IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

DETECTION OF LANE AND SPEED BREAKER WARNING SYSTEM FOR AUTONOMOUS VEHICLES USING MACHINE LEARNING ALGORITHM

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Abstract: Autonomous vehicles rely on a multitude of sensors and intelligent systems to navigate safely and efficiently. This paper presents a comprehensive Lane Detection and Speed Breaker Warning System designed to enhance the capabilities of autonomous vehicles using advanced machine learning algorithms. The primary goal is to improve the vehicle's perception of the road environment, specifically focusing on accurate lane detection and timely recognition of speed breakers. The proposed system integrates a combination of computer vision techniques and machine learning algorithms to achieve robust performance in real-world scenarios. For lane detection, a convolutional neural network (CNN) is employed to analyze camera inputs and identify lane boundaries. This enables the vehicle to precisely follow the road markings, ensuring safe navigation within lanes. To address the challenge of speed breaker detection, a machine learning model is trained on a diverse dataset containing images of roads with varying types and conditions of speed breakers. The model is designed to classify road segments and predict the presence of speed breakers ahead. When a speed breaker is detected, the system activates a warning mechanism to alert the autonomous vehicle, allowing it to adjust its speed and suspension settings accordingly. The effectiveness of the proposed system is evaluated through extensive simulations and real-world testing scenarios. The results demonstrate a significant improvement in lane-keeping accuracy and the ability to anticipate and respond to speed breakers proactively. The Lane and Speed Breaker Warning System contributes to the overall safety and reliability of autonomous vehicles, making them better equipped to handle diverse road conditions.

Index Terms **- Autonomous Vehicles, Lane Detection, Speed Breaker Warning, Machine Learning, Convolutional Neural Network, Computer Vision, Road Safety.**

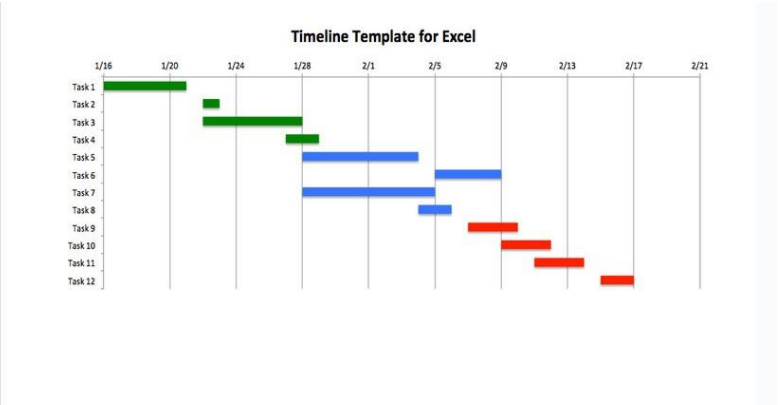
I. INTRODUCTION

In recent years, the advancement of autonomous vehicle technology has been at the forefront of innovation in the automotive industry. One of the critical challenges in the development of autonomous vehicles is the creation of reliable and robust perception systems. The ability of autonomous vehicles to accurately detect and respond to dynamic elements in their environment, such as lanes and speed breakers, is paramount to ensuring the safety and efficiency of these vehicles on the road. This research focuses on the implementation of a Lane Detection and Speed Breaker Warning System for autonomous vehicles, leveraging the power of machine learning algorithms. The primary objective is to enhance the perception capabilities of autonomous vehicles, enabling them to navigate through complex road scenarios with a high level of accuracy and safety.

II. MOTIVATION OF THE PROJECT

Autonomous vehicles become more prevalent, ensuring their ability to navigate diverse and challenging road conditions becomes crucial. Lane departure and the presence of speed breakers are common scenarios that demand swift and accurate responses from autonomous vehicles. By developing a robust detection and warning system, we aim to address these challenges and contribute to the overall reliability and safety of autonomous driving technology.

