

# Autonomous Cooperative Control of Emergent Systems of Systems (ACCESS) Laboratory

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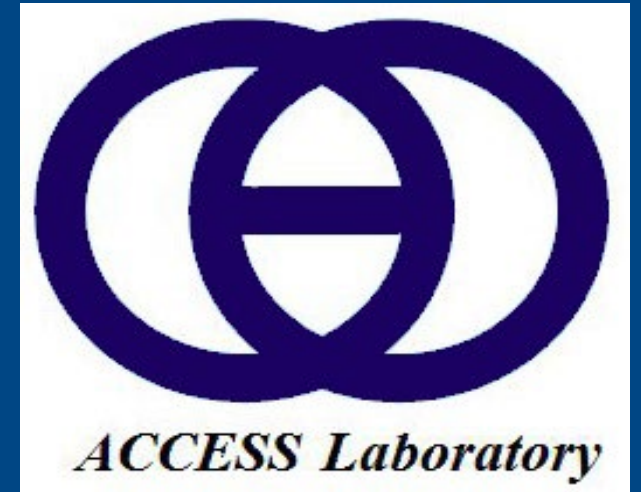
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## Autonomous Cooperative control of Emergent Systems of Systems (ACCESS) Laboratory

### Research Focus:

- Control and Robotics
- Human-machine Interactions
- Cyber-physical systems
- Multi-agent Systems
- Artificial Intelligence
- Reliability and Security

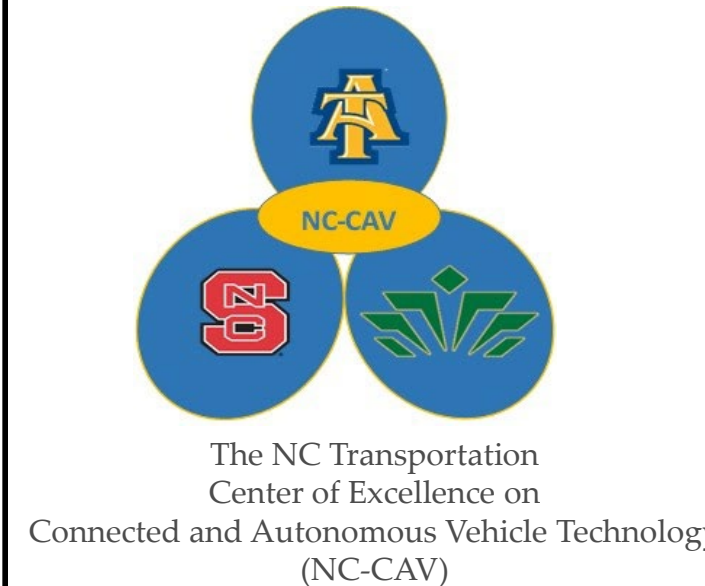
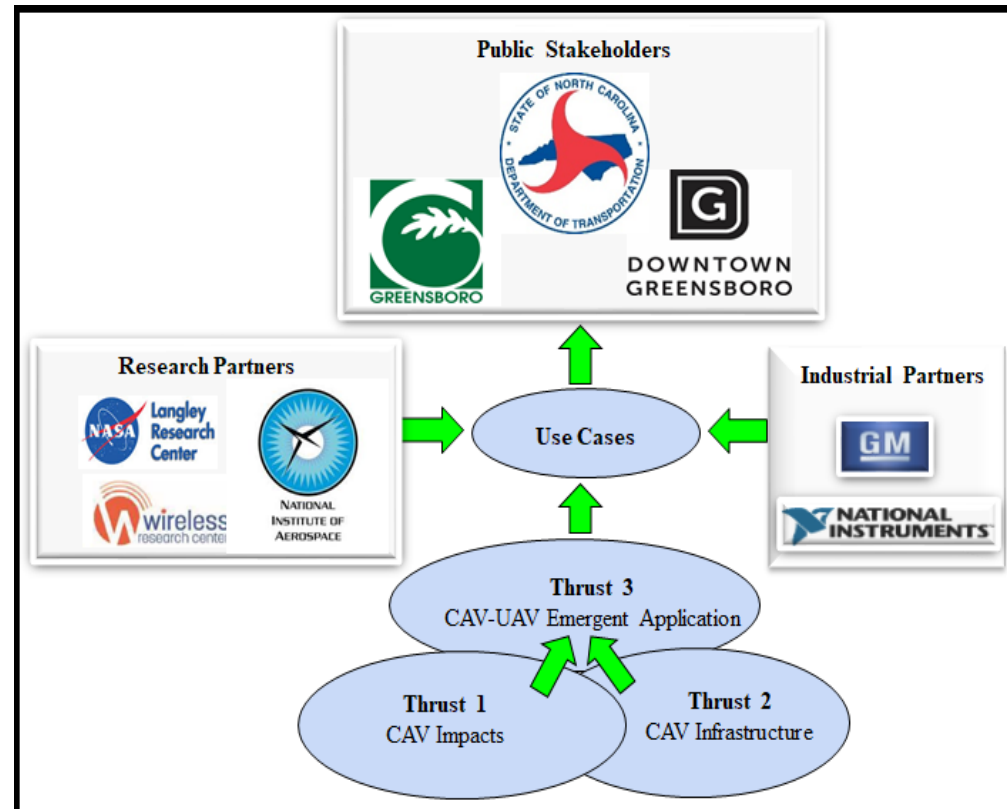
### Applications of Interest:

