Support for the I-STREET™ (Implementing Solutions from Transportation Research and Evaluation of Emerging Technologies) Testbed

FDOT Project BED31-977-06

Task 10: Final Report

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16. Abstract

The University of Florida (UF) and its Transportation Institute (UFTI), the Florida Department of Transportation (FDOT), and the City of Gainesville (CoG) have partnered to create I-STREET™ (Implementing Solutions from Transportation Research and Evaluation of Emerging Technologies). The principal objective of the three partners in developing I-STREET™ is to make significant improvements to transportation safety and mobility. This project developed a research and infrastructure plan; engaged with industry and developed an industry outreach and engagement plan; engaged with the stakeholders and developed a plan for further outreach; and developed an educational plan. The plans in the document are based on the three pillars identified in the Florida Transportation Plan (FTP): economic development, innovation, and partnerships. After reviewing the state-of-the-art and consulting with FDOT and other stakeholders, the research team identified five focus areas for future research: Artificial Intelligence, Autonomous Connected Electric Shared (ACES) Vehicle Technologies, Privacy and Cybersecurity, Multimodal Transportation, and Smart and Resilient Transportation Infrastructure. The researchers also developed an industry outreach plan, a living document that employs strategic communications to foster relationships with transportation technology companies. The plan was developed through a Strengths-Weaknesses-Opportunities-Challenges (SWOC) analysis and recommends Key Performance Indicators (KPIs) for evaluation purposes. The research team engaged with companies through meetings, an industry showcase, and an industry partnership program. We also engaged with local agencies and other stakeholders and developed a public agency engagement plan to facilitate access of data, testing of equipment, and deployments of advanced technologies. Lastly, the team develop an education plan with outreach strategies targeting professionals, students, and K-12 students. This report provides an overview of the processes followed and the final products generated, which are a comprehensive strategic action plan for leveraging the I-STREET™ Living Lab to address mobility and safety challenges in Florida's transportation system.

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Executive Summary

The University of Florida (UF) and its Transportation Institute (UFTI), the Florida Department of Transportation (FDOT), and the City of Gainesville (CoG) have partnered to create I-STREET™ (Implementing Solutions from Transportation Research and Evaluation of Emerging Technologies). The principal objective of the three partners in developing I-STREET™ is to make significant improvements to transportation safety and mobility. I-STREET™ is a real-world transportation Living Lab with diverse technology installed and embedded in the transportation infrastructure on and surrounding the UF campus in Gainesville, Florida. It also includes an expanding set of diverse technology installed on segments of Interstate 75 (I-75) in Florida.

The mission of I-STREET™ is to provide a real-world environment to enable the development, testing, evaluation, and implementation of emerging technology solutions that will provide real and measurable transportation safety and mobility solutions for all roadway modes and users. The main goals of I-STREET™ are to improve safety and mobility locally and across Florida; to facilitate the development and implementation of advanced and emerging technologies that can improve safety and mobility; to foster collaboration with industry wishing to develop, test and implement their own technologies to improve safety and mobility; and to become a recognized national and global leader in the development and implementation of advanced technologies to improve transportation safety and mobility.

The objectives of this project were to (a) develop a research and infrastructure plan for expanding the functionality and usability of the I-STREET™ testbed; (b) engage with industry and other agencies for data sharing and for jointly developing and implementing advanced transportation technology products; (c) disseminate locally and nationally the capabilities of I-STREET™ to engage with a broader audience; and (d) develop an education and outreach plan for I-STREET™.

The plans in the document are based on the three pillars identified in the Florida Transportation Plan (FTP): economic development, innovation, and partnerships. The plans incorporated the feedback received by the research team during discussions held at the quarterly I-STREET™ stakeholder meetings.

Regarding the first objective, the research team collaborated with FDOT and other stakeholders to identify five major research areas and possible research project topics in those areas for the next decade. The six major research areas are: Artificial Intelligence, Autonomous Connected Electric Shared (ACES) Vehicle Technologies, Privacy and Cybersecurity, Multimodal Transportation, and Smart and Resilient Transportation Infrastructure. The plan developed capitalizes on existing resources to fill gaps in knowledge while contributing to the mission of I-STREET™ and its partners.

