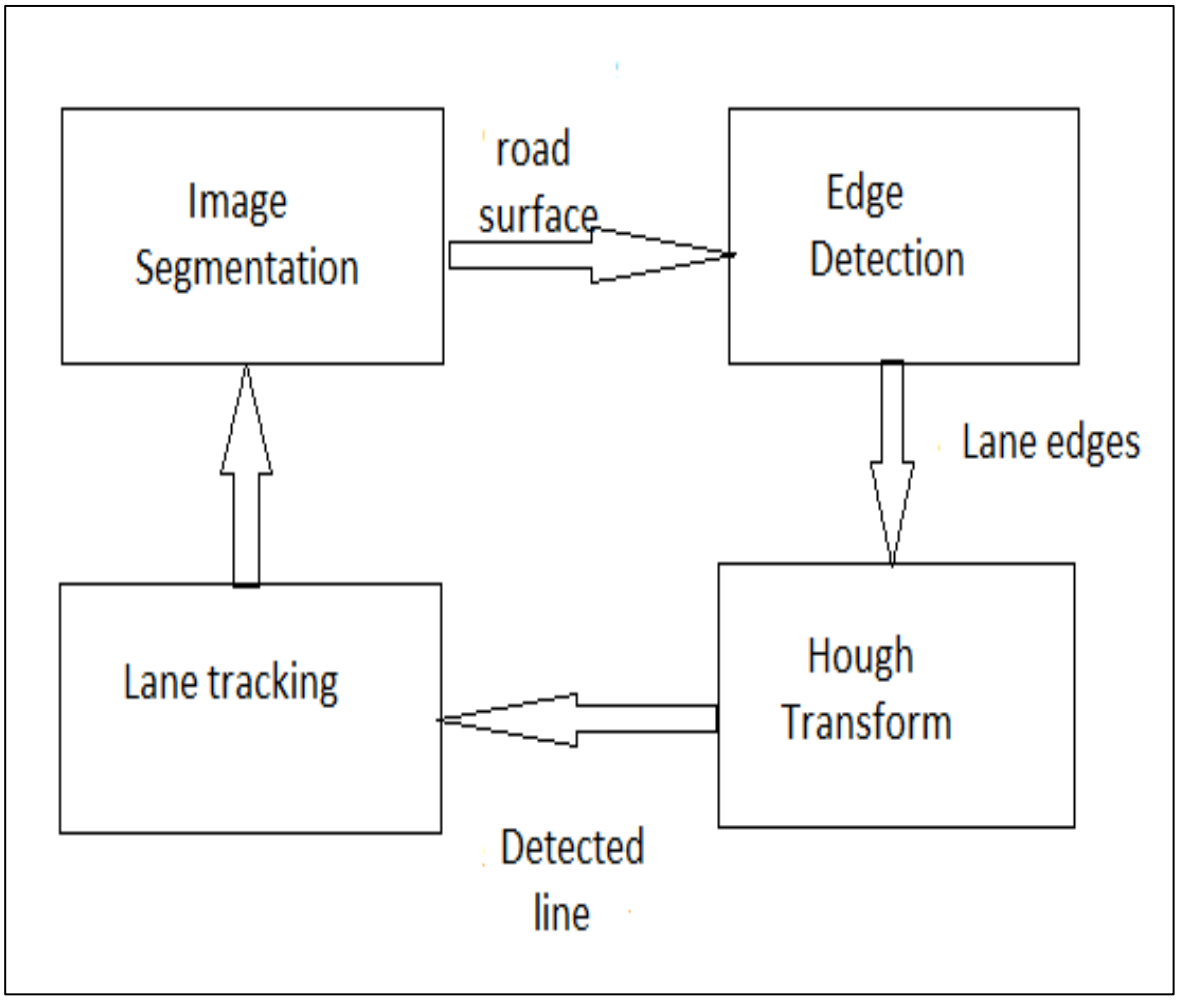
4. **<u>Edge Detection</u>: Edge detection algorithms such as Canny or Sobel are applied to the ROI to detect the edges of the lane lines.**

5. **<u>Hough Transform</u>: The Hough Transform algorithm is used to detect straight lines in the image. The output of this step is a set of lines that represent the detected lane lines.**

