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TRAFFIC SIGN AND LANE DETECTION USING SSLA

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Abstract The Autonomous cars are the future smart cars anticipated to be driver less, efficient and crash avoiding ideal urban car of the future. To reach this goal automakers have started working in this area to realize the potential and solve the challenges currently in this area to reach the expected outcome. In this regard the first challenge would be to customize and imbibe existing technology in conventional vehicle to translate them to a near expected autonomous car. This transition of conventional vehicles into an autonomous vehicle by adopting and implementing different upcoming technologies is discussed in this paper. This includes the objectives of autonomous vehicles and their implementation difficulties. The paper also touches upon the existing standards for the same and compares the introduction of autonomous vehicles in Indian market in comparison to other markets. There after the acceptance approach in Indian market scenarios is discussed for autonomous vehicles. The Self-Driving Cars are also known as Autonomous Vehicles. This Car has the ability to sense around the environment. These sensed parameters are processed and according to it the different actuators in the car will work without any human involvement. An Autonomous car work like a normal car but without any human driver. Autonomous cars rely on sensors, actuators, machine learning algorithms and Software to perform all the Automated Functions. The Software part is very important for Autonomous vehicles. The Software architecture acts as a bridge between Hardware Components and Application. The Standardized Software for Automotive cars is AUTOSAR. The AUTOSAR is a Standardized Architecture between Application Software and Hardware. This Standardized Architecture provide all Communication Interfaces, Device Drivers, Basic Software and Run-Time Environment. There are two important modules in Self-Driving Cars. They are Lane Detection and Traffic Signal detection which works automatically without any Human Intervention. A Machine Learning Algorithm is proposed in this paper. This Algorithm is mainly used to train the shape models and helps to detect the shape for Traffic Sign detection and Lane Detection. These both tasks are programmed using python with Open cv2 library file, numpy library file and Hough Detection technique is used to detect the appropriate circles of the traffic signals.By using all these tools, all the shape models are trained using Supervised training Algorithm and the detection is performed in such a way to help Autonomous cars to detect the lane and traffic Sign

Keywords: Traffic, open CV, Perdition**.**

I. INTRODUCTION

safety is the important aspect which must be noticed while driving vehicles.in a survey it is been published that more 10 lakhs of people die in the road accidents in a country. the road accident happened due to human errors are about 98% .so, to avoid this all over the world autonomous cars are under research and development. The term autonomous cars that the car drives itself using various technologies without any human intervention. for autonomous cars software task development is very much important. the software architecture acts as a bridge between hardware components and application. the standardized software for automotive cars is autosar. this standardized architecture will provide all communication interfaces, device drivers, basic software and run-time environment. there are two important tasks in autonomous cars they are lane detection and traffic sign detection. these two tasks are important because many accidents are due to malfunction of these two tasks. new algorithm SSLA (shape supervised learning algorithm) is proposed in this paper. The Though line transformation is the technique which is used to detect the traffic sign detection. matplolib and numpy is the library files in python used for lane detection. these two techniques are possible by open cv, numpy libraries in python. The Though line transformation is used to detect any shapes. in order to detect the lane in which the car is to drive is by using various edge detection techniques which makes use of colours in python.

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II. RELATED WORKS

Real-time traffic signal detection using a solid state lidar array" by qingquan liu, xiaoliang wang, and xiaohua zhao (2019). in this paper, the authors propose a real-time traffic signal detection system using an SSLA sensor. the system can detect traffic signals in different lighting conditions and is robust to occlusions and interference from other sourcess."robust lane detection using a solid-state lidar array" by paul theodosis, kostas alexis, and george j. pappas (2020). the authors propose a lane detection system using an SSLA sensor. the system is able to detect lane markings in real-time, even in challenging lighting and weather conditions. "lane detection for autonomous driving using solid-state lidar arrays" by heiko hirschmüller and jurgen sturm (2021). this paper presents a lane detection algorithm using a SSLA sensor for autonomous driving applications. the algorithm is able to detect lane markings in real-time and is robust to occlusions and other sources of interference."a high-resolution solid-state lidar array for lane detection in urban environments" by pengfei sun, yutong huang, and cheng chen (2020). the authors propose a high-resolution SSLA sensor for lane detection in urban environments. the system is able to detect lane markings with high accuracy and is robust to different weather conditions. Overall, these works demonstrate the potential of SSLA sensors for traffic signal and lane detection applications. SSLA sensors have several advantages over traditional lidar sensors, including higher resolution and faster scanning speeds, which make them well-suited for real-time applications.

