CNN Based Self-driven Autonomous Car

Gagan Kumar G [1], Sahana GP[2], Dileep V[3], Sunil Kumar GR [4]
[1234] *Dept of ECE, K S Institute of Technology, Bangalore, Karnataka, India*
[5] *Professor, K S Institute of Technology, Bangalore, Karnataka, India*

***Abstract*— According to the Society of Automotive Engineers there are six international standards set to know the level of driving automation. Few start-up companies are experimenting on the autonomous vehicles, these vehicles fail to reach the roads due to many reasons like improper processing of the input data from the sensors, Environmental causes, highly expensive hardware etc. In this paper we are proposing a better solution to process the Input data using High Dynamic Ranging technique, in which multiple input data is processed at least bit rate and the captured image data is acquired completely with less distortion. By using Convolution Neural Network, obstacles and traffic signs can be detected perfectly when compared to the conventional methods. In convolution neural networking every nodes of the system are interconnected to each other in the system by which we obtain a much responsive output compared to the present techniques for data collection. The processing unit (Master device) and the controller unit (Slave device) are set up on a single board, which makes the system function much faster than the other present systems.**

***Index Terms:* CNN, SENSOR, MASTER- SLAVE, TRAFFIC SIGNS.**

I.INTRODUCTION

In the recent time many start-up are into building self- driving cars .Most of them use the conventional sensor system to control the vehicle. All of which most of the time fails to detect the right inputs for processing a perfect output today we are here with our advancement in acquiring efficient data input through ,the WSN system processing and HDR imaging techniques. There are three major modules 1.Image Processing 2.Wireless Sensor Network. 3.Machine Learning. The existing self- driven cars are highly expensive and complicated. Most of these cars use 3-D Light Detection and Ranging techniques to map the obstacles, due to which there is a high probability of inaccurate image detection, that leads to malfunctioning

of system [3]. Some systems use cloud-based data processing systems which most of the time causes a delay between the transmission of data from the cloud to the car controller [4]. The traditional techniques used to detect objects such as traffic signal, signs etc., are by labelling them.

II. LITERATURE_SURVEY

1. In this paper title ”Ranging and obstruction mapping using ray optics approach to model LIDAR technology for self driven cars” LIDAR is a technology to measure the distance and image the surrounding obstacles. The image map gives the obstructions approximate height and width, which assist the Machine Learning algorithm to avoid any Obstructions. In this paper we modelled the LIDAR system by geometric optics approach. in modelling the LIDAR system, Various control are discussed the effect of all these parameters are also discussed. LIDAR, RADAR and ultrasonic imaging is playing an important role in self-Driven cars with the help of laser beams. The LIDAR can launch a highly directed light Beams creating error mapped image
2. Design and implementations of autonomous car using Raspberry-pi” Aims to build a autonomous car ultrasonic by using Raspberry pi HD camera is used to Provide Required info from the real world to autonomous car. The car is more safer and intelligent thus reduces the risk of human errors. Algorithms such as lane detection obstacle detection are together used to provide necessary control to the car. Traffic deaths and has become so common due to driven error accidents are increasing day by day so All this come to an end with self driving cars. The algorithm

mentioned in this paper is Successfully implemented on a Small autonomous cars.

3. In this paper titled ”Traffic light recognition using deep learning for autonomous cars” Autonomous terrestrial vehicles must be capable of identifying traffic lights and also Recognizing their current states for the human drivers to share the street. Most of the time , traffic hight’s are easily identified by human drivers .To deal with the above issue, we can integrate recognition with prior maps but however for detection and recognition of traffic light additional solution is required.

4. In this paper titled ”CNN for a self Driving Car in a Virtual Environment “ have proposed CNN based self driving car for virtual environment. This Paper describes a CNN that goes beyond pattern recognition. CNN has been trained and tested with dataset for the simulated environment.

5. In this paper titled “Safety Analysis based on critical scenarios and collision avoidance of highly automated vehicle “ Safety of automated factor to reduce the driving collision and to improve people’s Feelings of road traffic safety. They have described two effective measures to control the Risk and Reduce the damage i.e. backward collision warning and anti-collision warning and anti- collision lane changing.

6. In this paper titled “Deep CNN-Based Real-Time Traffic Light Detector for Self-Driving Vehicles” Region of selection module to identify all possible traffic lights, and a lightweight Convolution Neural Network (CNN) classifier to classify the results obtained.

7. In this paper titled ”Design of an Intelligent Active Obstacle Avoidance Car Based on Rotating Ultrasonic Sensors“ This paper proposes obstacle avoidance based on static ultrasonic wave sensor when the low sensitivity and slow response and low obstacle avoidance rate defect exists in the intelligent cars to the every momentary part. PWM drive servo actuators were used in this system to control the rotation measurement of ultrasonic sensor. Through sorting and filtering the image sampled data, and then the image is determined to the optimal path, where, which can achieve a full range of autonomous obstacle avoidance.