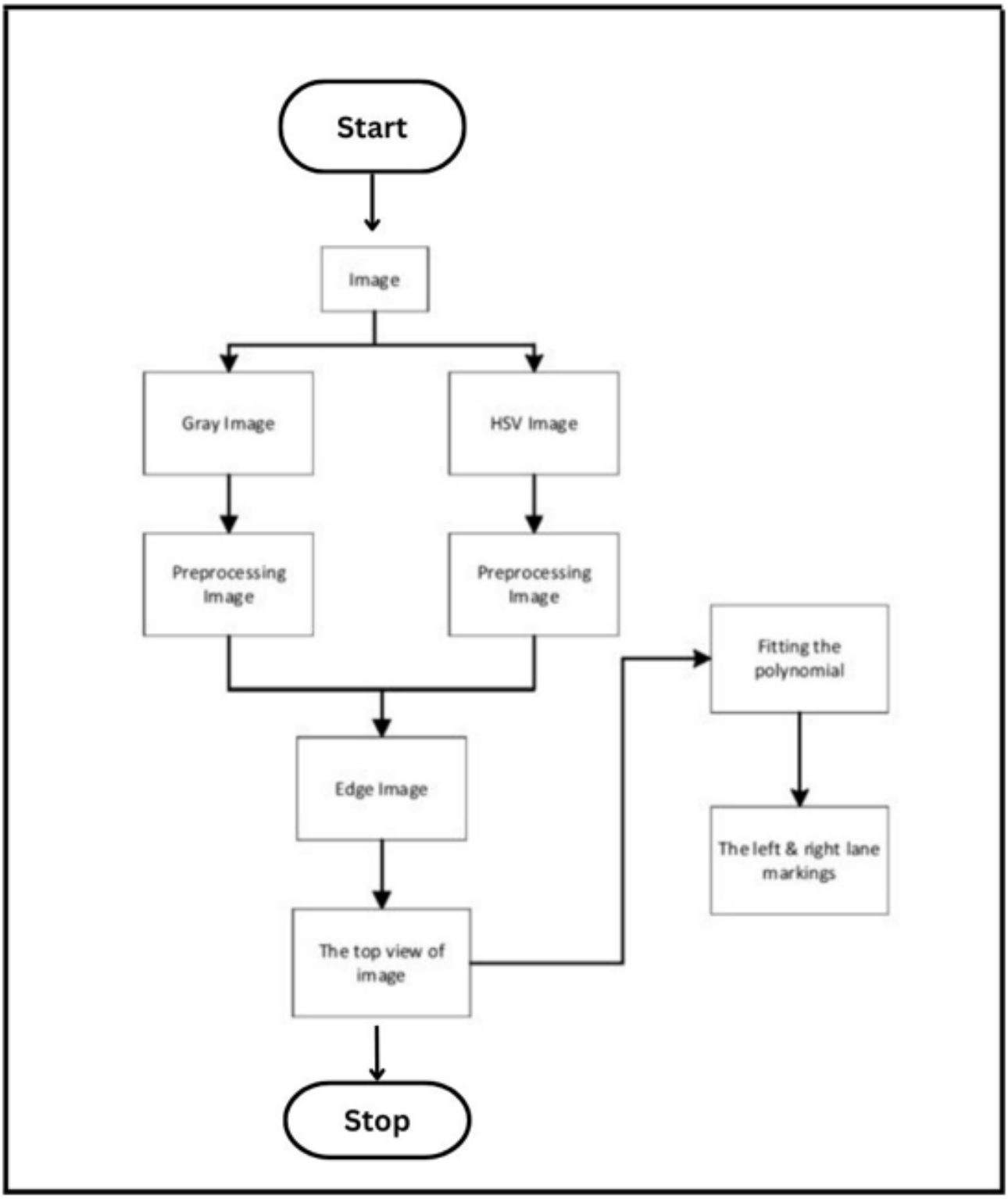
6. **<u>Line Filtering</u>: The detected lines are filtered based on their position and orientation to remove any false positives. This is done by comparing the detected lines with the expected lane line positions and orientations.**

7. **<u>Lane Departure Warning (LDW):</u> Finally, the position and orientation of the predicted lane lines are compared with the position of the vehicle.**

BLOCK DIAGRAM:



Data Flow Diagram:



5. Requirement Analysis:

Software Requirement:

- OpenCV
- Imutils
- NumPy

HARDWARE REQUIREMENTS:

1. **Computer**: A computer with sufficient processing power and memory is required to run the ML algorithms and process the images in real-time.

2. **Camera**: A camera or a set of cameras are required to capture the road scenes. The camera should be of sufficient quality to capture clear images with enough detail to detect lane lines.

3. **Sensors**: In addition to cameras, other sensors such as GPS, accelerometers, and gyroscopes can be used to improve the accuracy of the system and provide additional information about the vehicle's position and orientation.