- Smart Transportation
- Self-driving cars
- Human-Autonomy
- Connected Vehicles
- Battlefield management
- Smart Agriculture



“NC-CAV Center of Excellence on Advanced Transportation Technology,” Sponsor: North Carolina Department of Transportation (NCDOT), 2020-2025.

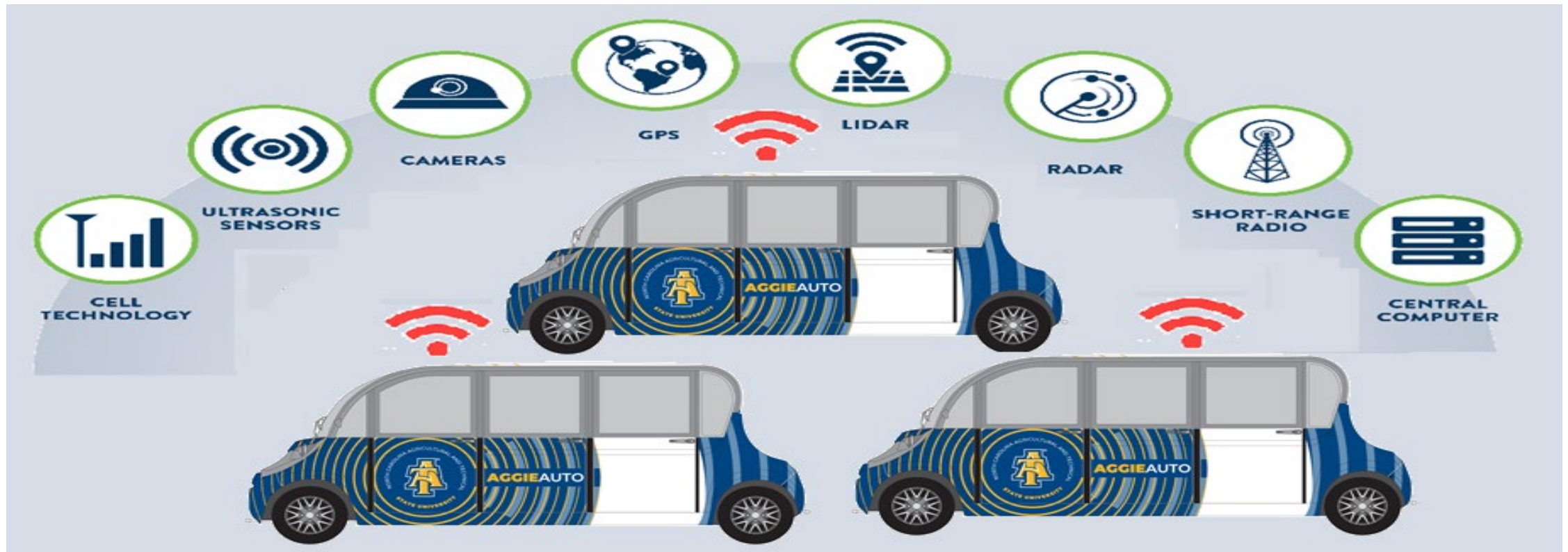
- **Thrust 1 (CAV Impacts)** investigates the impact of Connected and Autonomous Vehicle’s (CAV) on North Carolina’s transportation system and associated revenue.
- **Thrust 2 (CAV Infrastructure)** assesses North Carolina’s readiness for CAVs in traditional and emerging transportation infrastructure.
- **Thrust 3 (CAV Applications)** explores emerging applications of CAVs and develops CAVs and Unmanned Arial Vehicles (UAVs) for advancing transportation systems.







