

SREE VISVESVARAYA INSTITUTE OF TECHNOLOGY & SCIENCE



**DEPARTMENT OF MECHANICAL
ENGINEERING**

A TECHNICAL SEMINAR ON

AUTONOMOUS CAR

BY

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Abstract

The word "Auto pilot" mode here refers to the process of implementing the advanced technology in vehicles which enables it to self-drive in high way roads without the control of the humans. This process is going to be achieved by the use of Radars, Sensors and Advanced GPS maps. First a compact path of the place where user wants to go is selected on the GPS map.

When the engine is started, all equipment's will start to take positioning. The readings are obtained from the radar every second. It detects the objects at the limit of 180' angle and continuously feed the control unit. This control unit is built with a lot of conditions that makes the vehicle to move in the possible safe directions. Here 50% of the job is done by the radar equipment's and rest of the job is done by the advanced GPS mapping to make a safe journey. Separate signals are obtained from the ground level to detect the speed breakers and conditions of the road. Same set of equipment's is fixed on the rear side of the vehicle to avoid other vehicles hit on rear side of the user's vehicle.

Introduction

This Auto pilot mode Technology is a research project. By implementing this technology in vehicles enables it to self-drive in the highway roads without the control of the humans. This technology creates a new revolution in the Automobile and transport field. It helps the user to save their valuable time which is wasted while driving and it is not necessary for the drivers to be always seated in the driver seat except the places, where the signals and road counters present. Many accidents are occurred due to the carelessness of the drivers.

This can be avoided by implementing this Autopilot mode technology. In this technology many advanced equipment's are going to be used to make a safe journey. This Autopilot mode technology is going to be created by the combination of various departments in Engineering. But among these departments of Engineering four departments are going to play a major role.

They are Mechanical, Electronics, Information Technology and Computer science departments. Mechanical department is going to take care of all the mechanical movements of the vehicle. Electronics department take care of the fetching of programs made by the programmers in the controlling unit and for its proper functioning. Information technology and computer

science departments are going to be the back bone of this technology. Programs made by the programmers are going to be responsible for the working conditions of the control unit. Let us see the components and working of this technology in following paragraphs. A discussion about this technology is already made by HONDA UK in 2006 but it has many draw backs and they don't explain about the working of this technology. I had created a new way to overcome from this draw backs and I had explained about this process in detail in the following paragraphs in my own creation



COMPONENTS

This technology contains four major components. They are,

- RADAR
- OPTICS
- LIDAR
- GPS
- PROCESSOR



1.RADARS

Radar is an object detection system that uses electromagnetic waves to identify the range, altitude, direction, or speed of both moving and fixed objects such as aircraft, ships, motor vehicles, weather formations, and terrain.

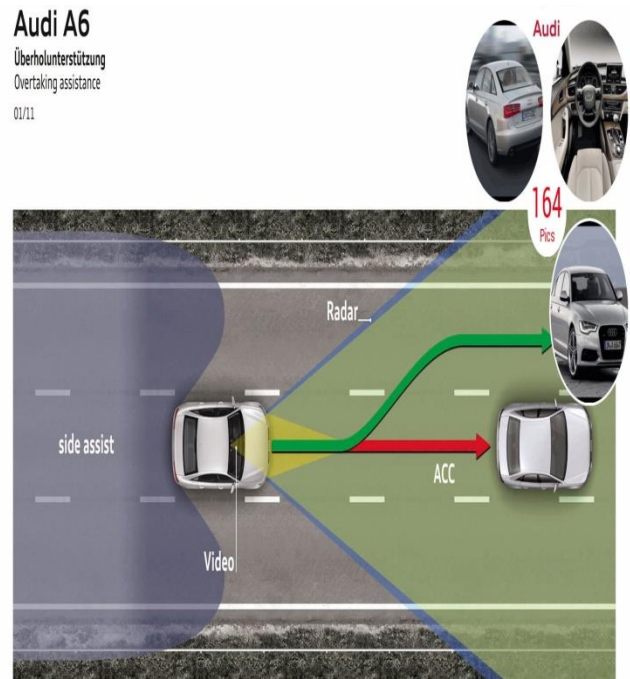
The term RADAR is defined as radio detection and ranging. A radar system has a transmitter that emits radio waves. When they come into contact with an object they are scattered in all directions. The signal is thus partly reflected back and it has a slight change of wavelength (and thus frequency) if the target is moving. The optimal range can be fixed as 50m.

The receiver is usually, in the same location as the transmitter. Although the signal returned is usually very weak, the signal can be amplified through use of electronic techniques in the receiver and in the antenna configuration.

This enables radar to detect objects at ranges where other emissions from the target object, such as sound or visible light, would be too weak to detect.



From the above picture it has been observed that the radar signals are transmitted and readings of the detected object is received by the reflected signals from it in front of the car. By the radar readings the control unit automatically accelerates and de-accelerates the car. In case object in front of the car moving slowly means then the control unit will go for the “overtaking” mode.

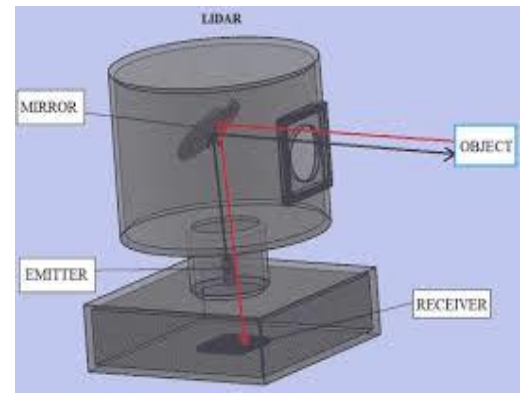


2.OPTICS

- A camera mounted near the rear-view mirror build a real-time 3D images of the road ahead,spotting hazards like pedestrians and animals.
- It is also used to identify road markings and traffic signals.