8 In this paper titled ”Road-Segmentation-Based Curb Detection Method for Self-Driving via a 3D-LiDAR Sensor” This paper presents a real-time curb detection method that automatically segments the road and detects its curbs using a 3D-LiDAR sensor. The point cloud data of the sensor is been processed to distinguish on-road and off-road areas. Which a sliding-beam method is then proposed to segment the road by using the off-road data. A detection method is used to obtain the position of curbs for each road segments.

9. In this paper titled “Self-Driving and Driver Relaxing Vehicle” Authors focused on two major applications, first two vehicles have same destinations and one knows the road and the other follows the first vehicle automatically. Second, automatic driving during heavy traffic jam hence relaxing driver from continuously pushing brakes, accelerator or clutch this idea has been taken from the google car.

10. In this paper titled “A Vision-Based Method for

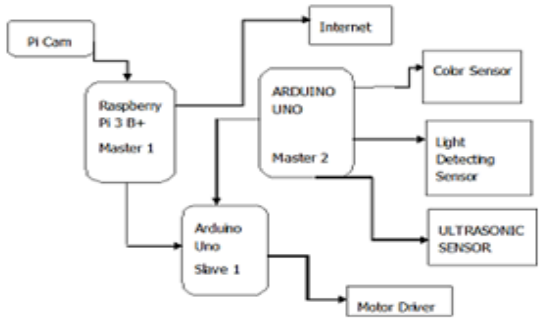
Improving the Safety of Self-Driving “In this paper, Author propose a control strategy with environment identification to minimize the cost but achieve the effect of expensive Multiline Lidar. We use computer vision and deep learning to train existing data set

III.OBJECTIVE OF THE MODEL

An urge to develop Next-Generation Smart Autonomous Car for smooth transportation experience. With the use of alternative sensors and better algorithm to gather the inputs, process them and utilize the system efficiently, leads to the reduction of the overall malfunctioning of the system. The input data processing and controlling takes place on the same board, which reduces the total delay taken for transmission and thus the response time of the system is high.

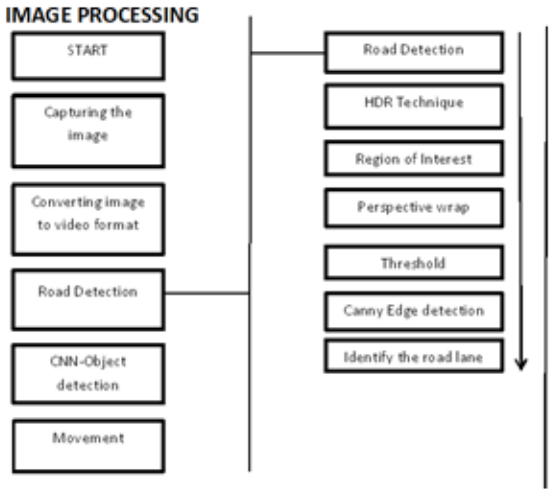
1. To Build a single board for better processing and efficient output response.
2. To overcome the present image processing techniques to capture better data using HDR techniques.
3. Training the vehicle to identify obstacles using much better algorithms by a wireless sensor network and machine learning techniques.

IV.BLOCK DIGRAM



Here above represents the Block diagram implementation of CNN based self driven vehicle.

- The Vehicle model which we have designed capture an image and converts Image into video Format in HDR Technique mode and the vehicle runs automatically without any external support.
- With the obtained data, Region of Interest is applied and Perspective Wrap Transformation will be achieved, along with this Threshold, Canny Edge Detection and Histograms and vectors will also be achieved. Wireless Sensor Network, which are usedto avoid obstacles and to control Color transformation are also used.



The Input Image is Captured using the Raspberry Pi Camera. This Still image is converted by capturing the still image in a forever loop. Once the Motion Image is Obtained, Region of Interest is applied to the region of ourinterest. We take the Perspective Wrapped view of the focused Region of Interest. Once the preferred view is obtained, we apply threshold. Finally, we apply the Canny Edge detection filter to identify the road lane on thefocused region. With the reference vectors obtained by the histogram, we calculate the left and rightlane on the road. With the locations of left and right lane identified we find the lane center position using equation.

V. HARDWARE AND SOFTWARE REQUIREMENT

Hardware Requirements :

- Raspberry pi
- ARDUINO UNO
- Raspberry-pi 3b+ camera
- Motor driver
- Dc motor
- Ultrasonic sensor
- Color sensor
- LDR sensor

Software Requirements :

That specify the software platform that is required to implement a system.Software requirements for the proposed system are given as follows:

1. Raspbian OS
2. Open CV
3. Embedded C

VI. APPLICATIONS

1 Processing of multiple input data and performs required action.

2 Increased processing speed, as both the processing and controlling takes place on same board.

3 Chances of Failure is too less.

VII. CONCLUSION

An urge to develop Next-Generation Smart Autonomous Car for smooth transportation experience. Training the vehicle to identify obstacles using much better. Algorithms by a wireless sensor network and machine learning techniques.With the use of alternative sensors and better algorithm to gather the inputs, process them and utilize the system efficiently, leads to the reduction of the overall malfunctioning of the system. The Project is mainly used in Automobile industries, Institutions and society.

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