

Research Needs

- Currently, there is a **significant lack of educational resources** tailored to equip engineering students with fundamental yet up-to-date knowledge of **emerging transportation technologies**.
- This project addresses this critical gap by developing a portfolio of virtual and interactive teaching platforms, named **ELET2: Engaged Learning Environment for Emerging Transportation Technologies**, to deliver emerging transportation technologies to undergraduate students.
- Using various techniques, such as **computer simulation**, **web/mobile-based interaction visualization**, and **gamification**, our platforms will cultivate **engaged learning environments** while nurturing a deeper understanding of the cutting-edge emerging transportation technologies.
- By integrating immersive learning experiences, our objective is to **elevate student engagement and foster a dynamic learning environment** for exploration and discovery.

Guiding Questions

- The **key research questions** of this research include:
 - 1) Identifying key emerging transportation technologies that warrant our immediate attention
 - 2) Designing teaching platforms that not only ensures accessibility for undergraduate students, but also effectively delivers the in-depth knowledge essential for the students to tackle future challenges
- To address these inquiries, our project focuses on **two promising emerging transportation technologies**: 1) **Connected and Automated Vehicles (CAVs)**, and 2) **Shared Mobility**.
- We introduce these technologies through the pivotal lenses of **system and infrastructure**, **human behavior**, and **transportation operation and safety**, facilitating a holistic understanding among learners.

Broader Impacts

- This research extends beyond the confines of academia, with broader impacts reaching into the realms of **K-12 education** and **diversity in STEM fields**.
- By establishing and promoting a **K-12 education pathway program**, we aim to inspire future generations of students to pursue careers in transportation engineering and related fields.
- Our research seeks to **train the next generation of transportation engineers**, especially those from **underrepresented groups** at Morgan State University, a Historically Black College and Universities (HBCU), and Old Dominion University, fostering innovation and inclusivity within the transportation field.
- Through collaboration, innovation, and a **commitment to diversity and accessibility**, we strive to equip students with the knowledge and skills necessary to **shape the future of transportation**.

Acknowledgement

This research is supported by the NSF Award (#2315450), titled Collaborative Research: ELET2: Engaged Learning Environment for Emerging Transportation Technologies.

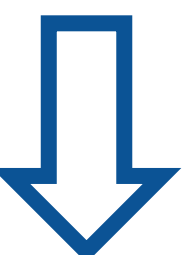
Preliminary Results

Modules on Connected and Automated Vehicles (CAVs) Learning

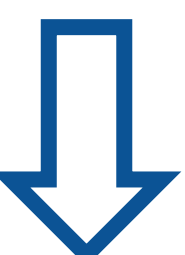
Microscopic

Teaching Modules

System and Infrastructure Module



Human Behavior Module

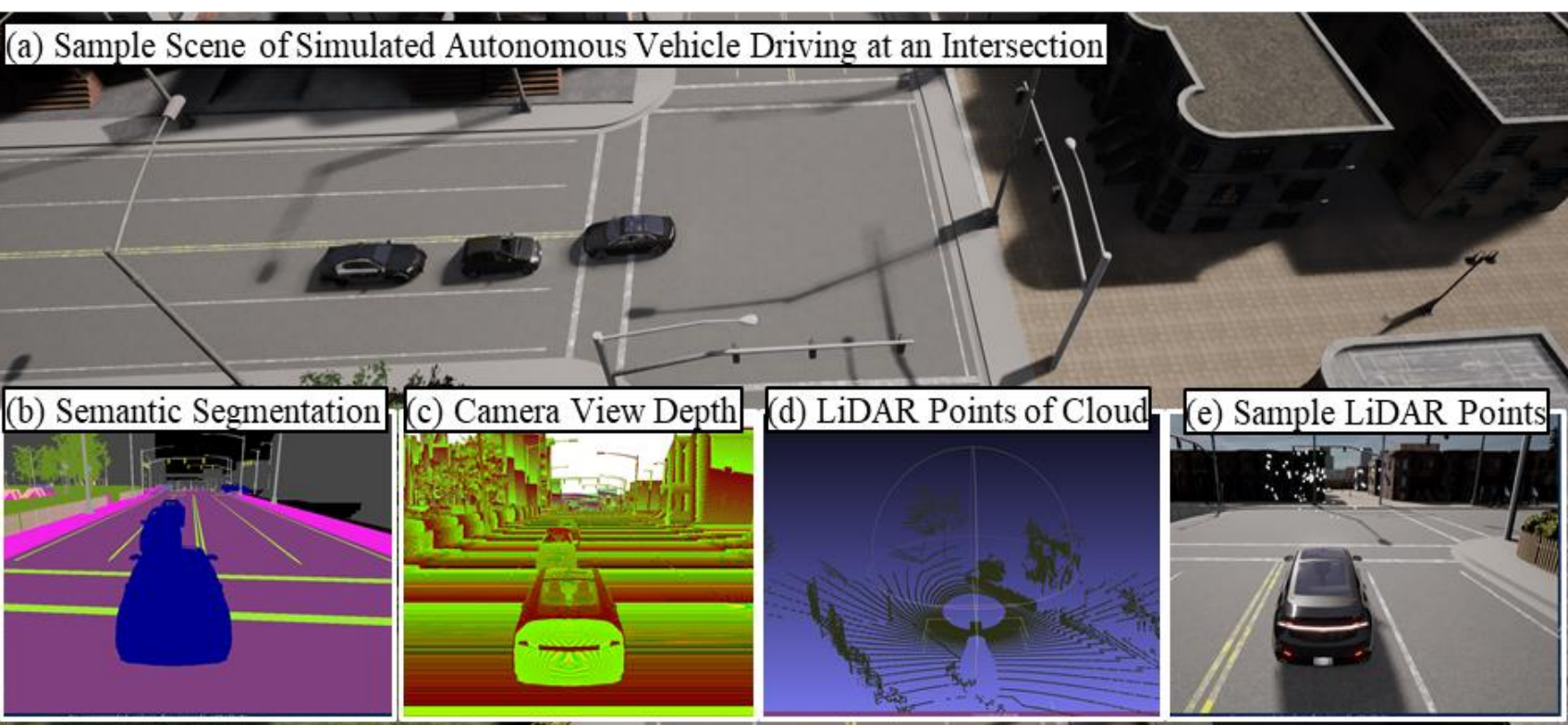
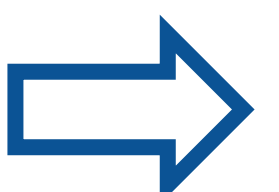