- The emitter sends out a LASER beam that bounces off a mirror that is rotating along with the cylindrical housing at 10 revolutions per minute.
- After bouncing off objects, the LASER beam returns to the mirror and is bounced back towards the receiver, where it can be interpreted into data.
- The vehicle can then generate a map of its surroundings and use the map to avoid objects.



3.LIDAR

- The Light Detection And Ranging (LIDAR) which is mounted on the roof of the vehicle is the most important device in the autonomous vehicles.
- The LIDAR consist of an emitter,mirror and receiver



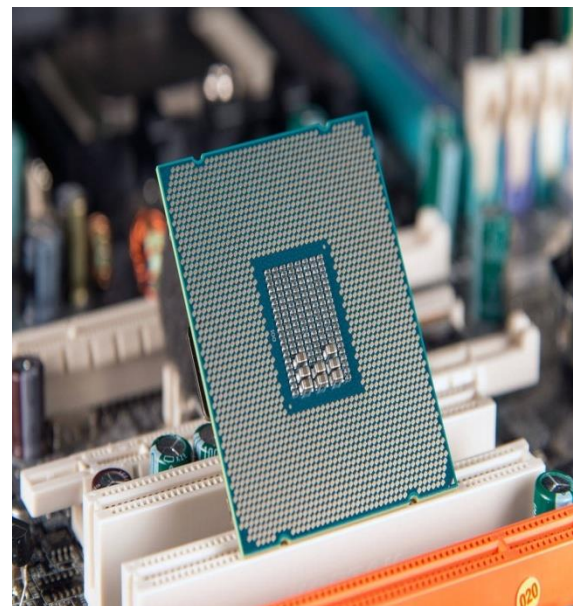
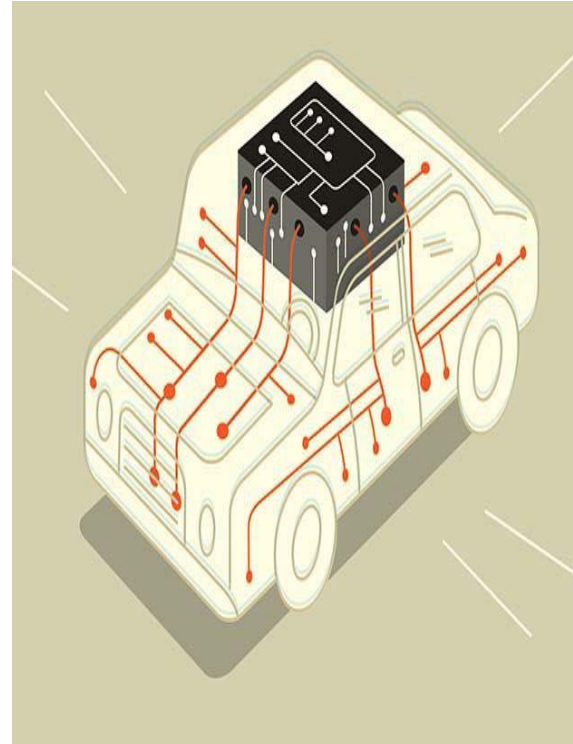
4.GPS

- A Global positioning system keeps the car on its intended route with an accuracy of 30cm.
- With GPS covering the macro location of car, smaller on-deck cameras can recognize smaller details like red lights stop signs and construction zones.



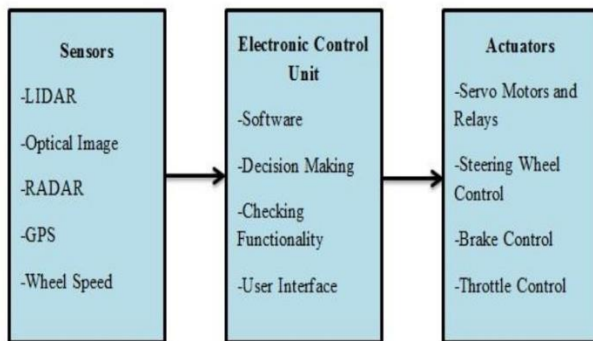
5.Processors

- Some 7 dual-core 2.13 GHz processor and 2GB of RAM are needed to make sense of the data collected by the cars instruments.
- Some car run as many as 17 processor to dispense the computing load..
- Processor measures small movements made by the car.
- It helps to accurately locate its positions on the map.



WORKING

- The signal from the sensors is used by the Electronic control unit for decision making using a software code.
- Based on the information from the sensors, the Electronic control unit gives signal to the actuators, which in turn control the vehicle.



Advantages

- Managing traffic flow to increase road capacity.
- Relieving vehicle occupants from driving allowing them to concentrate on other tasks or to rest during their journeys.
- To avoid accidents.
- The current location of vehicle can be determine using global positioning system (G.P.S) .

Disadvantages

- If the vehicle is using internet which is have less security then From the hackers point of view in some cases the vehicle can be switched off on the road(in rare cases)
- Hackers can change the rout which is plotted in the system(in rare cases)
- In case of failure of main sensor and backup sensors the vehicle can create a chance of accident

Conclusion

- By implementing this Autonomous car technology will surely reduce the occurrences of road accidents by a considerable value.
- The driver less car's technologies improves vehicle's stability helps to minimize loss of control.