Regarding the second objective, the research team developed an industry outreach and engagement plan which focuses on strategic communications principles, aiming to establish and nurture relationships with transportation technology companies. The plan was developed through a Strengths-Weaknesses-Opportunities-Challenges (SWOC) analysis and recommends Key Performance Indicators (KPIs) for evaluation purposes. The final product is a living document that employs strategic communications to create awareness, build relationships, and achieve the plan's goals.

In addition to the development of the industry outreach and engagement plan, the research team engaged with industry stakeholders in three ways:

- *Meetings:* The research team had individual meetings with 26 companies. The objective of these meetings was to engage with industry and explore data sharing, deployments, and joint development of advanced transportation technology products.
- *Industry Showcases*: The research team organized an industry showcase, inviting over 80 transportation technology companies to submit abstracts. The overwhelming response led to a series of showcases that took place from January to April 2023. Each event focused on a theme (Data Platforms, Smart Sensors, Infrastructure and Vehicle Applications, and ACES). The showcases served as a platform for companies to provide FDOT and other agencies with insights into the capabilities and potential of emerging transportation technologies.
- *Industry Partnership Program:* The UFTI launched the I-STREET™ industry program in October 2023 with five founding partner companies. This partnership aims to establish collaboration and partnerships between the institute and companies serving the transportation technology sector.

Regarding the third objective, the research team developed a plan to identify, communicate with, and engage with public agencies to access I-STREET™ data, test equipment in a real-world setting, and deploy technology and products developed and tested at the I-STREET™ Living Lab.

Regarding the fourth objective, the research team developed an education and outreach plan for I-STREET™. Through an extensive literature review and a series of interviews, the researchers outlined a list of priorities related to education and outreach considering federal, state, and local needs. Feedback from FDOT and other stakeholders was incorporated in the identification of priorities. The plan categorized the I-STREET™ audiences into three groups: transportation professionals, undergraduate and graduate students, and K-12 students. A list of recommended actions was provided to address the educational needs of each of these groups.

In summary, this report provides a comprehensive strategic action plan for I-STREET™ considering research activities and infrastructure, industry engagement, other stakeholder engagement, and educational activities to help address the mobility and safety challenges in Florida's transportation system using emerging technologies. This document is intended to serve as a living document which is updated based on evolving needs, priorities, and technological advancements.

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SYMBOL	WHEN YOU KNOW	MULTIPLY BY	TO FIND	SYMBOL
LENGTH				
In	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
mi	miles	1.61	kilometers	km
VOLUME				
gal	gallons	3.785	liters	L
ft^3	cubic feet	0.028	cubic meters	m^3
MASS				
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	metric ton	Mg

List of Acronyms

ACES:	Automated, Connected, Electric, and Shared vehicles
ADAS:	Advance Driver Assistance System
ADS:	Automated Driver System
AI:	Artificial Intelligence
AMPO:	Association of Metropolitan Planning Organizations
AV:	Autonomous Vehicle
CAV:	Connected Automated Vehicle
CARMA:	Cooperative Automation Research Mobility Applications
CDS:	Curb Data Specification
CoG:	City of Gainesville
DSRC:	Dedicated Short-Range Communication
FAA:	Federal Aviation Administration
FAU:	Florida Atlantic University
FAV:	Florida Automated Vehicles
FCAV:	Ford Center for Autonomous Vehicles
FHWA:	Federal Highway Administration
FIU:	Florida International University
FDOT:	Florida Department of Transportation
FTA:	Federal Transit Administration
FTP:	Florida Transportation Plan
GLOSA:	Green Light Optimized Speed Advisory
I-75:	Interstate 75
ICV:	Intelligent and Connected Vehicle
I-STREET™:	Implementing Solutions from Transportation Research and Evaluation of Emerging Technologies
IVP:	Infrastructure and Vehicle-to-Pedestrian
KPI:	Key Performance Indicator