III.EXISTING SYSTEM

In the existing work there are Automotive cars which work through Sensors, Actuators and an Embedded System Control. Here the Lane Keeping is very much important in terms of safety measures to prevent road accidents. In the Concept of Lane keeping the LiDar, radar and GPS is used in existing research work to keep the vehicles in the lane. Also, the lane keeping in the existing papers are achieved through ADAS based system with the help of Adaptive cruise control and this technique is performed through Deep Neural Networks. The Simulation part is possible in Carla Software also.

IV.PROPOSED SYSTEM

In existing research works and models the traffic sign and lane detection is done through SVM. Where thousands of images are put into training models to get an accurate output model. An Algorithm is proposed in this paper which is used to identify the appropriate shape. This Identification is possible through training model. The proposed Algorithm holds Hough line transformation technique which is used to detect any shape. Even the shape is broken as this technique works in an Efficient way. The shape which is detected in turned out in mathematical form by using various formulae. The maximum Area of the shape is 64480. In this Paper, the circle shape is required to be detected because Traffic signals are in the shape of circle. Not all circles are detected. It is because the traffic sign is placed on the higher place.

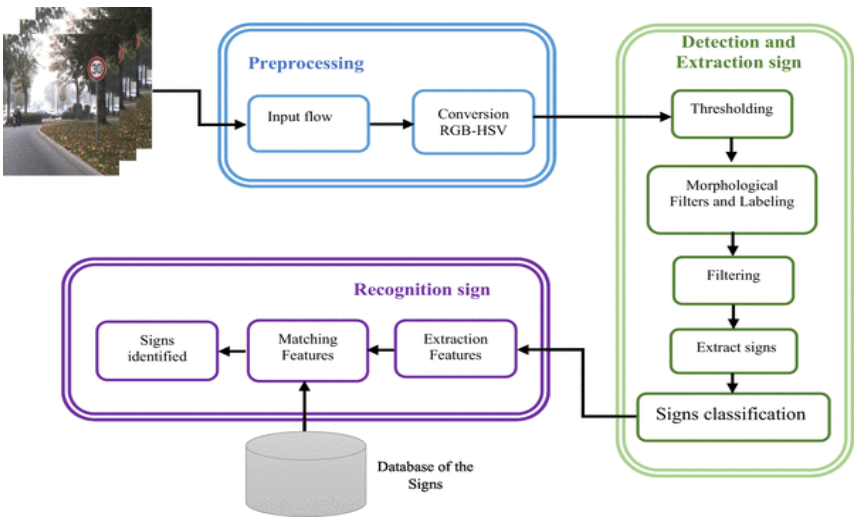

FIGURE 5.1 PROPOSED SYSTEM MODEL

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V. MODULES

A. ACQUIRE DATA SET:

- Mobile Mapping: One way to acquire a data set is to mount an SSLA sensor on a vehicle and drive along roads and highways to capture 3D point cloud data of the road environment. This data can then be used to generate a labelled data set for traffic signal and lane detection. Mobile mapping provides large-scale data sets with a high degree of accuracy.
- Laboratory Experiments: Another approach is to conduct laboratory experiments where SSLA sensors are placed in a controlled environment to capture data of traffic signals and lane markings. This data can then be labelled and used to train machine learning models for traffic signal and lane detection. Laboratory experiments provide a high-quality data set with controlled lighting and weather conditions.
- Simulation: Another approach is to use SSLA sensors in a virtual simulation environment to generate data sets for traffic signal and lane detection. This method can provide a large-scale data set with a high degree of variability in lighting and weather conditions. However, the accuracy of the generated data may be limited by the fidelity of the simulation environment