III. OBJECTIVE



To develop a robust Lane Detection and Speed Breaker Warning System for Autonomous Vehicles through the implementation of advanced Machine Learning algorithms. This system aims to enhance the safety and efficiency of autonomous vehicles by accurately identifying and tracking lanes on roadways, as well as detecting and providing timely warnings for speed breakers. The project will leverage cutting-edge computer vision techniques and deep learning models to enable real-time decision-making, contributing to the seamless integration of autonomous vehicles into diverse road environments.

IV. SCHEDULE OF WORK

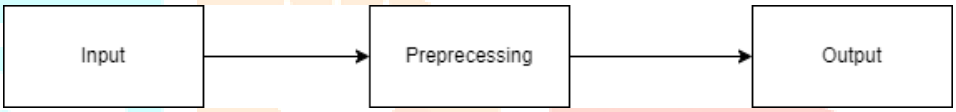


Fig. Schedule of Project Work

V. SYSTEM DESIGN

1. Data flow Diagrams

In Data Flow Diagram, we Show that flow of data in our system in DFD0 we show that base DFD in which rectangle present input as well as output and circle show our system, In DFD1 we show actual input and actual output of system input of our system is text or image and output is rumor detected like-wise in DFD 2 we present operation of user as well as admin.

Fig. Data flow diagram level 0

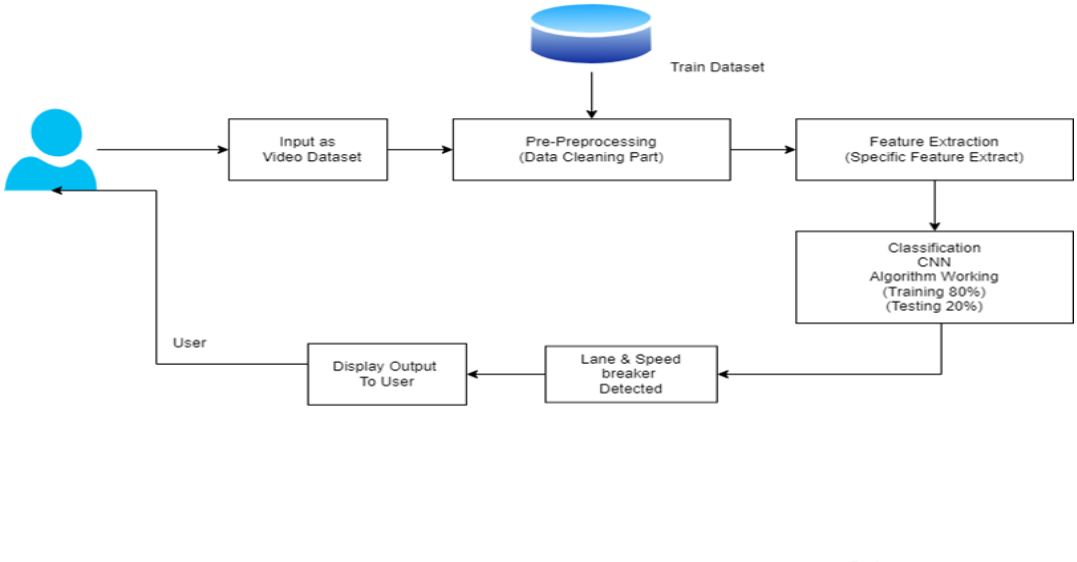


Fig. Data flow diagram level 1

Fig. Data flow diagram level 2

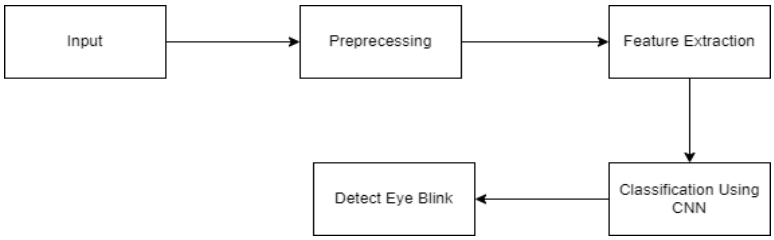


Fig. System Architecture

VI. LITERATURE SURVEY

Sr. No.	Author/Year of Publication	Title	Strength	Weakness
1	Shital Pawar, Siddharth Nahar 2023	Cloud based Single Shot Detector Model for Speed Breaker Detection	Cloud-based models can continuously learn and improve over time as they receive updates and new training data.	Depending on the frequency and volume of data processed in the cloud, the cost of utilizing cloud resources can become a significant factor.
2	Sarah Biswal , Ishika Chandra, S.K. Sinha, Kamlesh Pandey 2023	Intelligent speed breaker system design for vehicles using Internet of Things	Collected data can be analyzed to identify traffic patterns, optimize road design, and enhance overall traffic management strategies.	Collecting and analyzing data on vehicle movements raises privacy concerns.
3	Heltin Genitha C/Rajaji P 2022	Detection of Lane and Speed Breaker Warning System for Autonomous Vehicles using Machine Learning Algorithm	Machine learning models can be updated over-the-air, allowing for continuous improvement and adaptation to new road conditions or challenges.	Weakness 3 Heltin Genitha C/Rajaji P 2022 Detection of Lane and Speed Breaker Warning System for Autonomous Vehicles using Machine Learning Algorithm Machine learning models can be updated over-the-air, allowing for continuous improvement and adaptation to new road conditions or challenges. Sensor failures or malfunctions could compromise the effectiveness of the warning system.
