Driving into the future – How IoT and Machine Learning are Redefining Autonomous Vehicles

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Autonomous vehicles are the vehicles that observe its environment and moves on its own through traffic and other obstacles with minimum or no human input. Autonomous cars are said to be the future smart cars with zero human intervention, effective and crash avoiding ideal urban car of the future. In this article we call attention to "The self-sufficient and truly autonomous car", the TESLA'S self-driving car, which is best example for the perfect blend of IoT-Machine learning-Blockchain, which is revolutionising the Automobile industry. It also examines briefly the benefits it delivers and the risks associated with it.

Introduction

An autonomous car, also known as driver-less car, is a car that is capable of travelling without human input. They combine the data provided by sensors and software to control, navigate, and drive the vehicle. This is the current forthcoming technology in the automobile industry and indeed was discussed and worked on for a long time, it was successfully manufactured and deployed by TESLA which uses the integration of IoT, Machine learning and Blockchain techniques to realize the potential and break the challenges in this area to reach the anticipated outgrowth.

Fig 1:Tesla's self driving cars

Integration of IoT, Machine Learning and Blockchain in Tesla's Self Automating Car Technology

1. **Data Collection through Sensors:**
   Tesla cars are adapted with a collection of sensors such as radars, cameras and ultra sonic sensors. These sensors collect the huge amount of data about the surrounding environment around the car. This collected data is then used by Machine Learning algorithms to train the car to acknowledge and respond to varying situations .Machine Learning algorithms are also used to process the collected data by sensors to find and recognize the objects such as passing by cars, traffic signals, road signs and pedestrians in real-time.

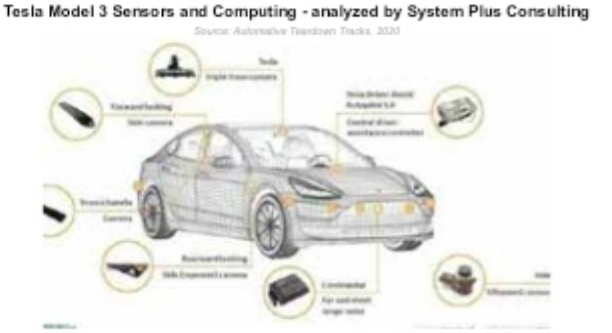

Fig 2:Sensors used in Tesla self driving cars

https://doi.org/10.5281/zenodo.8250316

2. Continuous Learning:

Tesla's self automating cars are designed to continuously learn and upgrade its performance over time. The car is capable of collecting data about its own driving behaviour and make use of this data to enhance its driving algorithms through Machine Learning.

Fig. 3: Auto pilot mode in Tesla cars

3. Autopilot and Self Driving Mode:

Tesla has its own software that permits the self driving and autopilot modes in the car. The driver can reduce their manual tasks by the use of Advanced Driver Assistance System(ADAS) incorporated in the software. The driver can take the control of the car during any difficult and hard headed situations with aid of this special IoT features.

4. Updates:

One of the main implementation of IoT in Tesla vehicles is its update system. Usually the cars are updated in dealership or merchant stores. This may come out as a complex task wherein it is difficult for a driver to always to take the car to the merchant for any upgrades. In Tesla there is no need to take car to the dealer instead the car fixes itself and this is done through its self updating features. This feature was first implemented by Tesla S model.

Fig 4: Self updating feature

5. Mobile App:

Similar to the use of IoT in home appliances apps where we can turn on the lights, switch on or off the AC just by one click, the same functions can also be used in Tesla cars using a mobile app. We can access various features of the car like flashing lights, unlocking and locking the car etc with just a single click. There is also a special feature used in the app where we can move the car out of a tight space. We can also set the climate control, check the battery status and purchase upgrades through the app.

Fig. 5: Mobile app of Tesla

6. Application of Block Chain:

The application of Blockchain in Tesla self driving cars is to enhance the safeguard and secure the data. This technology can also be used to store and manage the huge amount of data collected.

Risks Associated with the Self Driving Cars

- Hackers can acquire access to the cars since these cars always connected to the internet .This may lead to some dangerous situations.
- The IoT features in self driving cars collect a huge amount of data like location and personal details .This data can be sold out to third parties without the users consent.
- The Machine Learning algorithms implemented may not always make the right decisions at right time ,this can lead to accidents or injuries.

However the development of these self driving cars using any of these technologies should be done with proper considerations of these risks and also should implement a proper safeguard to overcome these challenges.

Security aspects of Tesla's Self Driving Cars:

- Tesla have the concept of passive safety and active safety ,where it's aim is not only focused on the safety of Tesla drivers and passengers but also the drivers on the road.

- The Model S, Model 3, Model X and Model Y of Tesla self automating cars have achieved the lowest overall probability of injury as compared to any vehicles tested by the U.S. Government's New Car Assessment Program.
- The Tesla's battery packs are rarely damaged in accidents, it also ensures that its safety system works as intended.
- Tesla uses a Sentry mode in its cameras and sensors to scan its surroundings for any potential threats. It flashes the lights and displays a warning message on the central touchscreen, when an object is too close to your car. A notification is sent to the mobile app where the user can access the footage before the event occurred.
- The Dashcam feature in Tesla is used to save a recording of the events that triggered an accident into a local USB drive in the car.

Conclusion

Due to the emerging technologies across the universe, autonomous vehicles will be the unborn mode of transportation globally and will be a revolution not just for drivers and traffic patterns but also for transportation industry as a whole. The legal, ethical and social counter-accusations of independent vehicles surround the ideas of reliability and effectiveness. Autonomous vehicles will profit the frugality through energy effectiveness, the terrain through reduced carbon emissions, society through further togetherness, and the legal system through a simpler system of liability. Nevertheless, these ideas revolve around two central aspects of independent vehicles: how they work and how they are kept secure. As technology advances, the security technology regarding driver-less cars will also continue to grow to combat hackers, increase the delicacy of internal systems, and prevent accidents through the integration of blockchain, IoT and machine learning. Once all these technologies are optimal, society will become one step closer to the utopia of flying cars most people pictured of as children.

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