American Association of Motor Vehicle Administrators

Automated Vehicles Technical Assistance for North Carolina

Agenda Item #8

February 27, 2020

OUR VISION

Safe drivers
Safe vehicles
Secure identities
Saving lives!

ADS-equipped Vehicles in Development and Testing

Low Speed Shuttles Testing

Several pilots; off public roads and on public roads in many cities

- Vary widely in design
- between 4-15 passengers
- Top speed of around 25 mph

SAE Level 4 –

- have a defined operational design domain (ODD)
- not intended to go everywhere
- on-board attendant during testing but expectation is they will eventually fully self-driving

Low Speed Shuttles Testing

- On-board attendant during testing
- Allowing public to ride during testing
- Crashworthiness research needed
- Does it address a local transportation need
- Funding the testing
- Obtain data to perform and analysis of the pilot

FHWA report: https://rosap.ntl.bts.gov/view/dot/37060

M-City

Automobiles

Being developed by:

- Traditional vehicle manufacturers examples: Toyota, Subaru, Tesla, Mercedes Benz, Nissan, BMW, Honda, Audi, Ford, Volkswagen, etc.
- Tech Companies (well established and start-up companies) Waymo, Uber, LYFT, Samsung, Aurora,

Several of these companies have developed partnerships that are a combination of tech companies and traditional manufacturers

Automobiles

Approved Testing Permits

Platooning

- The linking of two or more vehicles using vehicle-to-vehicle (V2V) communication technology.
- The first vehicle in the platoon sets the speed and direction for the rest of the vehicles, enabling them to follow at a close distance on highways.
- Some jurisdictions regulate the following distance of vehicles by indicating the minimum number of feet or meters required between vehicles. (problematic for platooning)
- Other jurisdictions do not have an actual numeric value as a minimum following distance but indicate there must be a safe or reasonable and prudent distance between vehicles.

Platooning

Transportation Network Companies

APTIV and LYFT in Las Vegas

Transportation Network Companies

Transportation Network Companies

Transportation Network Companies

Uber Advanced Technologies Group integrating ADS into Volvos

Pittsburgh

Enhancing focus on safety

Public Safety Official & First Responders Guide

Transportation Network Companies

Local Delivery Vehicles

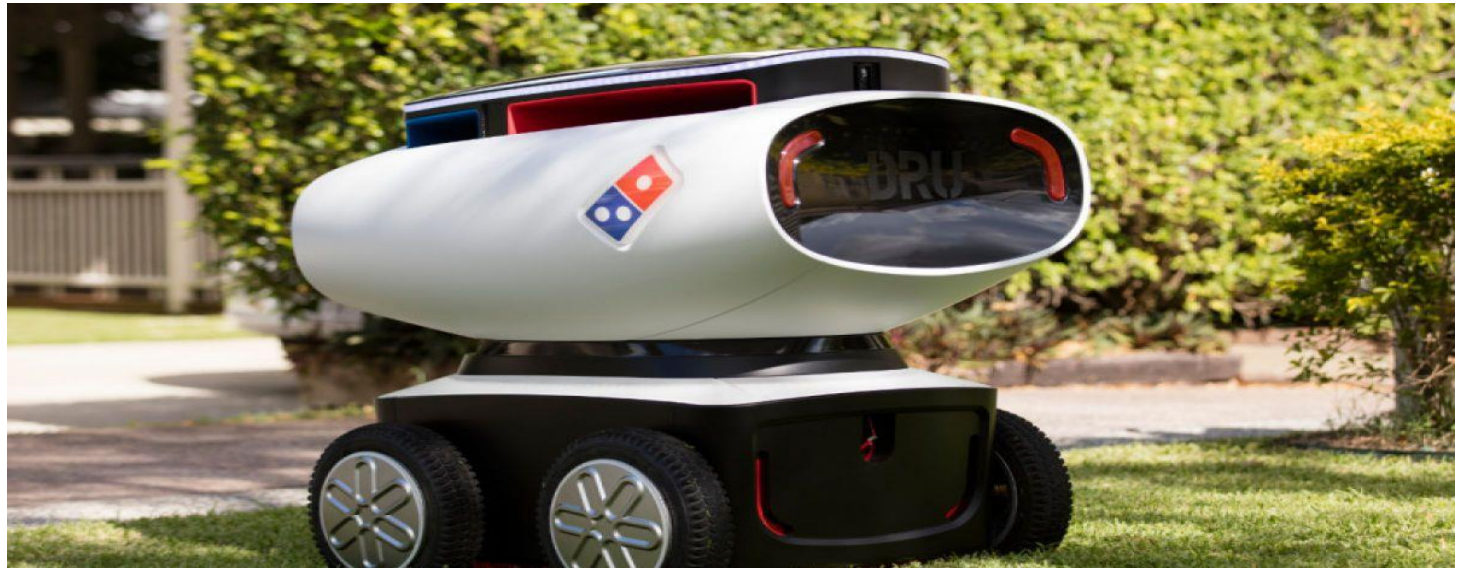
Lots of questions:

Is it a vehicle?

Should it be operated on local roadways or sidewalks?

Can it use crosswalks?

Can other vehicles see it?



Research and Educational Institutions

Some examples:

- Michigan State University
- Michigan Tech
- University of Michigan
- University of North Carolina
- Texas A&M University
- University of Alabama
- Virginia Tech
- Stanford
- Purdue
- University of Illinois
- University of Florida
- Ohio University

Remote Drivers

Remote Drivers

Remote Driver Concerns

- Drivers may completely control a vehicle from a remote location using a virtual driver's seat.
- Operate all types of vehicles from personal to commercial vehicles, including shuttles and delivery vehicles.
- They may control more than one vehicle at a time as most likely the vehicles will be part of a fleet of vehicles.
- The remote driver may be in a company office, may work from home, may be in another vehicle, may be in another state…….

Categories of Testing

- Low Speed Shuttle - Pilots
- Long Term, in specific locations for an extended period of time
- Short Term; single trip through several different cities and states

Each type of testing creates challenges for jurisdictions.

Low Speed Shuttle Pilots

- Testing in many countries
- In many cities and states in US
- Several manufacturers
- Sometimes there are written agreements between companies and government entities
- Campuses, gated communities
- Highly congested areas, large parking lots
- Fixed route and stops
- Very specific Operation Design Domain (ODD)

Low Speed Shuttle Pilots

May be contracts between companies and government entities to collect and share data to study:

- Feasibility for solving a local transportation gap
- Potential costs to include in local transit planning
- Potential transportation solution for an underserved population
- Public awareness and acceptance

Low Speed Shuttle Pilots

Low Speed Shuttle Pilots

Challenges:

- Do these vehicles meet Federal Motor Vehicle Safety Standards (FMVSS)
- Have they been tested for crashworthiness
- Weather conditions may restrict operation
- Should the regulators require an attendant to be on board while testing
- When is the vehicle ready to use without an attendant
- How do the users act or react when there isn't an attendant on board
- What if there is an emergency

Short term; single trip

Short term test

May be long distance to test different situations

Includes cars and large trucks

May include remote operator

May be publicized or may be completely unreported

May require a specific location to be restricted from other traffic

May require law enforcement escort

Depending on regulations in state, the testing may not require any notification to government officials

Short term; single trip

Short term; single trip

Short term; single trip

Challenges:

Depending on regulations in state, the testing may not require any notification to government officials

If notification required, government officials may receive very short notice and be required to react quickly

May be publicized or may be completely unreported

May require a specific location to be restricted from other traffic

May require law enforcement escort

Long term, in specific locations

- Many companies – established one or more locations to develop, test and operate in
- Traditional vehicle manufactures and tech companies
- Become part of the community
- Increases consumer awareness
- Specific Operation Design Domain (ODD)
- Potential for the ODD to expend

Long term, in specific locations

Long term, in specific locations

Challenges:

Operating among other vehicles

Mixed fleet for many years

Weather conditions may restrict operation

Should the regulators require an driver on board

When and under what circumstances can the vehicle test continue without a driver

What if there is an emergency

Police Interaction

Crash with other vehicle

Questions?