



# 3D OBJECT DETECTION FOR AUTONOMOUS VEHICLES

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**Abstract:** The dynamic evolution of Machine learning technologies starts the inception of undeny accuracy of prospects which were hard to imagine few decades ago are now easily executable with various variation of a single field. In today's situation, self-driving cars have gained a lot of traction but there is a huge gap in expectation and the current state. On those lines, our project focuses on 3D Object Detection of autonomous vehicles. In recent years, there has been a significant increase in research interest supporting the development of the autonomous vehicle. The task of environment sensing is known as perception, and often consists of several subtasks such as object classification, detection, 3D position estimation, and simultaneous localization. It features simultaneous object detection and association for stereo images, 3D box estimation using 2D information, alignment for 3D box refinement.

**Index Terms - Component, formatting, style, styling, insert.**

## I. INTRODUCTION

In recent years, electric vehicles (EVs) are gaining increasingly more favor and a focus. Eco-friendliness and monetary return are the benefits of electronic vehicles. electronic vehicles are getting famous because they avoid polluting environment. On the opposite hand, the excellent cost of EVs is not up to that of traditional vehicles under a same mileage. because the development of recent tech is growing it's also benefitting Ev's to achieve more integrity and accuracy. within the process, safety, comfort, energy conservation and environmental protection are the direction and eternal theme of vehicles development. the first goal must be to boost the comfort and security of the vehicle. The autonomous driving can reduce the human prone errors and might help to realize automatic running vehicle concept effectively.

## Related Work

1. Maximilian Denninger, Martin Sundermeyer, Dominik Winkelbauer, Youssef Zidan, Dmitry Olefir, Mohamad Elbadrawy, Ahsan Lodhi, Harinandan Katam et. Used BlenderProc, a modular procedural pipeline, which helps in generating real looking images for the training of convolutional neural networks.
2. Jiajun Wu, Chengkai Zhang, Tianfan Xue, William T. Freeman, Joshua B. Tenenbaum et. proposed a novel framework, namely 3D Generative Adversarial Network (3D-GAN), which generates 3D objects from a probabilistic space by leveraging recent advances in volumetric convolutional networks and generative adversarial nets.
3. Ben Graham et. have implemented a convolutional neural network designed for processing sparse three-dimensional input data.

## II.LITERATURE SURVEY

In this paper 3D object detection using LIDAR and image data is demonstrated. We aim at highly accurate 3D localization and recognition of objects in the road scene. Recent LIDAR-based methods place 3D windows in 3D voxel grids to score the point cloud or Apply Convolutional networks to the front view point map in a dense box prediction scheme.

Sr. No	Paper Name/Year	Author Name	Strengths	Limitations
4	Multi-View 3D Object Detection Network for Autonomous Driving (2017)	Xiaozhi Chen <sup>1</sup> , Huimin Ma <sup>1</sup> , Ji Wan <sup>2</sup> , Bo Li <sup>2</sup> , Tian Xia <sup>2</sup>	It operates on 3D voxel grids and uses computationally expensive 3D convolutions	High level of box regression loss.
5	Shift RCNN deep monocular 3d object detection with closed geometric constraints(2019)	Andretti naiden, vlad paunescu, Gyeongmo kimJiaWei Lu, Ni-Bin Chang, Senior Member, IEEE, Li Liao, and Meng-Ying Liao	Higher accuracy for 2d objects using 3d module.	Estimates are not accurate when predictions are noisy.
6	RoarNet 3d object detection based on region approximation refinement(2018)	kiwo o shin, youngwook paul kwon,masayoshi tomizukaLongoria-Gand ara Omar, Rodea-Aragon Oscar, Torres-Garcia Andres, Sanchez-Garcia Francisco	RoarNet has superior performance in the state of art AND Easy to use and compact design	Synchronization between 2d camera sensors and 3d sensors is challenging.

Sr. No	Paper Name/Year	Author Name	Strengths	Limitations
1	An Overview Of 3D Object Detection(2020)	Yilin Wang and Jiayi Ye	BirdNet+ provides an end-to-end solution for 3D object detection	Only preferable through bird eye view.
2	3D-vehicle associated research fields (2017)	Haluk Eren, Mucahit Karaduman	High accuracy and less ambiguity	Not reliable for simultaneous processing.
3	Stereo RCNN based 3D Object Detection for Autonomous Driving (2020)	Peiliang Li <sup>1</sup> , Xiaozhi Chen <sup>2</sup> , and Shaojie Shen <sup>1</sup>	Multitasking can be done.	There is only one 3D semantic key point can be visibly projected to the box.

## I. CONCLUSION

Even, there is significant research going on in the field of autonomous vehicles, but there is no practical solution yet proposed for localization in the environment. System will be provided with limited data if using 2D object detection system. System will not understand the proper dimensions of nearby vehicles or their orientation. Extracting 3D information from the normal RGB image is a hard task, but it is a cheaper approach, and we can create an enhanced algorithm to achieve the goal.

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