B. DATA PRE-PROCESSING

- Data Cleaning: The first step is to clean the data to remove any noise or outliers. This can be done by applying filters to the raw point of cloud data.
- Data Segmentation: Next, the data is segmented into regions of interest such as roads, sidewalks, and buildings. This can be done by clustering points based on their geometric properties.
- Ground Removal: Ground removal is the process of separating points that belong to the ground from those that belong to other objects such as cars or buildings. This can be done using algorithms that estimate the ground plane based on the point cloud data.
- Object Detection: Once the ground is removed, object detection algorithms can be used to identify and locate traffic. Signals, lanes, and other objects such as cars and pedestrians.
- Data Augmentation: To increase the diversity of the data set, data augmentation techniques can be used. This involves applying transformations such as rotations, translations, and scaling to the original data.
- Data Labelling: Finally, the pre-processed data needs to be labelled to indicate the presence and location of traffic signals and lane markings. This can be done manually or using semi-automated labelling tools.

C. TRAINING THE DATA SET

- Data Preparation: First, the acquired data set needs to be pre-processed to remove noise, segment the data, and label objects such as traffic signals and lane markings.
- Model Selection: Next, a machine learning model needs to be selected based on the specific needs of the application. Popular choices for object detection tasks include convolutional neural networks (CNNs) and their variants
- Raining: The labelled data set is then used to train the selected model. During training, the model learns to identify the features that distinguish different objects such as traffic signals and lane markings.
- Evaluation: After training, the model needs to be evaluated to assess its performance. This can be done using metrics such as precision, recall, and F1 score.
- Fine-tuning: Based on the evaluation results, the model can be fine-tuned to improve its performance. This can involve adjusting the model architecture, the hyperparameters, or the training data set.
- Deployment: Once the model has been trained and evaluated, it can be deployed in a real-world application. This involves integrating the model with the SSLA sensor and the control system of the traffic signal and lane detection system.

VI. RESULTS AND DISCUSSION

Overall, the result and discussion for a traffic signal and lane detection system using SSLA will depend on the specific implementation and the evaluation metrics used. However, by evaluating the system using appropriate metrics and discussing its strengths and limitations, it is possible to develop an accurate and reliable system that can improve traffic safety and efficiency.

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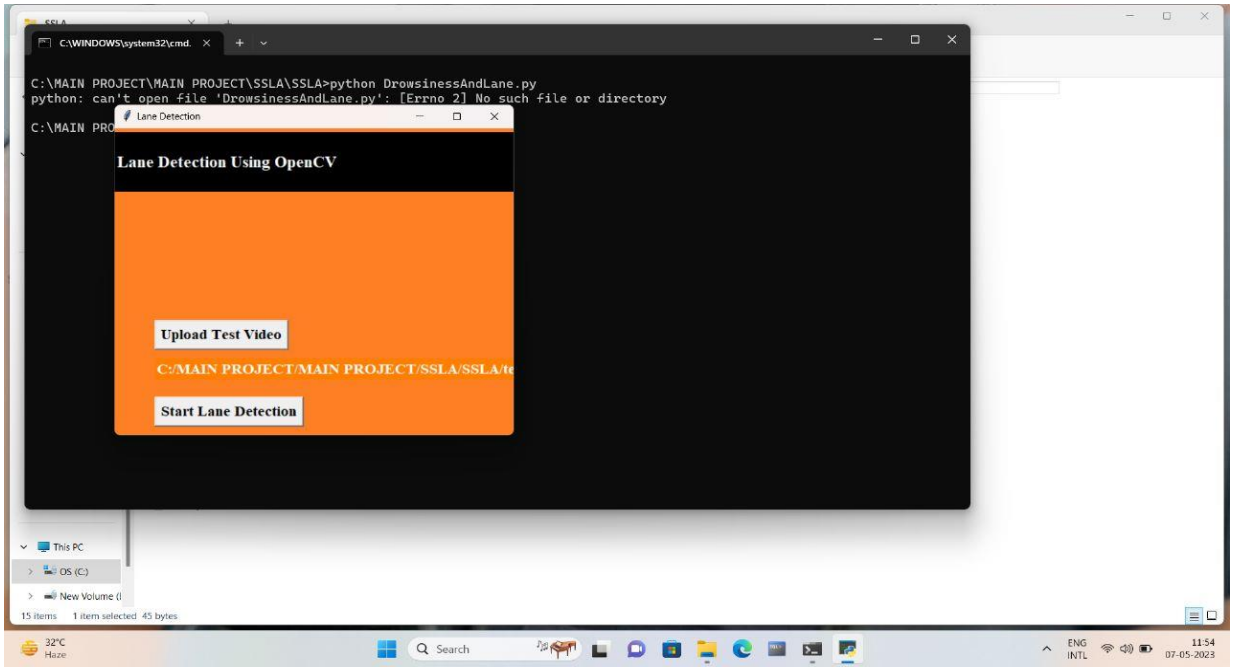