*“Developing and Operationalizing a Testbed of Connected Self-driving Shuttles to Test and Develop CAV Applications in North Carolina,”* Sponsor: North Carolina Department of Transportation (NCDOT), 2021-2023.





Center for Regional and Rural Connected Communities (CR<sup>2</sup>C<sup>2</sup>) was initially funded by Department of Transportation in 2023 for \$15M for 5 years. The consortium members will contribute \$15 million in matching funds, making the total investment in this project \$30 million.

The CR<sup>2</sup>C<sup>2</sup> will serve as the Region 4 (Southeast) University Transportation Center (UTC) charged with addressing transportation challenges within the southeastern region of the United States.





The first university research testbed of connected and autonomous self-driving shuttles!

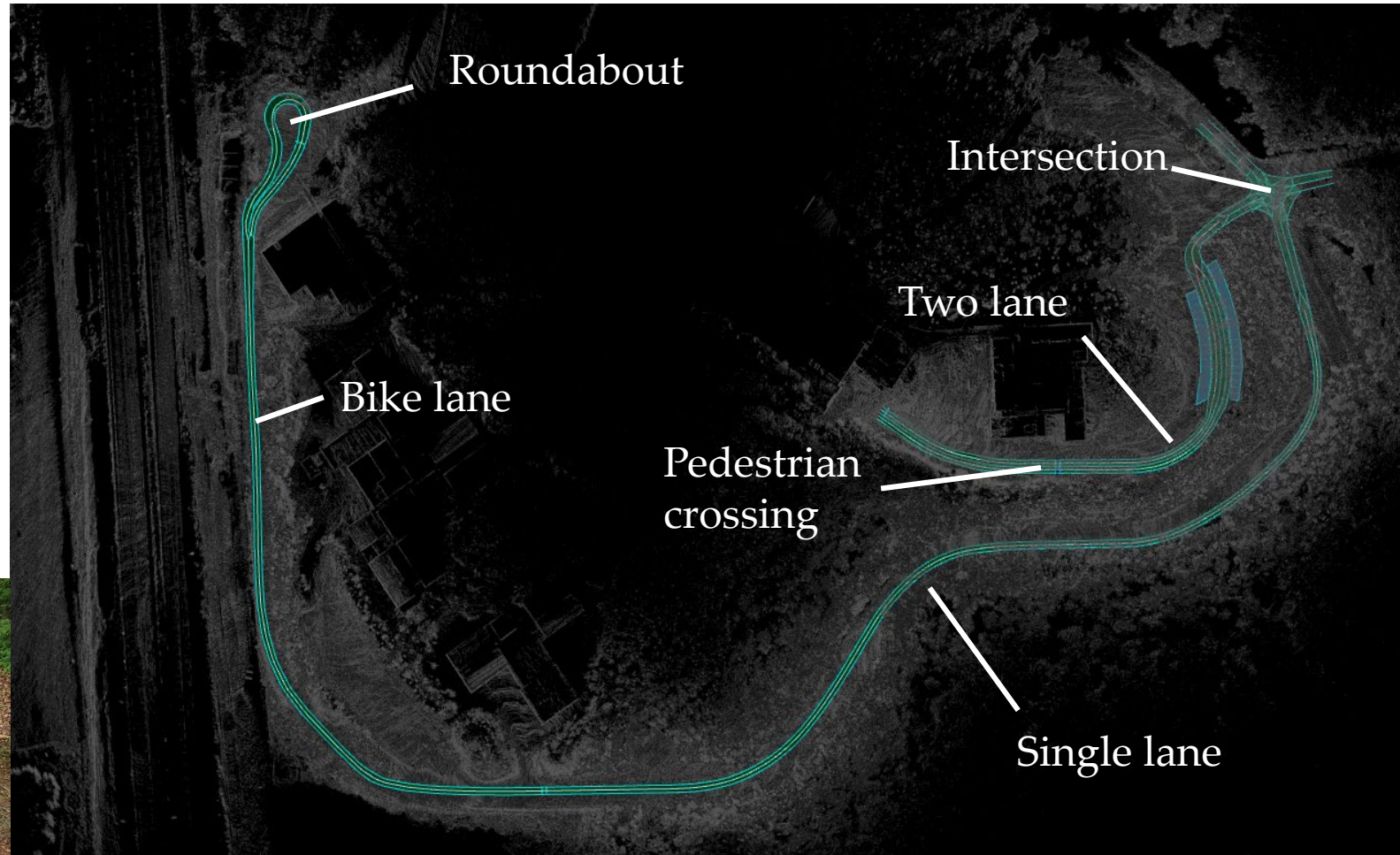






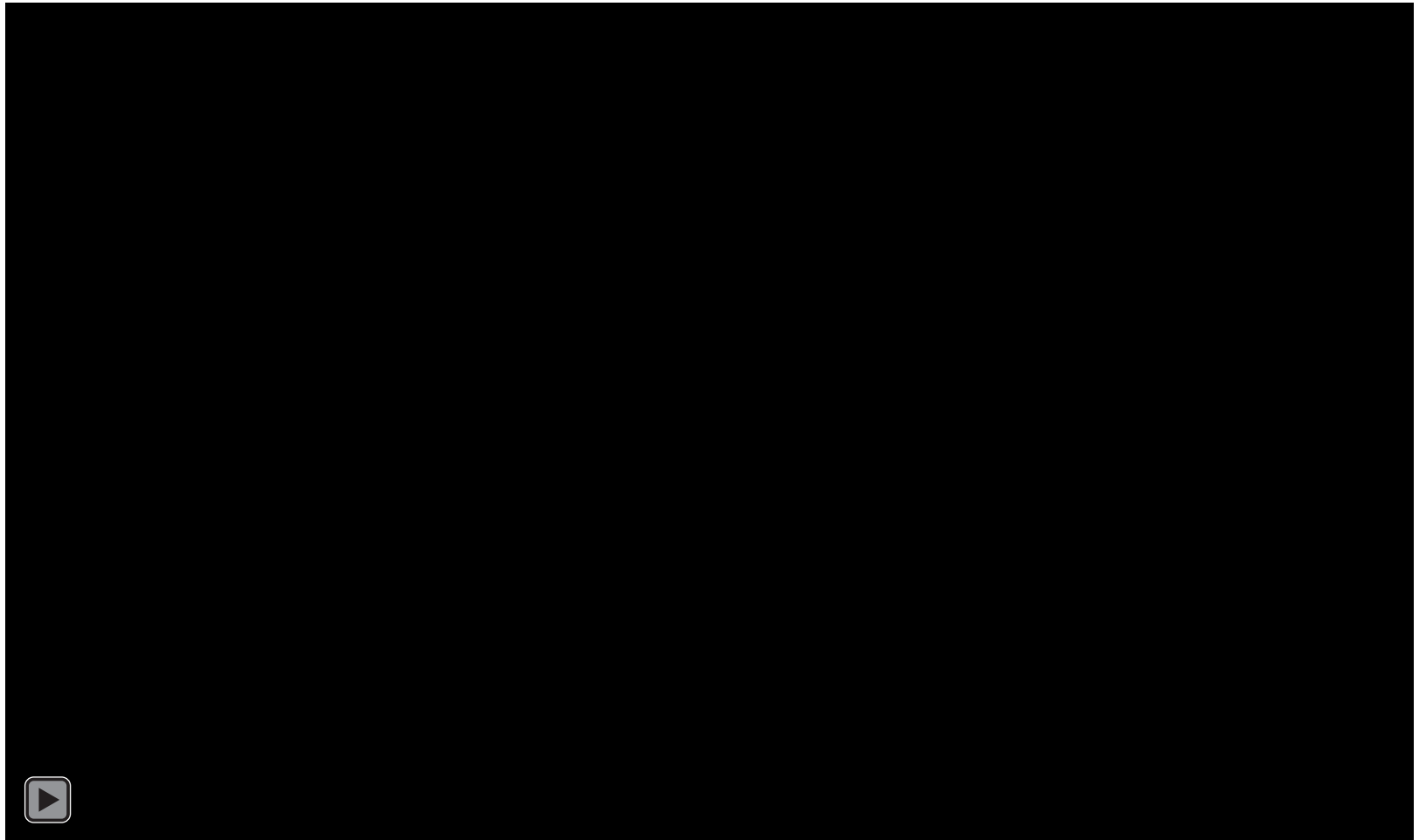


- Narrow road
- Steep Hills
- Forest environment
- Solid /Dash line
- Pedestrian Cross
- Roundabout
- Intersection
- Regulatory/Warning Signs
- Bicycle lane
- Bus stop
- Pedestrian crossing



One of the first nation's AV rural test track.







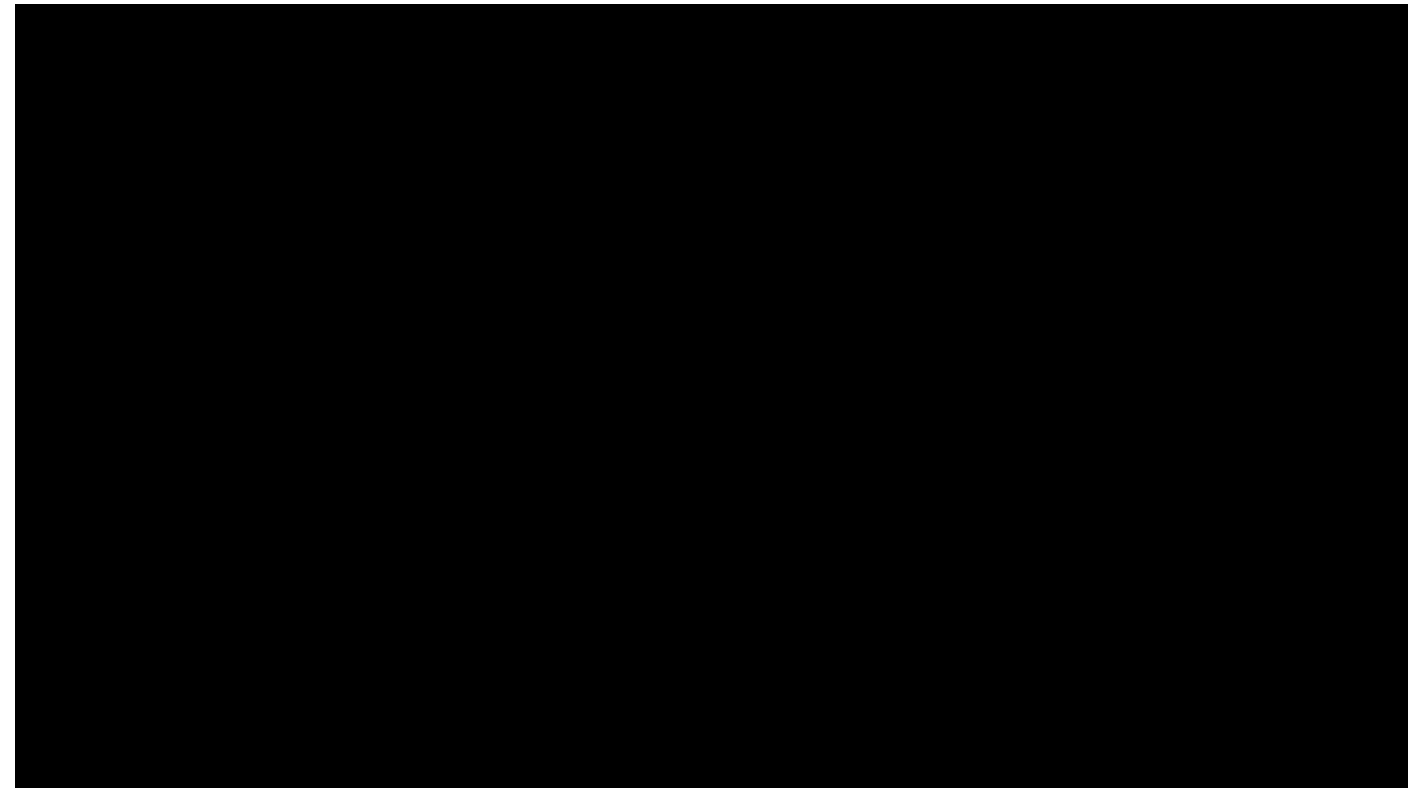
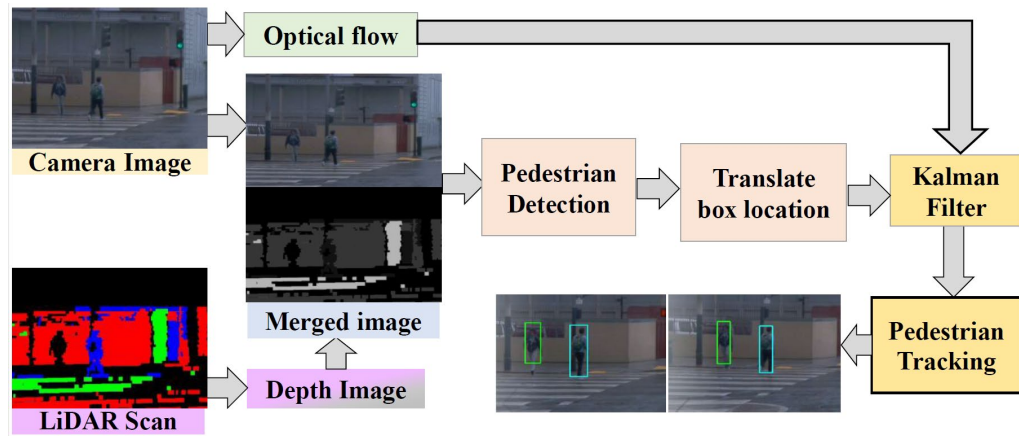




