**Smarter and Safer Transportation in Automobiles**

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## Smarter and Safer Transportation in Automobiles

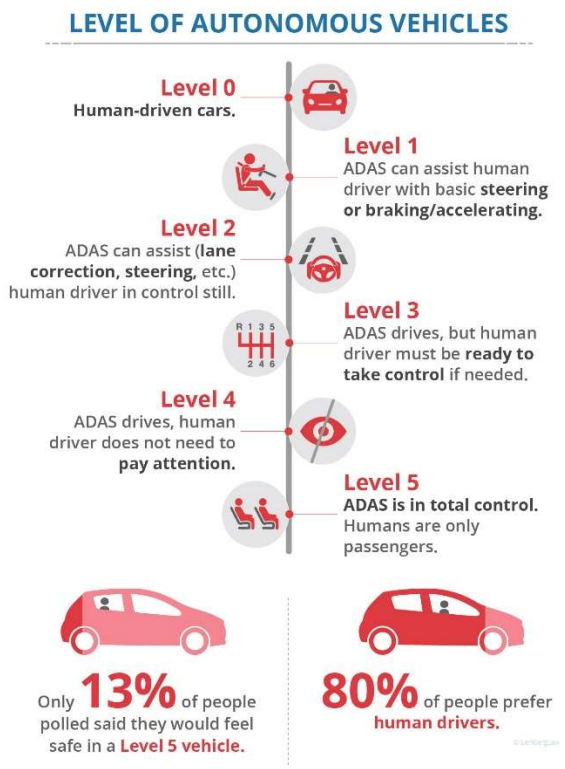
Building smarter automobiles that emphasize safety and efficiency is an important step in reducing automobile fatalities and enabling faster travel. According to Bishop (2022), “At least one driver or passenger is injured in 43% of car crashes. There were 2,282,015 injuries reported in 2020 — that's 6,252 per day, or four per minute”. A myriad of solutions are being developed and tested now. Some of these solutions come in the form of smarter cars, improved construction materials or methods, and advanced sensors. To improve efficiency and safety, Artificial Intelligence can be used. This allows cars to communicate with each other to optimize lane changes, speed up intersection traversal, and avoid collisions. Although currently not readily available or accident-free, advanced driver-less cars will greatly increase safety and enable faster travel.

## Early Driverless Cars

Throughout history, various assisted driving cars were built**.** In 1925, Francis Houdina developed a radio-controlled car that could drive by itself. In the 1990s, Carnegie Mellon built self-driving vehicles with the use of neural networks that could drive using cameras. The first affordable self-driving cars were first built in 2014 by Tesla Motors and that car was named the Model S. At the time, however, it was only capable of assisted driving. Assisted driving is limited to steering, braking, and speed adjustment based using its external sensors. It would not be until 2016 that Tesla began to roll out its fully self-driving software, and this was the first time a Level 4 Self Driving Artificial Intelligence was fielded. “Fully self-driving” is somewhat untrue currently, as Level 4 still requires a human who may take over control, as seen in Figure 1.

**Figure 1**

*Stages of Self Driving Logic Development* (Lemberg, 2019)




## Full Self-Driving Artificial Intelligence

Although Level 4 has been achieved, cars that do not require a human driver to be present are not far off. Currently, AI can do all the things a human can do. It can drive, park, make turns, and avoid collisions, but this can be further enhanced. When self-driving cars become prevalent, driverless cars may be allowed to communicate with each other to enhance traffic flow in addition to safety. If a self-driving car needs to switch lanes, it may communicate with another car. This communication may let a lane-switching car know if a lane is needed, and it may let another car know not to brake, as a car is entering the lane behind it. If a self-driving car is