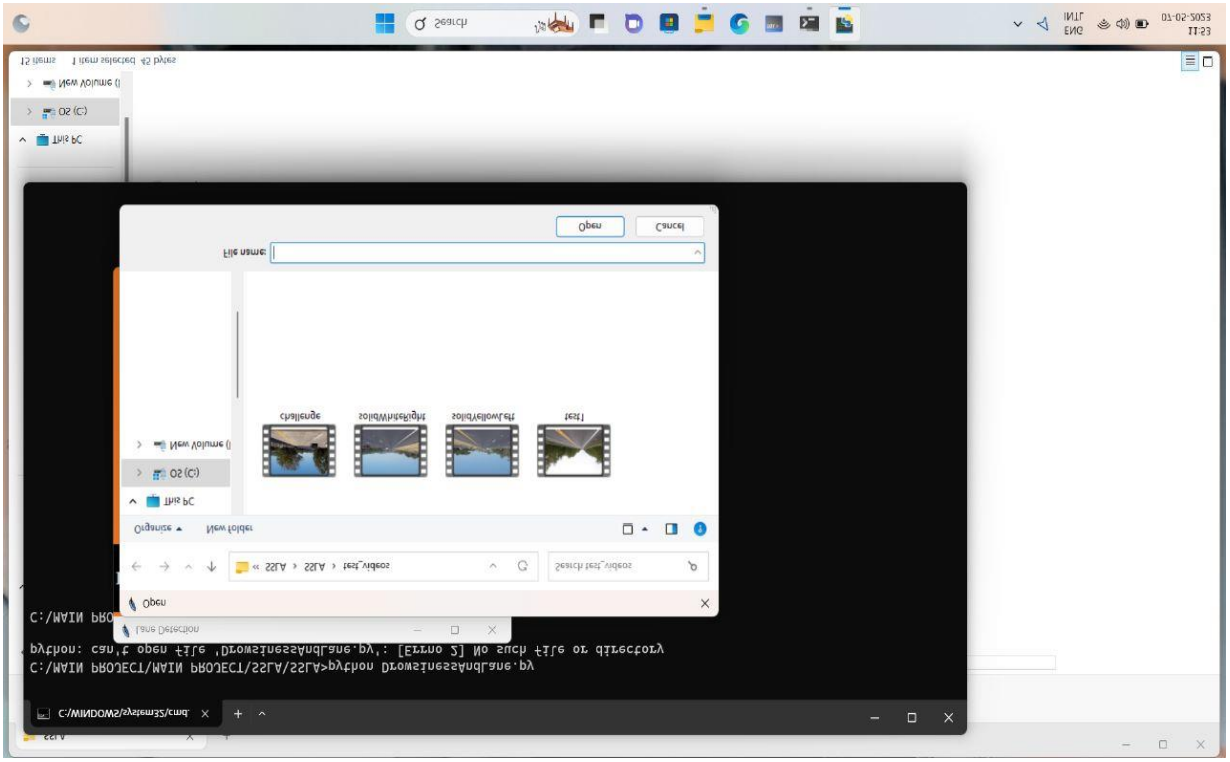

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VII. CONCLUSION

The result of this paper is that the two important aspects Traffic signal and lane detected using Machine Learning Techniques. The learning is performed using image processing and detection using video data set for traffic sign and lane detection using python programming. The SSLA Algorithm is very useful for Autonomous cars in terms of safety and prevention.

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