



THE ELECTRICAL COMPONENTS OF THE SELF-DRIVING CAR

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Full autonomous driving is perhaps the most disruptive development in the automotive industry today. According to a study by IHS Markit, global sales of vehicles with some level of autonomy will reach **76 million units by 2035** while fully autonomous vehicle sales will rise to **33 million units in 2040**. What is most interesting is that its penetration is likely to be stronger in the electric vehicle segment. This is mainly because of the following factors:

◆ **EASY INTEGRATION:** It is easier to integrate autonomous features on an electric car, since the self-driving capability of a car draws heavily from its electrical subsystem for its multiple sensors and advanced computing hardware.

◆ **COLLECTIVE MARKET MATURATION:** The electric vehicle market is still in the product innovator phase. Full autonomous technology is also in its early stages of development, and these two technologies are expected to mature with each other — reinforcing and accelerating one another. Both technologies are expected to reach mainstream adoption by 2030.

◆ **COMPONENT CONTROL:** It is simpler to control the components that make up an electric vehicle, as the electric car has fewer simpler pieces — the battery, inverter, and the electric motor. The internal combustion engine has about 2000 small parts that need to be lubricated for fear of breaking.

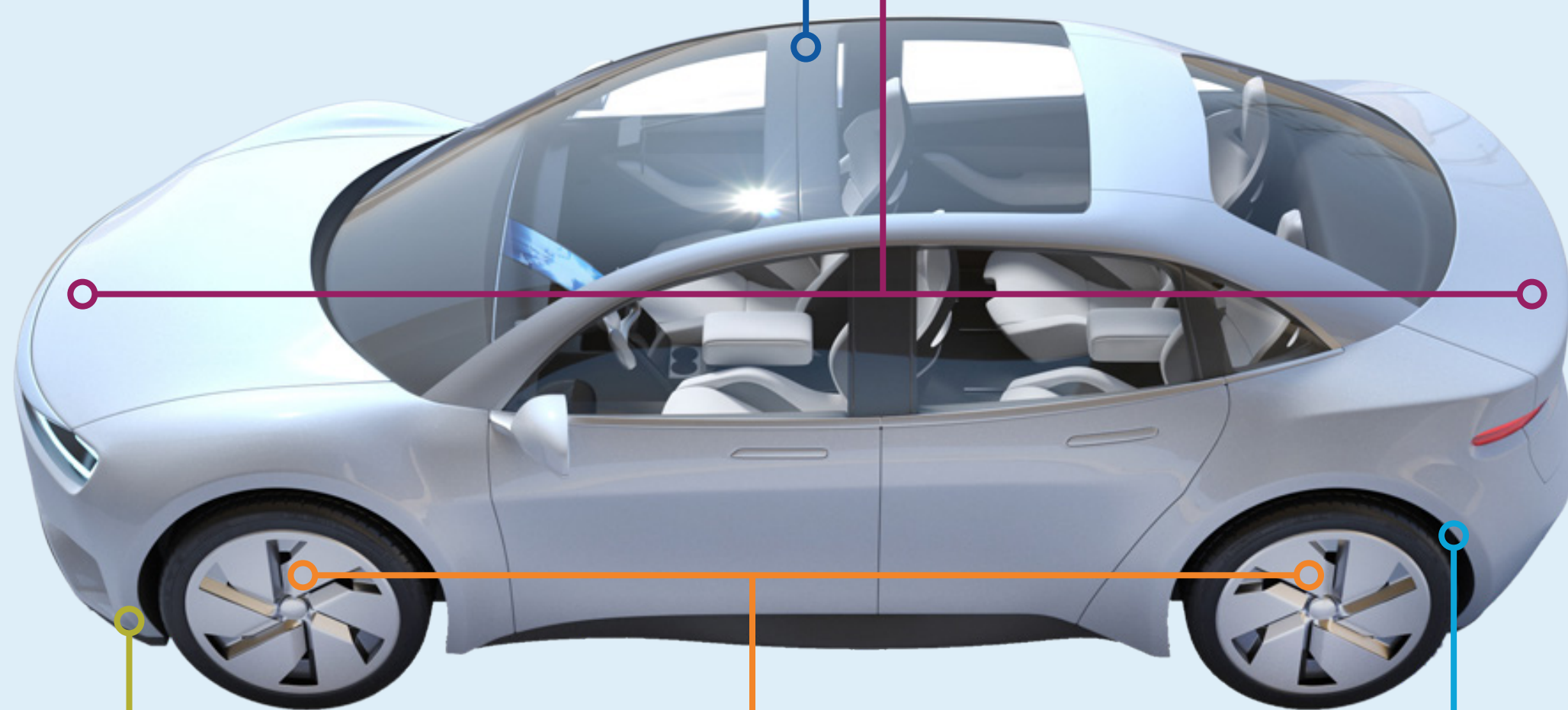
◆ **RIDESHARING:** According to experts at Morgan Stanley, ride-hailing trips are expected to grow from 4% in 2016 to 25% by 2030. Ride-sharing companies such as Uber and Lyft and also automakers such as BMW, Daimler, Volkswagen, Honda, and Ford are focusing on launching a fleet of autonomous electric cars.

Lidar

Lidar sensors emit short pulses in a steerable and focused beam, and the focused beam can detect objects up to 300 meters away. It can measure velocity directly and map static environments as well as moving vehicles, pedestrians, and wildlife.

Radars

Radar located at the front, rear, and sides will detect proximity to nearby obstacles. Long-range radar can detect objects up to 200 meters away, and ultrasound radar will be used for parking assistance.



Onboard Computers

The central computer manipulates the steering, accelerator, and autonomous brakes. The onboard computer will be responsible for interpreting all the data collected by the sensors to make real-time driving decisions. They will also connect to 5G signal infrastructure to help predict traffic conditions.

Brake Systems

Automatic brakes will be one of the significant safety features in autonomous vehicles. Almost 90% of all traffic accidents are caused by human error. Automatic brakes will be able to reduce accidents by 14%.

Electric Battery

High costs of lithium-ion battery cells have been one of the main hindrances to large scale electric vehicle adoption. Over the last few years, prices of battery packs used in electric vehicles have fallen. According to a recent report published by McKinsey, the prices have dropped from a global average of \$1,000 per kWh in 2010 to \$227 per kWh in 2016. By 2023, average prices are expected to fall close to \$100 per kWh.