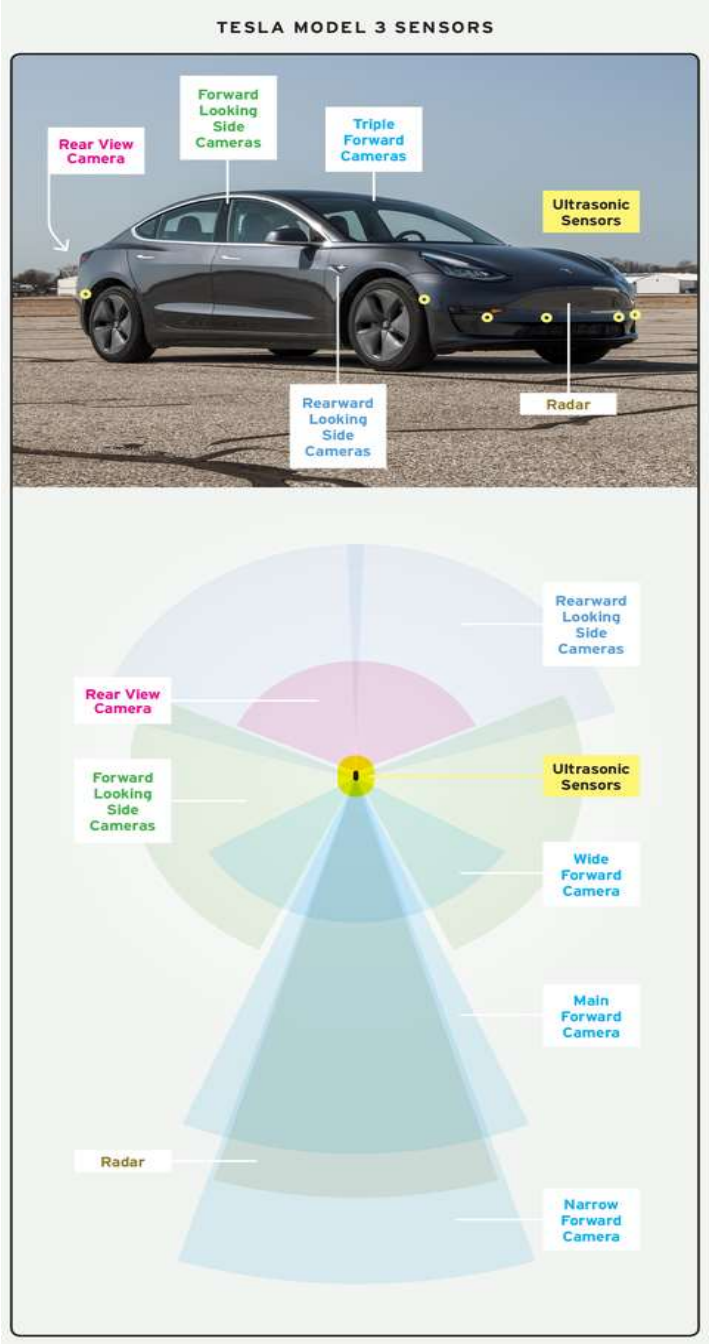
approaching a dangerous blind intersection and another self-driving car is at the intersection, they may not detect each other with sensors. By communicating they may coordinate to prevent an accident, potentially saving a life.

## Analysis of Driver-less Cars

AI drivers utilize the many different sensors embedded in the body of the automobile. Cameras, ultrasonic sensors, and even radar are some of the devices that may be found in driver-less vehicles currently. Tesla's Model 3 vehicles use ultrasonic sensors and cameras on all sides of the car to detect vehicles nearby. The Model 3 computer employs image recognition to identify cars using the cameras and ultrasonic sensors to detect the distance from the detected car. Lastly, a narrow field-of-view camera points forward to identify cars ahead or other road hazards. Some of the hazards it may detect include pedestrians, debris, and even animals. This camera is the main driving sensor of the Model 3, as such it can also detect traffic lights, road signs, and different lanes on the road. The radar installed in the forward direction may detect other cars, as well as the distance to those cars. The Artificial Intelligence of the Model 3 receives all data from the various sensors from around the vehicle and creates somewhat of a 3-dimensional map of its surroundings as seen in Figure 2. Using this, the Model 3 can make decisions on what it should do in a particular situation. If a turn is detected it will turn the steering wheel to stay inside of the lane it is in. Perhaps someone walks across the road far ahead; it may slow down or stop to avoid a collision. These advancements ensure that the Model 3 will drive in the safest manner possible.

**Figure 2**

*Sensor field-of-view map of the Model 3 sensors* (Hoffman, 2021)



**The Road Ahead for Artificial Intelligence**

AI drivers are quickly becoming advanced, and although not accident free or cheap, they will one day be safer than driving manually. Once the new generation of AI driven vehicles arrive, the only thing required to travel will be the input of a destination. Imagine stepping into a vehicle, inputting the destination, and then relaxing while the AI drives to your destination. Knowing with absolute certainty that a computer can arrive safely at the destination in minimal time can only save time and lives. According to the U.S. Department of Transportation (2017), The major factor in 94 percent of all fatal crashes is human error." Many lives can be saved by developing and incorporating Artificial Intelligence for use in safety.

## References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