



The Future of Automotive



Society of Automotive Engineers (SAE) Levels of Autonomy



No Automation

Zero autonomy; the driver performs all driving tasks. Driver Assistance

Vehicle is controlled by the driver, but some driving assist features may be included in the vehicle design.

Partial Automation

Vehicle has combined automated functions, like acceleration and steering, but the driver must remain engaged with the driving task and monitor the environment at all times.

Conditional Automation

Driver is a necessity, but is not required to monitor the environment. The driver must be ready to take control of the vehicle at all times with notice.

High Automation

The vehicle is capable of performing all driving functions under certain conditions. The driver may have the option to control the vehicle.

Full Automation

Full Automation

The vehicle is capable of performing all driving functions under all conditions. The driver may have the opportunity to control the vehicle.



No Automation

Blind-spot Monitoring



Rear Cross-traffic Alert System





Driver Assistance

Adaptive Cruise Control



Self Parking



Automatic Emergency Braking





Partial Automation

Combined Steering and Acceleration/Deceleration





Autonomous Driving

- Level 3 Has conditional automation
 Driver must be ready to control
- Level 4 Has high automation Driver may have option to control
- Level 5 Full automation
 No driver required



Consumer Acceptance of Automated Technology

- Drivers having driver assistance features are 75% more likely to trust the technology
- US drivers afraid to ride in a selfdriving vehicle:

2018 (May) - 73% 2018 (early) - 63% 2017 - 78%

- April 2018 AAA survey of Ohio drivers found 65% were afraid
- Education can play a key role in easing fears.



Autonomous Vehicle Regulation & Future Deployment

- 27 states and the District of Columbia have regulated use of autonomous vehicles
- Ohio approved testing of autonomous vehicles in May on all roadways
- By 2025, 1.1% of vehicles on U.S. roads will be driverless
- By 2040, 90% of all vehicles sold will be automated
- Ohio Governor ordered all of Ohio's public roads open to smart vehicle testing



Acronyms and Messages

- CAV/I = Connected and Automated (or Autonomous) Vehicles and Infrastructure
- V2I = Vehicle-to-Infrastructure
- V2V = Vehicle-to-Vehicle
- V2X = Vehicle-to-Everything
- RSU = Road Side Unit
- OBU = On-Board Unit
- DSRC = Dedicated Short Range Communications (5.9 GHz radio)
- SPaT = Signal Phase and Timing Message
- MAP = Map Data File Message for each Specific Intersection (+GPS correction)
- BSM = Basic Safety Message

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V2X

V2I, V2V, and V2X

V2I and V2V



First successful V2V and V2I connection for Path Master with the City of Marysville on January 3, 2018.

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Connected Intersection – Why?





Benefits

• Enhance *safety*

- Mitigate roadway conflicts: fewer traffic collisions and injury accidents
- Improved response time of first responders to accidents
- Vision Zero: No more traffic deaths
- Improve <u>mobility</u>
 - Increase operational efficiency (lower speeds & shorter gaps; platooning)
 - Increased roadway capacity and reduced traffic congestion
 - Improve individual mobility (first & last mile and enroute)
- Reduce *environmental* impact
 - Reduced traffic congestion = reduced pollution
 - Smart parking availability = less searching for spaces
 - Vehicle sharing = reduced number of vehicles and parking spaces







Challenges

- What is better DSRC radios or cellular technology?
- Industry standard and enforcement of valid and complete SPaT and MAP messages
 - No independent intersection safety monitoring of broadcast V21 messages
- Low levels of connected and autonomous vehicle market saturation
- ITS infrastructure disparity
 - Lack of funding for upgrades (top-down vs. traditional bottom-up approach)
- Connected solution for vulnerable road users (bicycles, motorcycles, pedestrians, maintenance workers, etc.)

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Why do we need to know this?



What does this mean for Repair? **☑** Training **☑** Technicians **Who Provides**? **☑** How? **Cyber Security**



Technology Takes The Wheel®

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THANK YOU

