

## A Novel Review on Google Driverless Autonomous Vehicle

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### ABSTRACT:-

*Now a day's huge technological development around the world. The era of self driving car is not far. Autonomous vehicles (driverless, self-driving and robotic vehicles) are having travel demands and transportation planning in near future. Many car manufacturers trying to implement self drive cars. Telsa inc., company already implemented such technology in its cars. It uses GPS, RADAR, LIDAR, Ultra Sonic Sensors, High Definition camera, Machine Learning and Computing Technologies. The analysis indicates some advantages like fully fledged independent mobility for affluent non-drivers, but high impacts includes reduced traffic congestion and parking deadlocks, independent mobility for low-income people, enhanced and increased safety, this may probably happens in the 2040s to 2060s.*

**Keywords:-** GPS,LIDAR,RADAR,ADAS.

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### I. INTRODUCTION:-

Autonomous vehicles have long been prediction in automotive industry. In past few years, major corporations have announced plans to begin and sell vehicles in a few years called as telsa inc., and some of the laws have been passed by legislation to allow these vehicles so that they can operate on roads, still it is good indication for the growth of automotive sector.

#### Levels of Autonomous Vehicles:

**Null Automation (level -0):** Driver will fully control vehicle all times. Automation is unavailable for none of the parts of an automotive.

#### Function-specific automation (Level -1):

This kind of automation is available for specific control operations these include functions like cruise control, automated parking. Overall control of the vehicle is handled by driver.

**Combined function Automation (level-2):** in this type of automation is available in multiple and integrated control functions. Drivers are fully responsible controlling and monitoring.

**Limited self-driving Automation (level-3):** in this type, a driver doesn't constantly monitor the roadway. They can plan all critical and safety functions for specific conditions. They rely on the vehicle and monitor for changes in those conditions, if it doesn't meet conditions the driver will take control over it.

**Full self-driving automation (level 4):** vehicles are responsible fully to perform all the driving functions; they also monitor conditions of roadway for an entire trip.

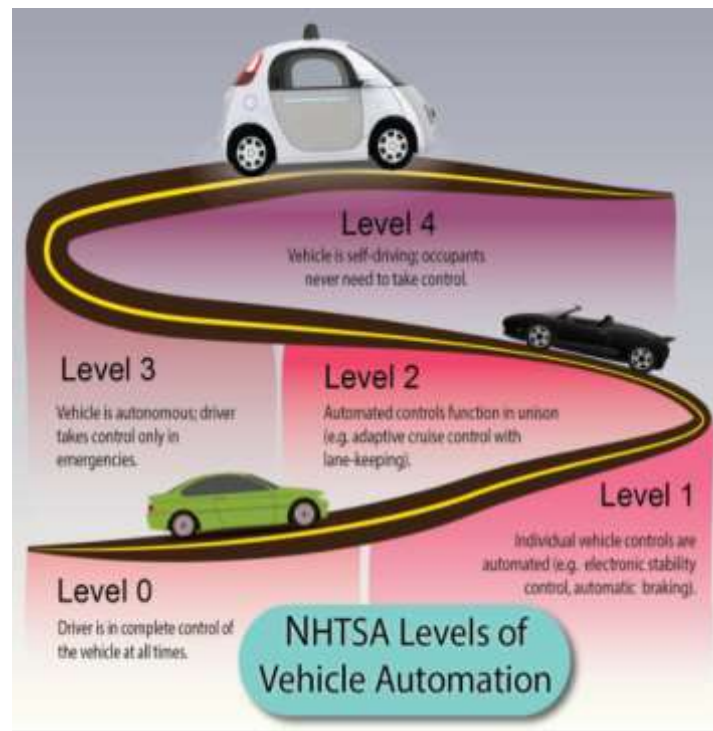


Fig.1:- Vehicle Automation Levels

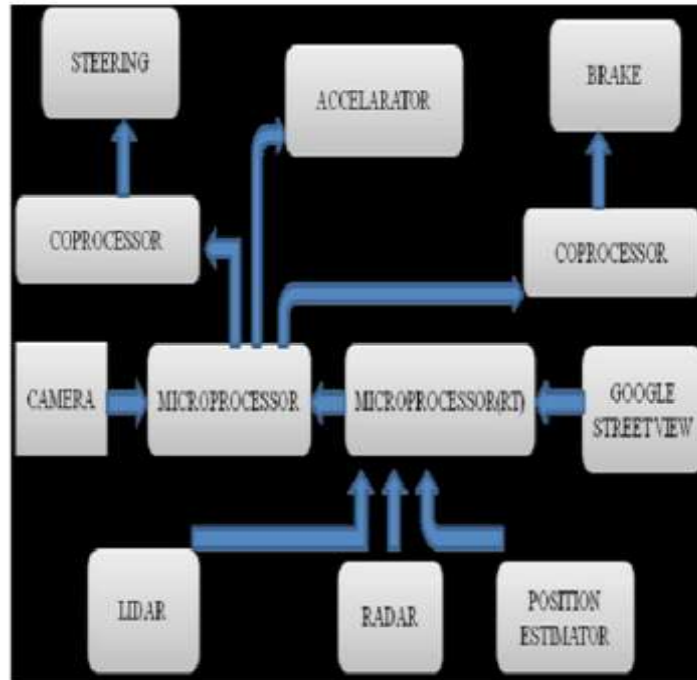
Table.1:- Latest technologies used in autonomous vehicles