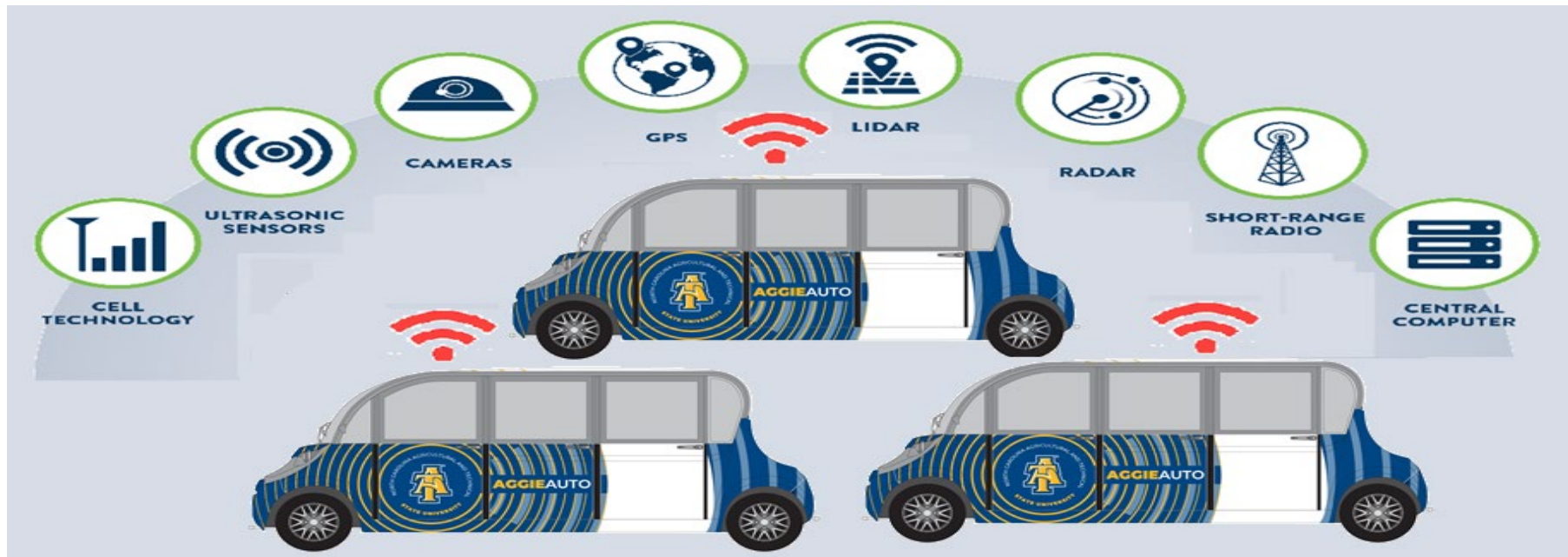
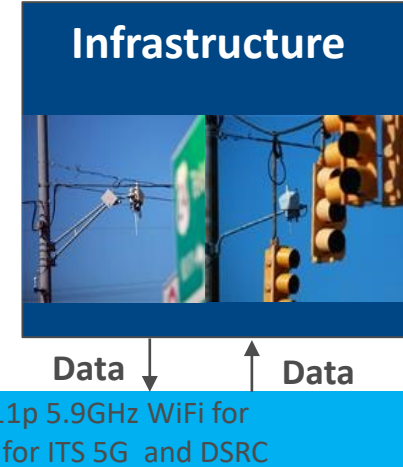
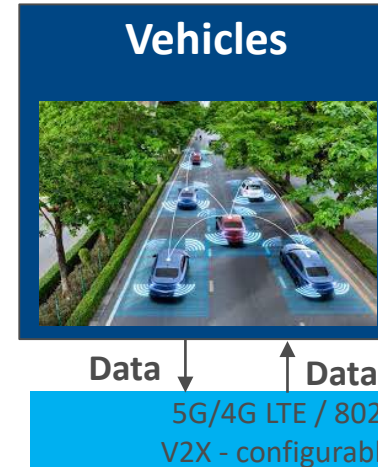
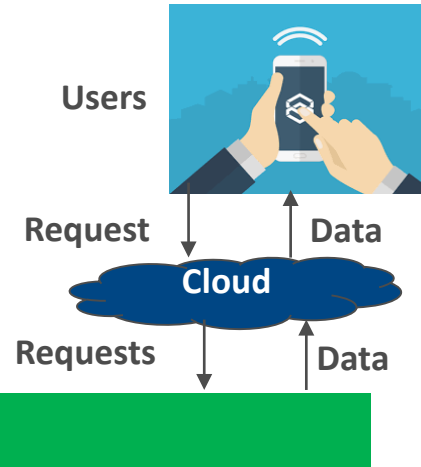
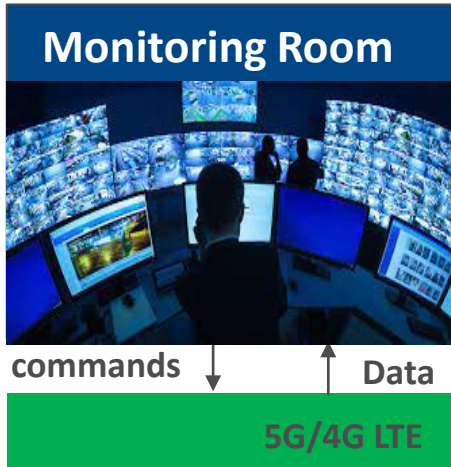
“Enhancing Autonomous Vehicle Traffic Safety through Pedestrian Detection, Classification and Communication,” Ford, 2021-2023.

**Objective 1:** Network fusion: We explore fusing different networks and inferences with manageable runtime overhead through parallel fusion mechanisms.

**Objective 2:** Edge acceleration: We explore the implementation of the developed networks on the RPI4B+, NVIDIA Jetson by achieving an optimized speed in network communication using edge computing, while maintaining IoT devices.







“Technology Transfer (T<sup>2</sup>): Microtransit Pilot Project in Greensboro, NC,” Sponsor: NCDOT, April 15, 2023- May 15, 2024.

Public Deployment Pilot Program: Sep 18-Oct 13; 11 AM to 1:00 PM

