North Carolina: Open for Autonomy
AV’s are Here! NCDOT’s Autonomous Shuttle Project

Stephanie L. Sudano, P.E.
Multimodal Transportation Special Projects Engineer

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NCDOT is advancing emerging technology by piloting innovative transportation tools into communities to foster innovation.
Project CASSI

NC wants to position itself on the leading edge of transportation technologies

– driving economic growth
– attracting high tech industries
– producing research
– educating citizens
– innovating transportation solutions
Levels of Automation

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE) AUTOMATION LEVELS

0
No Automation
Zero autonomy; the driver performs all driving tasks.

1
Driver Assistance
Vehicle is controlled by the driver, but some driving assist features may be included in the vehicle design.

2
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.

3
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.

4
High Automation
The vehicle is capable of performing all driving functions under certain conditions. The driver may have the option to control the vehicle.

5
Full Automation
The vehicle is capable of performing all driving functions under all conditions. The driver may have the option to control the vehicle.
Why an AV shuttle is the best choice for NC’s first project:

• More vehicle run time at Levels 3 or 4 provides more research opportunities of vehicles operating almost entirely in autonomous mode
  – Increased learning about “vehicle to infrastructure” autonomy
  – More flexible to test different use cases
  – Lower speed “approachable”
  – Handles a group of people
  – Easy to get in/out of
  – Unique and appealing looking – increases educational opportunity
How CASSI Will Operate

• Route is pre-programmed, including stops
• Continuously reads and compares environment via LIDAR, RADAR, GPS
  – Reacts to changes in environment - pedestrians, vehicles, bicycles, etc.
  – Defaults to stop when a change recognized
  – If change resolves (goes away), CASSI will resume
  – If change does not resolve, operator takes CASSI out of AV mode and drives around the obstacle
Other Reasons for CASSI

- Connected, autonomous and electric vehicles are driving the future of transportation improvements
  - Safety improvements
  - Efficiency improvements
  - Accessibility for underserved populations
  - Infrastructure footprint reduction
  - Transition to a clean energy economy
Research

- NCDOT will partner with universities to gather data, to publish results, and to establish best practices for AV deployment:
  - V2I (Vehicle to Infrastructure) performance
  - Safety
  - Ridership
  - Public experience and perception
  - Benefits
  - Strengths and weaknesses of automated and connected technologies
Many Communities, Many Opportunities

- Opportunities for NCDOT and NC’s communities to test AV technology in various use cases
  - Rural, Urban communities
  - First/last mile solutions
  - Limited mobility solutions
  - Community circulators
  - Universities

- Two AV shuttles will be deployed over 24 months at various sites statewide
CASSI NC Project Delivery

Teams:

CASSI NC Transit Deployment Team
- NCDOT Division Leaders
- Crosscutting disciplines involved

CASSI NC Technical Oversight Team
- Small Internal Team
- Day to Day Oversight
- Technical Expertise

CASSI NC Community Deployment Teams
- Local leaders, city, town, and university leaders and staff members
Stakeholder Outreach, Engagement & Collaboration

- Other AV and Transit initiatives in NC
- Local Communities
- Universities
- Public Agencies
- Private Partners
- Other AV and Transit initiatives nationwide
CASSI NC Project Timeline

• Phase 1: Deploy into two communities
• Phase 2: CASSI NC Competition & Deployment additional deployments

Timeline:
• January 2020 NC’s CASSI Shuttles arrive
• February 2020 Deployment Phase 1
• January – February 2020 Phase 2 Competition
• July 2020 Deployment Phase 2
• January 2022 CASSI NC Deployment ends
How we got to where we are Today

• NC passed an FAV law in 2018
  – The law – in its most simple terms – was designed by legislators to make it easy to deploy FAV’s on NC’s roads
  – **BUT** technology is changing so fast that you don’t really know what the law needs to say
  – AV shuttles do not fit neatly into NHTSA’s vehicle regulations – unless they are imported from another country
  – NC’s “additional vehicle regulations” are in the way of forward progress

• With persistence, creativity, collaboration, and ingenuity NC is closing in on its first shuttle deployment
Challenges

- NC’s regulatory agencies and different interpretations of the law
- Reaching and engaging Communities
- Funding
- Logistics of Multiple Pilot Locations
- Short-term Deployments (4-6 months)
- Diverse Demographics
- Public Perception/Reception

- Who knows what else? This is NEW!
In addition to the CASSI project, we are also looking at recommending tweaks to the existing FAV legislation to more easily allow other deployments in North Carolina. The industry changes rapidly, so states need to stay engaged and informed on AV issues to be competitive.
Stephanie L. Sudano, P.E.
NCDOT Multimodal Special Projects Engineer
ssudano@ncdot.gov
919-707-2611