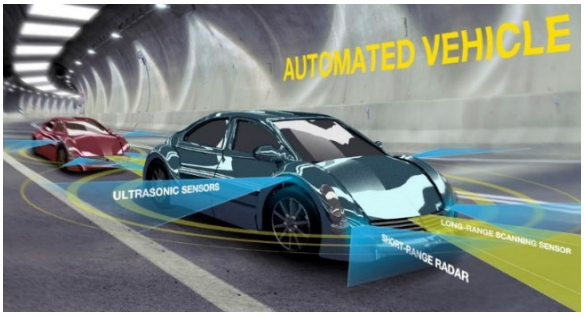
Automated Vehicles

What are AVs?

Automated vehicles (AVs) are vehicles that have some level of automation in their driving operations. AVs leverage sensors, algorithms, and computational power to scan, analyze, predict, and make decisions to operate the vehicle in various environments. This automation can take various forms, from audio, visual, or haptic warnings to the driver; to momentary driver assistance features (such as lane keeping capabilities or adaptive cruise control); to full automation of all driving tasks. Depending on the level of automation in a vehicle, a driver may need to be partially or fully engaged. A vehicle with full driving automation, however, is capable of operating the vehicle independently.

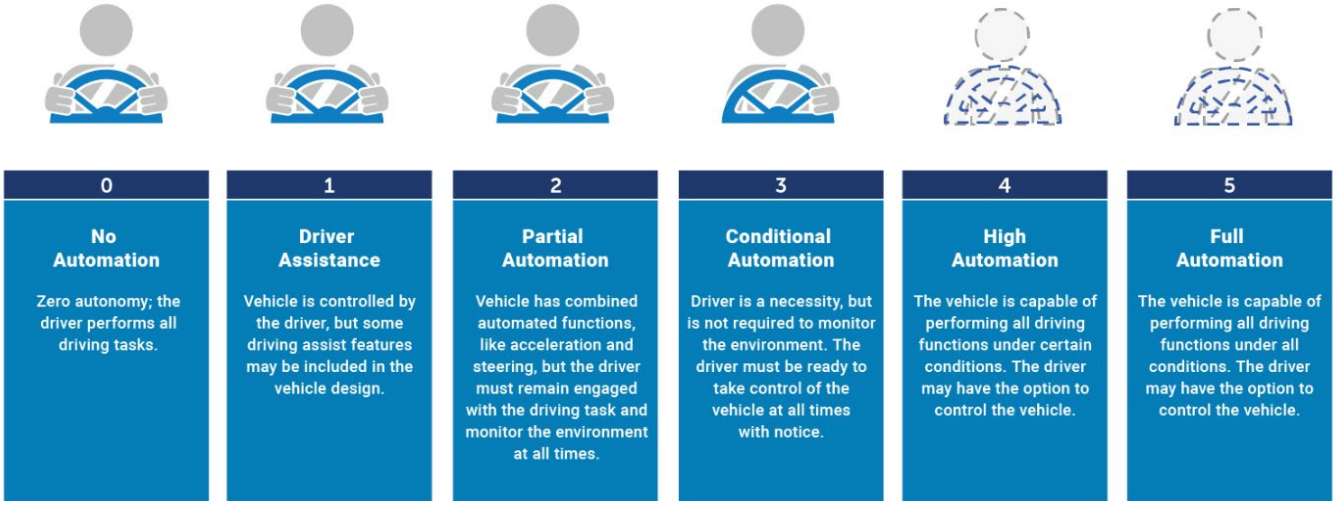


AVs can use sensors and on-board computer hardware to assess their surroundings, analyze their driving environment, and make informed vehicle operation decisions. Source: USDOT

Types of AVs

AVs are being developed and piloted in different forms across the country and world – from fleet operated cars for personal or small group point-to-point transport, to shuttles with high-level driving automation for improved first/last mile transit access, to trucks and truck platooning for more efficient long-distance interstate transport, to small delivery vehicles for urban middle-mile and last-mile delivery.

The Society of Automotive Engineers (SAE) has developed a six-level hierarchy to categorize AVs based on the level of assistance that automation provides. **SAE Levels 0, 1, and 2** require a driver to monitor the driving environment and be actively engaged in the task of vehicle operation (aka. features may support, but do not take over for, the driver). **SAE Levels 3, 4, and 5** pertain to automation where the system can, to varying degrees, monitor and perform driving tasks without the driver's engagement, with level 5 referring to full automation.



SAE Automation Levels; Source: SAE

Potential Impacts of AVs

While AVs are still being designed and tested, these vehicles present new possibilities for improving mobility.

An AV designed to accommodate wheelchair-bound passengers along with additional riders. Source: USDOT

- **Safety**: AVs could potentially help reduce vehicle collisions and fatalities. More than 36,000 people died in vehicle crashes in 2019, with a majority of crashes involving driver error. As AV technology advances, there may be increased opportunities to reduce crashes and improve road safety.
- **Accessibility**: AVs can potentially help to improve accessibility. Approximately one in four Americans live with some form of disability. Not only could fully automated vehicles possibly better enable those who are unable to drive to travel independently, but also, the development of AVs presents an opportunity to rethink vehicle design to make mobility more accessible for all users. For example, if the driver cockpit were to be eliminated or remodeled, there may be opportunities to open up vehicle floorspace and make modifications to the vehicle body with universal design principals in mind to better accommodate wheelchair users, those traveling with luggage or strollers, and other travelers.

On-demand delivery robot; Source: Getty

- **Delivery**: AVs can provide delivery services to customers. Be it via road-going vehicles that can be unloaded by the customer at the curb, unmanned aircraft systems (UAS) delivery, or sidewalk delivery bots that transporting goods directly to a customer's door, AVs can be leveraged to help connect people with goods, such as groceries, medical supplies, etc.

Aerial drones can provide fast, point-to-point delivery of goods by air. Source: Getty

Future-facing Considerations

Key topics associated with the advancement of AVs looking forward include, among others:

- Policy: considering AV-related standards and guidance
- Data security: protecting user information, as well as vehicle performance and reliability
- Human-machine interactions: developing interfaces that enable AVs to effectively communicate with riders and the full range of other road users
- Education and outreach: providing information on new services and collecting and building upon diverse input. Polling conducted by PAVE, for instance, has found that 60% of Americans would trust AVs more if they better understood how the technology worked. Educating the public on AV capabilities and promoting understanding is an important piece towards advancing public utilization of this developing technology.

About the UTC Speaker Program: *The mission of the speaker program is to connect transportation industry leaders and innovators with university and college students in the classroom. In this way students will hear directly from transportation professionals their personal experiences, challenges, and successes, and learn about how to better prepare for entering the Intelligent Transportation Systems (ITS) workforce.*

To learn more about the UTC Program please visit the University Transportation Centers website. For more information related to AVs, please visit the NHTSA Automated Vehicles website.