Technology	Functionality	Limitations
Self steering	Self steering systems use cameras which watches the road markings. Radars and Laser sensors are used to track other objects.	Machines do not yet do a good enough job of extrapolation – artificial intelligence helps to improve this sensing capacity.
GPS	Space based satellite navigation system that provides time and location information anywhere.	Accuracy of a GPS receiver is $\pm 10$ meters, not practical for locating a car which is 3 meters.
DGPS	Enhancement to GPS to improve location accuracy to 10 cm.	Shadowing from buildings, foliage causes temporary losses of signal.
Digital maps	Process by which a collection of data is compiled and formatted into a virtual image.	Only parts of the world mapped; need critical mass to enter and cross validate data in order to achieve required accuracy.

## 2. ARCHITECTURE:-

The Architecture block diagram of Google driver less car is depicted below. It includes sensor Section, drive by wire technology and processor section. The main controller of the goggles driver less vehicle is the microprocessor section. There are two

Processors; one is for the general working and one for handling the sensory inputs which is real time. There are two coprocessors for handling the steering and the brake. Accelerator is directly controlled by the general purpose processor. The general purpose processor is constantly communicating with the engine control unit.



**Fig.2:-** Architecture of *Google Driverless Car*

### 2. 1. Always on always connected

The concept of self driving cars is to be always on and always connected to the internet. To feed real data, to push software updates, to supply live traffic data and fixed bugs, to send data usage and to send all updates vehicle need to connected always. More over to receive real updates from neighboring cars and to process artificial intelligence vehicle must be connected.

### 2.2. Lidar

LIDAR -Light detection and ranging, is optical remote sensing technology which helps to measure the distances to and other properties. It illuminates the target with its laser light and analyzes the backscattered light.

It produces safe and unseen laser rays and these rays reflects from solid body around car are perceive by sensors.. Based on what type of object, distance ,size and density laser rays reflects differently, these received by sensors. By observing, the lidar create a 3d virtual map its look like a virtual 360 panoramic image. It captures 1000000 shots per second .it can system can scan each and every object up to 600 feet. Laser light is has higher energy level and shorter wavelength when compared to radio waves, it reflects better from objects such as non-metals and provide better result over radar technology.

### 2.3. Radar

Radio Detection and Ranging works similar way of a lidar except to know the distance of an object, distance and speed it uses radio signals. Radar is used as object-detection system which contains electromagnetic waves to check the range, direction and speed of moving as well as fixed objects. It enables self driving car to maintain perfect distance between preceding and following cars by increasing or decreasing speed of the car that is without using driver.

#### 4. Ultrasonic distance sensors

Now a days is in every automotive equipped with reverse sensors to park vehicles, in the same way ultrasonic se sensors works which deals with even long distance objects. Each self driving car equipped with multiple ultrasonic sensors which sensors small objects, bigger objects, near and far objects and give exact distance. Few automotive manufacturers may use ultrasonic sensors instead of lidar and radar due to its cost effectiveness.

#### 2.5. Gps

The Global Positioning System (GPS) is also known as space-based global navigation satellite system (GNSS) it provides information such as location and time in all weather conditions. Now a days each and every automotive equipped with GPS system in case of self driving car GPS has unique functionality. The main functionality is to collect various real time data, time line history, data map, speed of the vehicle etc and make perfect movement of vehicle. It helps to get new clear road, diversions, caution regarding dead end of the road, so the self driving car can move easily. It is high resolution global positioning system

#### 2. 6. Latest processing

GYROSCOPES, ALTIMETER, BAROMETER like different sensors sends large amount of various real time data to the central processing unit. By analyzing these real time data can navigates towards its destination without any difficulties. These real time data received and need to be processes and rapid movement of vehicle signals need to be produced. To perform this super computer capability required. Nvidia ,Intel,Qualicomm, Texas instrumentation etc companies already supplying drive less car computer



Fig.3:-Google Driverless Car

### 3. DRAWBACKS:

- Costlier: - The equipments and technologies used are costly the main equipments used in this technology .until this technology implemented fully on road price of the car may be rise. Hence can customer afford this high cost?? Recently valve, pyne time Inc produced low cost lidar system for driverless car. Its cost around \$8,000 that is 500000 rupees.
- Unavailability Clear map:- usually, if we compare Google map and street view , Google driverless car map is very clear and in depth, which includes length and breadth of the road, dead end and obstacles in roads, to process this it's a complicated task. To maintain search map of entire country and routing live traffic of every road and updating requires high computing capabilities.
- Government Law and Regulation: - Regulations and legal factors are one of the critical obstacles for self-driving cars. Insurance underwriting is a major issue for autonomous vehicles.

- Professional Threat: - the main threat is for drivers here as arrival of autonomous cars will reduce their demands. The industries employing drivers will benefit from the costs associated with drivers.
- Legal and Humanitarian Matter: - The question of to whom this vehicle belongs is a risk if an autonomous vehicle is met with an accident this issue need to be addressed for convergence solutions to gain mass-market adoption. Assume that, for self driving car, if situation arises, where to avoid accident, it can lead to another accident, e.g.. If a kid and animal encounters in accident? To whom save? If the driver was a human being, obviously it may save kid and hit animal?? Can driver less car do this???

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