

Autonomous Vehicle

Abstract

Autonomous vehicles have been invented to increase the safety of Transportation users. These vehicles can sense their environment and make Decisions without any external aid to produce an optimal route to reach a Destination. Even though the idea sounds futuristic and if implemented Successfully, many current issues related to transportation will be solved, Care needs to be taken before implementing the solution. This paper will look At the pros and cons of implementation of autonomous vehicles. The vehicles Depend highly on the sensors present on the vehicles and any tampering or Manipulation of the data generated and transmitted by these can have disastrous Consequences, as human lives are at stake here. Various attacks against the Different type of sensors on-board an autonomous vehicle are covered.

Introduction :

Automated vehicles have been generating significant attention And discussion, recently with almost every automobile Company trying to develop their respective autonomous Vehicle concept and are successful in achieving some levels of Autonomy and are planning to start production of driverless Vehicles in few years. Even though people have mixed Feelings of excitement and insecurity regarding the driverless Concept but will either accept or reject it on the basis of the Impacts of autonomous vehicles. Researchers and analysts Have already started considering the effects of autonomous Vehicles on carbon emission, number of cars per person, etc. And are providing their views on vehicle automation. Self-Driving[2] cars will need to outperform human driving Capabilities for securing a larger consumer market. But surely, It will have a huge impact on the timeline of transportation And a landmark in human inventions.

History

This gives an overview on the past inventions of the Various parts related to design of autonomous vehicles in Their respective years'

- Transmitting antenna

- Embedded circuits and Radio controller

- Electronically controlled highways
- Powered and controlled by
- Lateral control, computer vision and autonomous Robotic control
- Off-road map and sensor-based autonomous Navigation6. In 1990's
- Extensive systems engineering work and Research
- Video cameras on board use of stereoscopic Vision algorithms
- Real-time control system
- RFID-tags

Working

Autonomous cars rely on sensors, actuators, complex Algorithms, machine learning system and powerful Processors to execute software. The signal received by the Sensors are used by the electronic control unit for making the Decisions using a software code, then the control unit sends The signal towards the actuator whose main objective is to Control the vehicle. These cars create its own map of the Surrounding based on the various sensors which is present at Different parts of it. Then, the received information from the Map is the output to the user interface located inside the Vehicle. Hard-core rules, obstacles avoidance algorithms, Predictive modeling and object recognition help the software Follow traffic rules and navigate obstacles.

Software

Control algorithms are necessary to capture the data From sensors and connectivity and make decisions on Steering, breaking, speed and routine guidance. By far, The most complex part of self driving cars is the decision Making of the algorithms which must be able to handle a Multitude of simple and complex driving situations Flawlessly. The software used to implement these Algorithms must be fault tolerant and robust

http://en.wikipedia.org/wiki/Autonomous_car

<http://drivesteady.com/how-autonomous-vehicles->

Calculation

Calculation for steering mechanism:

Gear1

Teeth=55

Gear2

Teeth =10

Torque of stepper motor (T2) = 7.2

N-cm Gear1 teeth/T1= Gear2

Teeth/ T2

T1= 39.6 N-cm

Where, T1 – Torque of required to move steering

Advantage

Let's look at the main advantages brought by autonomous vehicles:

360° vision. Thanks to high-precision technology, autonomous vehicles possess the ability to view the environment in a 360° range, twice as much as humans, who have a viewing angle of only 180° horizontally. Reduced accidents. Thanks to 360° vision and vehicles being interconnected with each other and in constant communication, accidents will be significantly reduced. Although (at least initially) accidents will not be reduced to zero, they will be much less than accidents caused by human driving. Higher traffic efficiency. Although it is estimated that their speed in big cities will be lower, their traffic efficiency will be higher. Access to the disabled and people with reduced mobility. Thanks to the fact that the automobile will be autonomous and will require practically no human interaction for its operation, even people with visual or hearing disabilities will be able to have one, i.e., they will become inclusive. Sustainable vehicles. It is expected that these vehicles will operate based on clean energy, so carbon and greenhouse gas emissions will be practically zero.

Market Report

The two main companies which focused on the advancement Of self driving car are Google and Tesla in which Google uses Lidar sensor technology and going straight to cars without Steering wheels or foot pedals whereas Tesla uses a software System called autopilot which consists of hi-tech camera Sensors as a car's eyes to some of its cars already on the Market. Right now, autonomous cars are legal only in few U.S States .The company Toyota modified one of its car names Toyota Prius into a Google driverless car. By 2020, Volvo Envisages having cars in which passengers would be immune From injuries and Mercedes, Benz, Audi, Nissan and BMW all Expect to sell autonomous cars.

Conclusion

Autonomous vehicles have been subject to research and Development for nearly a century. Vehicle to vehicle Communication is in the near future. Cars will no longer be thought of as simple a transportation option, but rather a Mobile entertainment equipped with WI-FI, television And a entertainment dedicated onboard computer. Autonomous car is a super computer with deterministic Network on wheels. 5G will play significant role in Autonomous vehicle. Upon addressing the mechanics of the Driverless car as well as its benefit and potential issues, it is Quite interesting to see how the world will actually look by The year 2040. Companies manufacturing them should take Great care and control mechanisms for these vehicles