Project Work Title:
AI-DRIVEN ROAD DETECTION FOR INDIAN ROADS WITH MINIMAL LANE MARKINGS.

Course No.: S2-24_AELZG628T

Course Title: Dissertation

Project Work Done by:

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BITS ID: 2023HT65065

Degree Program: Automotive Electronics

Research Area: ADAS

Dissertation carried out at:

Continental, Bangalore

BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE,
PILANI
VIDYA VIHAR, PILANI, RAJASTHAN -
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1. Broad Area of Work

This project falls under the domain of Advanced Driver Assistance Systems (ADAS). It focuses on detecting Indian roads with minimal lane markings using advanced road detection techniques. The project involves implementing state-of-the-art methods to identify and analyze road features in challenging environments where conventional lane markings are sparse or absent. It integrates advanced image processing, machine learning, and real-time decision-making to enhance road detection capabilities. The primary focus is to ensure the ADAS operates reliably on Indian roads, promoting road safety and improving driver assistance functionality. Additionally, the solution will be designed to be efficient, adaptable, and compliant with relevant automotive safety standards and regulations.

2. Background

Component for enhancing road safety and improving driving experiences. A significant challenge in this domain is the detection of roads with minimal lane markings, especially in India, where lane markings are often faded, inconsistent, or absent.

This project focuses on addressing this challenge by utilizing machine learning to detect and understand roads with minimal lane markings. With the increasing adoption of ADAS-enabled vehicles, precise road detection and understanding are essential for achieving accurate perception and decision-making, which are critical for the reliability and safety of such systems.

By developing a robust road detection solution tailored to Indian roads, this project aims to significantly enhance the functionality of ADAS. It will ensure improved accuracy in vehicle perception, contribute to safer autonomous driving, and lay the foundation for future advancements in intelligent transportation systems.

3. Objectives

The objectives of my project are as follows:

- Research and integrate the best available tools and technologies to create a robust and reliable road detection system tailored for Indian roads with minimal lane markings.
- Design and develop a machine learning-based model that accurately detects and understands roads with minimal markings, ensuring compatibility with ADAS functionality.
- Implement and optimize the solution for real-time deployment, initially focusing on a lightweight system compatible with Raspberry Pi 5 hardware for cost-effective testing and validation.

4. Scope of Work

The scope of this project is to design a fully functional road detection system capable of accurately identifying roads with minimal lane markings, ensuring enhanced support for ADAS-enabled vehicles.

5. Plan of Work

Phases	Start Date-End Date	Work to be done
Dissertation Outline	13 Jan 2025 – 25 Jan 2025	Literature Review and prepare Dissertation Outline
Design & Development	26 Jan 2025 – 23 Feb 2025	Design & Development Activity
Testing	24 Feb 2025 – 13 Mar 2025	Software Testing, User Evaluation & Conclusion
Dissertation Review	14 Mar 2025 – 25 Mar 2025	Submit Dissertation to Supervisor & Additional Examiner for review and

		feedback
Submission	26 Mar 2025 – 30 Mar 2025	Final Review and submission of Dissertation

6. Literature References

The state art is the base for any successful research project. In current project, the literature inclined towards the new domain of conversational information retrieval is considered. The following are referred journals from the preliminary literature review.

[1] The process of enhancing image quality can involve various techniques such as graying, image enhancement, and binarization. These methods are crucial for preparing the images for further analysis and feature extraction [2].

[2] Gray scaling is an essential step in image processing that simplifies the data by reducing the color information, making it easier for algorithms to analyze the road conditions. This process can be implemented in C language, which allows for efficient manipulation of pixel values [2].

[3] Utilizing deep learning models, such as convolutional neural networks (CNNs), can significantly improve the accuracy of road detection systems. These models can learn to identify various road conditions and features from the processed images [2].

[4] Implementing real-time object detection frameworks can enhance the system's ability to monitor and recognize road features dynamically. Techniques such as background subtraction and component labeling can be integrated into your system to improve detection performance [1].

[5] Combining video data from cameras with other sensor data can enhance the robustness of the detection system. This multimodal approach allows for better understanding and interpretation of road conditions, especially in challenging environments [3].

[6] It is important to evaluate the performance of your system using established metrics. This will help in understanding the effectiveness of your image processing and machine learning techniques in real-world scenarios [1].

7. Particulars of the Supervisor and Examiner

	Supervisor	Additional Examiner
Name	M, LONARD JAISON	Himanshu
Qualification	B.tech	M.tech
Designation	Team Lead	Engineer
Employing Organization and Location	Continental Automotive (India) Private Ltd.	Continental Automotive (India) Private Ltd.
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8. Remarks of the Supervisor

I can confidently state that this is a promising and innovative project with a strong use case in the field of ADAS. The focus on detecting Indian roads with minimal lane markings addresses a critical need in modern vehicle systems. The objectives and scope of the project are well-defined and demonstrate a clear direction toward achieving impactful results. I am confident that the student will excel in this project and deliver exceptional outcomes, just as they have consistently shown in their endeavors.

BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI
WORK INTEGRATED LEARNING PROGRAMMES (WILP) DIVISION
SECOND SEMESTER OF ACADEMIC YEAR 2021-2022

(INSERT COURSE NUMBER HERE) : (INSERT COURSE TITLE HERE) OUTLINE

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DISSERTATION / PROJECT / PROJECT WORK TITLE	AI-DRIVEN ROAD DETECTION FOR INDIAN ROADS WITH MINIMAL LANE MARKINGS.

Please prepare the outline as a separate document with the following sections along with the above identification information.

1. Cover Page with Student ID No., Name, Course Number, Course Title and Dissertation / Project / Project Work Title, Broad Academic Area of Work.
2. Background (Relevance of the Project to the current work environment in the employing organization)
3. Objectives
4. Scope of Work (To be done by the student independently)
5. Plan of Work (Work to be done during the semester)
6. Literature References
7. Particulars of the Supervisor and Additional Examiner
8. Remarks of the Supervisor

Devashish Ranjan.		*Himanshu*
Signature of Student	**Signature of Supervisor**	**Signature of Additional Examiner**
Name: Devashish Ranjan	**Name:** LONARD JAISON	**Name:** Himanshu