Lidar:	Light Detection and Ranging
MaaS:	Mobility as a Service
MDS:	Mobility Data Specification
MoU:	Memorandum of Understanding
MPO:	Metropolitan Planning Organizations
MPOAC:	Metropolitan Planning Organization Advisory Council
NSF:	National Science Foundation
NYCDOT:	New York City Department of Transportation
OBU:	Onboard Units
ODOT:	Oregon Department of Transportation
ROI:	Return of Investment
RIO:	Real-time Intersection Optimizer
RSU:	Roadside Unit
STRIDE:	Southeastern Transportation Research, Innovation, Development, & Education
SWOC:	Strengths, Weaknesses, Opportunities, and Challenges
TBMO:	Tampa Bay Mobility Alliance
TERL:	Traffic Engineering Research Lab
TPO:	Transportation Planning Organizations
UCF:	University of Central Florida
UF:	University of Florida
UFTI:	University of Florida Transportation Institute
UM:	University of Michigan
UTA:	University of Texas Arlington
UTC:	University Transportation Center
USDOT:	United States Department of Transportation
USF:	University of South Florida
V2I:	Vehicle-to-Infrastructure
V2V:	Vehicle-to-Vehicle

V2X:	Vehicle to Everything
VDOT:	Virginia Department of Transportation

1. Project Background

The University of Florida (UF) and its Transportation Institute (UFTI), the Florida Department of Transportation (FDOT), and the City of Gainesville (CoG) have partnered to create I-STREET™ (Implementing Solutions from Transportation Research and Evaluation of Emerging Technologies). The principal objective of the three partners in developing I-STREET™ is to make significant improvements to transportation safety and mobility.

The primary goal of I-STREET™ is to develop, deploy, and evaluate advanced technologies and make improvements to the transportation system to increase safety and mobility for all users. The vision and mission statements for I-STREET™ are:

- **Vision:** Become the leading global Living Lab for mobility and safety innovators.
- **Mission**: To provide a unique ecosystem for the collaboration, research, testing, and market delivery of innovative mobility and safety solutions that scales to urban and rural regions around the world.

Since 2017, the I-STREET™ program has grown significantly (key statistics are shown in Table 1).

Table 1: I-STREET™ Key Statistics Summary

$10M+ Invested in I-STREET™ research, education, and outreach activities	~$1.6M Annual research expenditures related to I-STREET™	10+ Industry partners engaged with testing at I-STREET™
75+ Industry partners engaged in I-STREET™ activities	15+ UF faculty and students engaged in I-STREET™ activities	1 Full-time staff working on I-STREET™ activities
200+ Miles of roadway networks instrumented	1 Education and training programs developed by the UFTI	1863 Transportation professionals trained by the UFTI annually

The mission of I- STREET is to provide a real-world environment to enable the development, testing, evaluation, and implementation of emerging technology solutions that will provide real and measurable transportation safety and mobility solutions for all roadway modes and users. The main goals of I-STREET™ are to improve safety and mobility locally and across Florida; to facilitate the development and implementation of advanced and emerging technologies that can improve safety and mobility; to foster collaboration with industry wishing to develop, test and implement their own technologies to improve safety and mobility; and to become a recognized national and global leader in the development and implementation of advanced technologies to improve transportation safety and mobility.

The following elements are part of the I-STREET™ infrastructure:

- More than 130 Roadside Units (RSUs)
- More than 80 On-Board Units (OBUs) on UF fleet vehicles, the CoG vehicles, and FDOT vehicles around Gainesville, FL
- Research Autonomous Vehicles (AV) – NaviGATOR (1), Gainesville Autonomous Shuttle
- Custom Instrumentation developed and/or acquired through research projects at the UFTI
    - Dedicated short-range communication (DSRC) equipment (Cohda Mk5 radios, Mobilemark Antennas)
    - Smartmicro 2D and 3D Radars
    - Econolite Autoscope Vision camera
    - Real-time Intersection Optimizer (RIO) Software Program
- Other Equipment
    - Mobileye Shield+ – Advanced Driver Assistance System (ADAS) on RTS Transit buses
    - Bike Rack Sensors on RTS transit buses
    - Eye Trackers
    - Fisheye cameras
    - Smartphone Applications

Several automated and connected vehicle technologies are being tested on the I-STREET™ road network. An autonomous shuttle service was deployed in downtown Gainesville and evaluated by UF researchers. Another AV associated with I-STREET™ and used in research experiments includes the NAVIGator, an AV developed at UF.

I-STREET™ has created a data hub that allows for a cost-effective way to synthesize a variety of data and share performance metrics with stakeholders. Planned uses include a variety of predictive analytics, decision support systems, and dashboard applications.

