The Past, Present, and Future of Autonomous Vehicles

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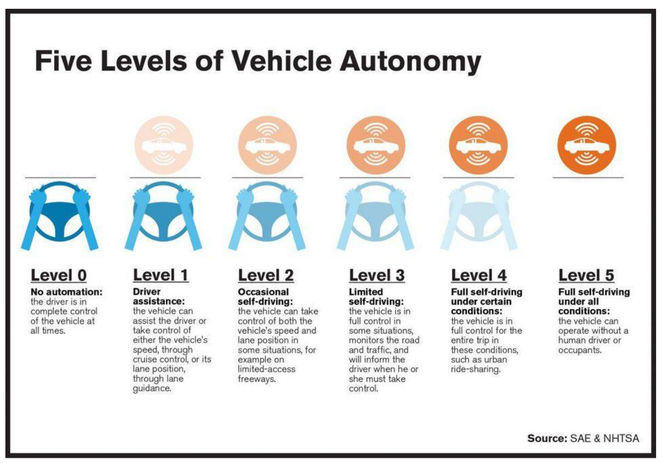
Abstract

The idea of autonomous vehicles has become a part of driving history dating back to early as the 1920s. First created by Houdina Radio control as demonstration of the potential of radio technology, the idea has immensely expanded and now incorporates six different levels to autonomous driving. The science and mechanics of this technology include the incorporation of laser rangefinders, GPS/inertial navigation system, cameras, sonar, radar, and lidar. There are five primary components that shape how self-driving cars operate, and research on the subject is currently being investigated by companies such as Google, Tesla, and Honda. As more analysis is done, the inevitable question regarding the future comes into play. This research will highlight the potential benefits and costs that go into this endeavor.

The Evolution of Autonomous Vehicles

- **The first public demonstration of an autonomous vehicle was exhibited by the Houdina Radio Control Company in 1925.**
- **Experience with previous vehicle technology deployment is key in helping predict how we will advance in the future of autonomous driving.**



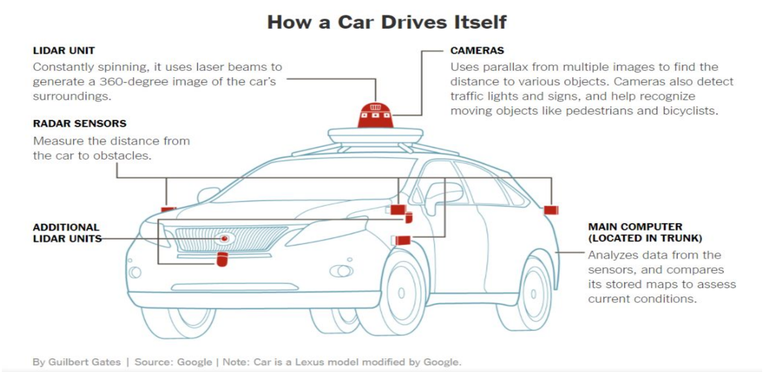
- **Different types of autonomous vehicles exist to fit users specific needs.**
- **Current companies investing money into research and development include Tesla, Google, GM, Daimler, Volvo, Honda, Jaguar Land Rover, Audi, and BMW**

The Science and Mechanics

The vehicles are equipped with the following sensors GPS, cameras, laser rangefinders, sonar, radar, and lidar. Self-driving vehicles have five core components:

- **Computer Vision provides the vehicle a complete view of the road.**
- **Sensor Fusion combines the computer vision data to optimize decision taking and a better understanding of the vehicle's environment.**
- **Localization uses advance algorithms to gather the data from the computer vision and sensor fusions to create an internal map.**

- **Most of autonomous vehicles have connectivity. With the addition of the localization, the software creates a safe driving path.**
- **Control algorithms capture the data from the sensors and connectivity to make decisions on steering wheel, braking system, speed, and route guidance.**



Looking ahead

<u>Impact on Jobs</u>

- **Estimated 300,000 driver jobs lost annually**
- **Uber and Lyft partnerships with automakers**

<u>Traffic Patterns and Environmental Concerns:</u>
<u>2 Different Possibilities</u>

<u>Possibility #1</u>

- **Ride-sharing services replace ownership, reduce the number of cars on the roads**
- **Decreased fuel emissions, less cars manufactured, cleaner environment**

<u>Possibility #2</u>

- **People continue to own vehicles,**
- **Likely to send "zero occupancy cars" out for errands**
- **Increase in the number of cars owned, cars more frequently driving, longer trips being made, all resulting in increased fuel emission**

<u>Auto Insurance</u>

- **Who will be liable in the case of an accident?**
- **Decreased likelihood of accidents results in lower rates**
- **Insurance may be included in a flat fee from manufacturer if they are liable**

<u>Real Estate</u>

- **Impacts on housing market, garages, parking lots**

<u>Travel</u>

- **Impacts on hotels, flights, vacations**

Resources

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