4	1st Haari Babu,Ridhu Raj A.M 2021	A Study on the Behavior of Speed Breakers using Non-Newtonian Fluid and Comparison with Conventional Speed Breakers	The viscosity of non-Newtonian fluid can be adjusted, allowing for customization of the resistance experienced by vehicles.	The production and use of non-Newtonian fluid could have environmental implications, and the disposal of such fluids must

				be managed responsibly.
5	Malaya Mohanty1 , Yash Raj2 , Subhangee Rout3 , Utkarsh Tiwari4 , Sagarika Roy5 , Satya Ranjan Samal 2021	Operational effects of speed breakers: a case study in India	Speed breakers help in enforcing speed limits, reducing the likelihood of accidents caused by speeding vehicles.	Speed breakers can contribute to traffic congestion, especially in areas with high traffic volume.
6	Rahul Ramakrishnan ,Ayusha Pendse 2020	Speed Breaker Detection and Mapping using IoT	The system can create accurate maps of speed breakers, helping drivers navigate and plan routes more effectively.	Poor connectivity or network disruptions can lead to delays or failure in providing real-time data.
7	Prof. Varunakshi Bhojane1, Romali Surve2, Krunal Rane3 2020	Vision Based Road Hump and Speed Breaker Detection	Vision systems can be trained and adapted to various road conditions, making them versatile for deployment in different environments.	Detection accuracy may be reduced during nighttime, requiring additional artificial lighting or infrared sensors to maintain performance.
8	Martins E. Irhebhude, Oladimeji A. Adeyemi, Adeola Kolawole 2019	Speed Breakers, Road Marking Detection and Recognition Using Image Processing Techniques	Collected data can be used for traffic management, providing insights into road usage patterns and contributing to better traffic flow	The field of view of cameras may be limited, affecting the system's ability to detect speed breakers and road markings at a distance or in wide road sections.

VII. Conclusion

In this manner, we are increasing the system which ready to control agriculture monitoring in fields where masses aren't capable to produce security. Such a system we are developing within the field where the crops are costly are monitored and every one the atmospheric condition is well maintained important. during this area, we are providing such a reasonable system. Thus, this effective and reliable system helps in agriculture monitoring. except for the most objective, the system also helps in reducing warming to an excellent extent. The natural habit of plants is prevented indirectly. The plants can even be shielded from fire by using this technique. This successively helps in reducing crop destruction. Thereby, the ecological balance is maintained.

VIII. Acknowledgment

I would like to thank Prof. S.R. Bhujbal for helping us out in selecting the topic and contents, giving valuable suggestions in preparation of Seminar report and presentation of our Project 'Detection of Lane and Speed Breaker Warning System for Autonomous Vehicles using Machine Learning Algorithm'.

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