Traffic Operation & Safety Module

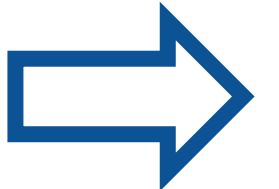
Macroscopic

Main Focuses

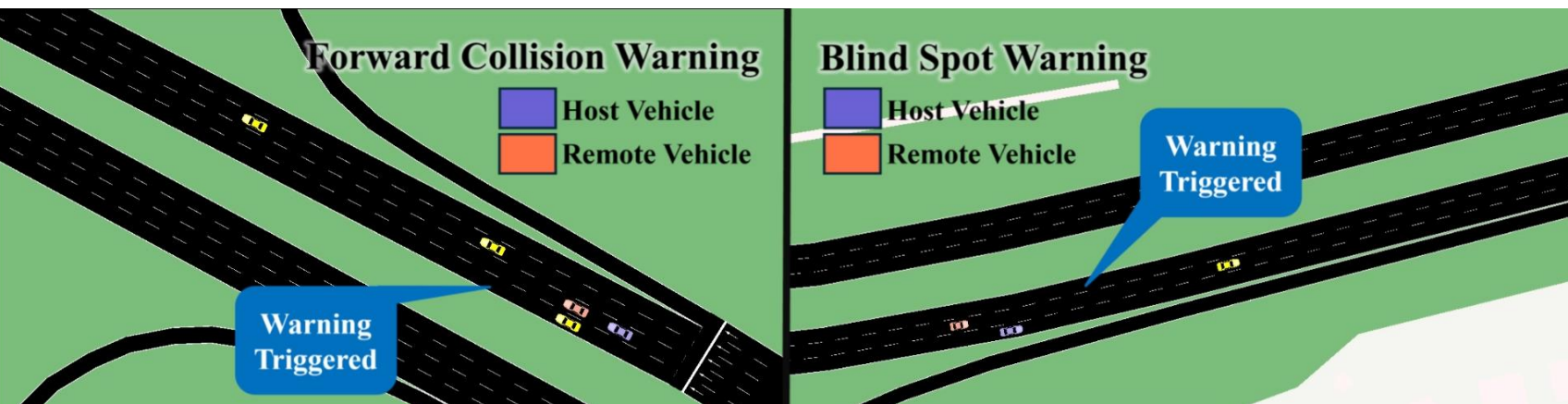
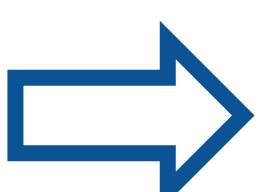
- Fundamental Building Blocks of CAVs



- Hands-on Driving Experience



- CAV Application Design
- Driver Response Behavior



Enabling Students to Learn through an Engaged Learning Environment

“What if I Change This?”



“Oh, I See What I Changed!”