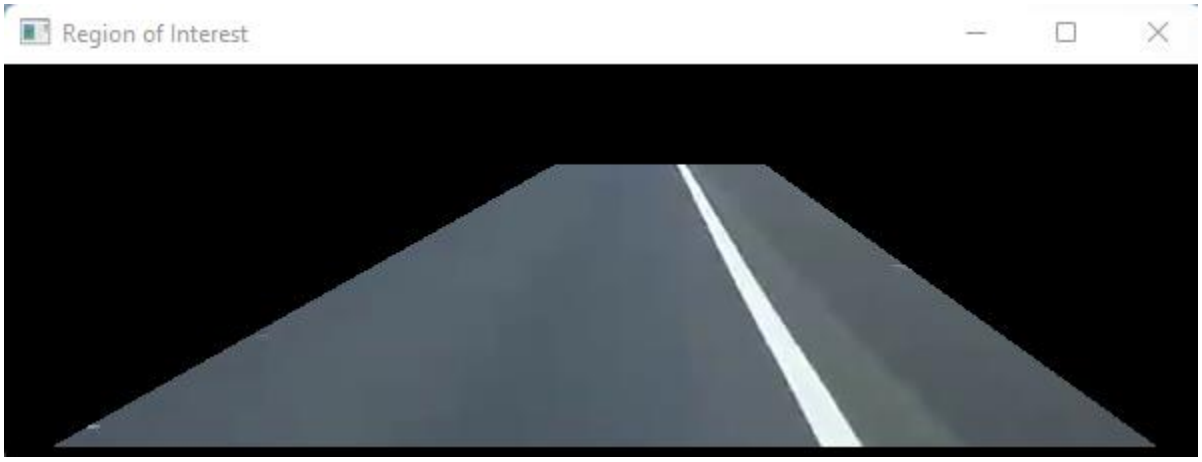
4. **Display**: A display or a set of displays are required to provide visual feedback to the driver about the detected lane lines and any lane departure warnings.

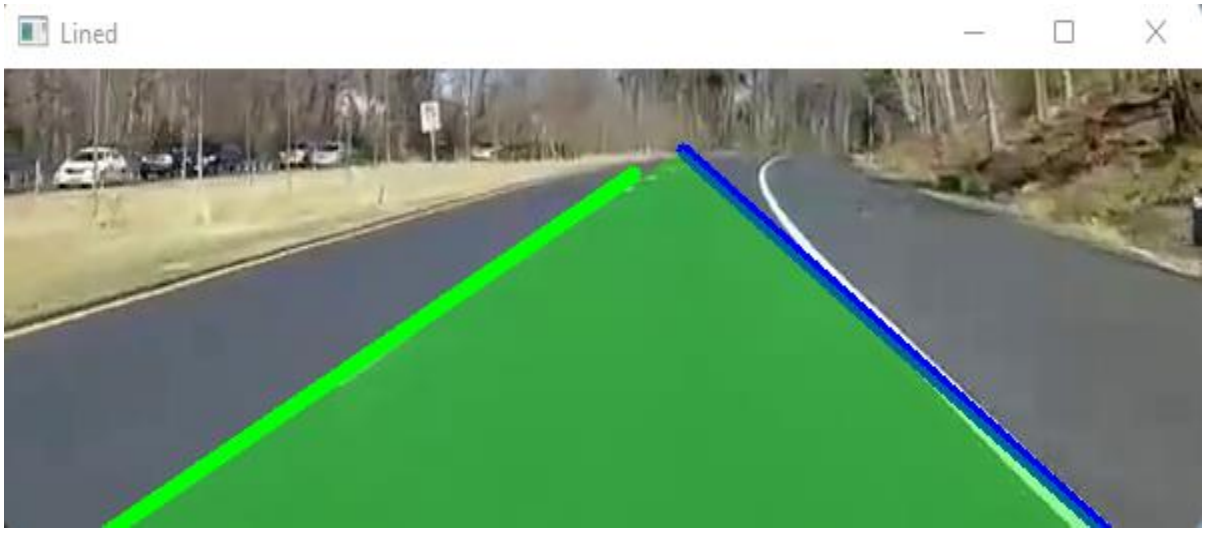
5. **Connectivity**: The system should have connectivity options such as Wi-Fi, Bluetooth, or cellular connectivity to communicate with other systems and exchange data.

6. **Power Supply**: A reliable power supply such as a battery or an alternator is required to power the system.

6. RESULT:

6.1. Screenshot :





7. CONCLUSION:

- In conclusion, road lane line detection using ML is an important application of computer vision technology that can improve road safety and driver assistance systems.
- ML algorithms can detect lane lines in real-time and provide lane departure warnings to the driver, thereby reducing the risk of accidents caused by lane departure.
- The accuracy and performance of road lane line detection using ML can be improved by using large and diverse datasets for training and implementing advanced ML algorithms such as deep learning techniques.
- Additionally, the system's hardware requirements can vary depending on the specific use case and should be carefully selected to meet the system's performance and power requirements

8. Future Scope

- Enhanced Safety Features: Lane line detection can be utilized to develop additional safety features, such as detecting and warning about potential collision risks, identifying pedestrians or cyclists in the vicinity of the vehicle, and providing alerts for unsafe lane changes or merging maneuvers.
- Infrastructure Maintenance: Lane line detection systems can assist in monitoring and maintaining road infrastructure. They can be used to detect fading or damaged lane markings, enabling timely maintenance and repainting activities. This contributes to improved road safety and visibility for drivers.

8. REFRANCES:

- https://www.researchgate.net/publication/3901648_Road-time_lane_detection_for_autonomous_vehicle

- https://uwaterloo.ca/statistical-image-processing/publications/deep-learning-generic-road%20lane%20line%20-detection-survey

- https://ieeexplore.ieee.org/document/8714247

- http://cse.anits.edu.in/projects/projects1920A11