

# Electronic Hardware Design of An Autonomous Vehicle

Prof. Shaista Khanam

Electronics and Telecommunication Engineering  
Vidyavardhini's College of Engineering and Technology  
Vasai, India

Garvit Garg

Electronics and Telecommunication Engineering  
Vidyavardhini's College of Engineering and Technology  
Vasai, India

Umang Waghela

Electronics and Telecommunication Engineering  
Vidyavardhini's College of Engineering and Technology  
Vasai, India

Pratik Waghela

Electronics and Telecommunication Engineering  
Vidyavardhini's College of Engineering and Technology  
Vasai, India

**Abstract**— The world is thriving towards technological advancement and so as the transportation industry. Hence it is necessary to introduce such technology in transportation sector which would transform the orthodox perception of people. And hence Autonomous cars were introduced to transportation industry. The captivating fact about autonomous car is that, it can drive its way throughout with any human assistance. There are various challenges associated with this project. The car has to make decisions into real time and drive its way through the desired path. If it is not capable of doing so, then the results might be gruesome which may lead to accidents and lose of life as well as property. For developing such an autonomous vehicle many complex algorithms are used which involves Machine Learning, Artificial Intelligence, Neural Networks and Image Processing. The autonomous vehicle must be capable of providing accurate outputs in real time which can be reliable for the proper execution of commands. Hence it is proposed to develop such electronic hardware for autonomous car which can achieve desired results by referring numerous recently published papers. The data will be captured with the help of sensors and processed by an algorithm. The output of this algorithm will provide necessary information regarding steering, braking and acceleration. And these are the major components taken into consideration for this project that is calibrating the acceleration, braking and steering into real time application through the data obtained from training algorithm.

**Keywords**—Driverless, hardware, steering, acceleration, braking.

## I. INTRODUCTION

Every year approximately 1.25 million people die in road accidents. The numbers are quite astonishing. The major reason for these accidents is mistake made by driver while driving car. Hence to avoid such mistake, the transportation industry felt need to revolutionize the way of driving cars and hence they came up with an idea of self driving cars. Since this car does not require any human intervention the mishaps caused by drivers can be avoided completely. Therefore autonomous driving system allows the vehicle to drive by itself without requiring help from a human. The vehicle equipped with autonomous driving capability detects the environment, locates its position, and operates the vehicle to get to the specified destination safely without human input.

Though there are many researches going in developing autonomous car by tech giants and renowned institutions across the globe, the information available to students who are willing to build this project is scanty. Hence designing electronic hardware of autonomous car from scratch is very challenging. The main reason is that the autonomous vehicles need to make critical decision in real life environment and improper results can be detrimental to human life. For developing such autonomous vehicles many complex algorithms are used which involves Machine Learning, Artificial Intelligence, Neural Networks and Image Processing. The proposed system has to work in real time and execute desired commands. Accuracy of proposed model will be very critical in designing such system. Solving above stated problems will lead to reliable and revolutionize the entire transportation industry.

## II. LITERATURE SURVEY

This literature is provided by NVIDIA, wherein they proposed end-to-end autonomous vehicle using various algorithms [2]. Though there was detailed specification regarding Software methodologies but there was hardly anything regarding Hardware implementation techniques. Only multiple software development techniques were proposed. NVIDIA has used very highly sophisticated processors and algorithms for implementation of autonomous vehicle. DRIVE APX2 is world's first commercially available level 2+ automated driving systems. This let's manufacturer bring driver assistance features, as well as intelligent cockpit and visualization capabilities, to passenger cars and commercial trucks. NVIDIA has a wide range of products and DRIVE AGX is one such open autonomous vehicle computing platform that serves as the brain for autonomous vehicles. They use software that enables important self driving functionalities such as sensor fusion and perception. Finally the photorealistic simulation was performed since it is safe and scalable solution for testing and validating self-driving platform before it hits the road. NVIDIA DRIVE is the data center that integrates powerful GPUs, cameras, radar, and lidar[3].

The MIT developers [4] provided analysis of driver behavior and Interaction with automation. It provides the

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