Most of the research and deployment on the I-STREET™ open road network is undertaken through projects funded by the US DOT (through the Southeastern Transportation Research, Innovation, Development, & Education (STRIDE) Center, which is the UFTI's grant-funded Region 4 - Southeast), the FDOT, the National Science Foundation (NSF), UF, and the CoG.

1.1 Project Objectives

The objectives of this project are to:

- Develop a research and infrastructure plan for expanding the functionality and usability of the I-STREET™ testbed, capitalizing on industry engagement
- Engage with industry and other agencies for data sharing and for jointly developing and implementing advanced transportation technology products
- Disseminate locally and nationally the capabilities of I-STREET™ to engage with a broader audience
- Develop an education and outreach plan for I-STREET™

The research team engaged several stakeholders (FDOT, CoG, industry partners, and academia partners) through quarterly meetings to maximize the impacts and benefits of I-STREET™. In the remainder of this

report, Chapter 2 discusses the research and infrastructure plan, while Chapter 3 summarizes the industry outreach plan. Chapter 4 provides an overview of meetings with industry throughout this project, while Chapter 5 discusses the industry showcase events. Chapter 6 summarizes the public agency outreach plan and Chapter 7 discusses the process used for developing data agreements with industry partners and public agencies. Chapter 8 provides the education plan, and Chapter 9 presents the overall strategic plan for I-STREET™ which is based on the research during previous tasks. Chapter 10 provides a summary of the project along with conclusions and recommendations.

2. Development of Research and Infrastructure Plan

This chapter details the development of the research and Infrastructure plan and provides recommendations for next steps. The plan is based on an extensive review of the state-of-the-practice as well as consultations with various FDOT offices. The long-term plan developed prioritizes research and infrastructure needs based on safety and mobility priorities.

2.1 Review of the State of Practice

With increasing research interest in AV and CAV, several research efforts have been established and deployed worldwide, involving national agencies, state DOT and local agencies, private industry, and universities and research centers. The research covers fields in vehicle, infrastructure, and human factors. Funded by different grant sources, their projects focus on automated trucks, cars, transit, Artificial Intelligence (AI), Vehicle-to-Vehicle (V2V), Vehicle to Infrastructure (V2I), safety, driver behavior, cybersecurity, sensors, data analytics, and related topics.

Around the U.S., several projects have been developed to support vehicle automation. Many of these are funded by the US and state DOTs with university participation. For example, the Federal Highway Administration (FHWA) provides leadership in the safe development, testing, and deployment of AV technology, including CAV research and cooperative driving automation (CDA). Important projects supported by FHWA include Work Zone Data Exchange (WZDx), Cooperative Automation Research Mobility Applications (CARMA), Vehicle Platooning, and Eco-Approach and Departure. The Intelligent Transportation Systems Joint Program Office (ITS JPO), within the Office of the Assistant Secretary for Research and Technology (OST-R), also supports several research efforts focusing on high-priority areas, including Emerging and Enabling Technologies, Data Access and Exchanges, ITS Cybersecurity Research, Automation, ITS4US, and Accelerating ITS Deployment. With expertise in regulatory, policy, and institutional barriers to deploying AVs, the U.S. DOT Volpe Center has been working on automated transit buses and impact of AVs. The Federal Motor Carrier Safety Administration (FMCSA) also leads several projects on improving the safety of motor carrier operations and commercial motor vehicles and drivers.

State DOT and local agencies also lead AV and CAV projects. The New York City Department of Transportation (NYC DOT) has been working on Connected Vehicle (CV) projects with focus on V2V, V2I, and Infrastructure and Vehicle-to-Pedestrian (IVP) communications. The Virginia Department of Transportation (VDOT) is investing in CAV deployments and preparing Virginia's roadways for CAVs with their CAV test facility. CALTRANS has been continuously working with PATH at UC Berkeley to construct and update CAV test beds in California. There are now 16 test beds operating in California for applications such as Cooperative Intersection Collision Avoidance Systems (CICAS) and Multi-Modal Intelligent Traffic Signal Systems. Other agencies leading AV and CAV projects include Oregon Department of Transportation (ODOT), Pennsylvania Department of Transportation, Michigan Mobility Collaborative – City of Detroit, Contra Costa Transportation Authority, Maricopa County ADOT – MCDOT, Wyoming DOT, CCTA and GoMentum Station.

Universities and research centers have also been contributing to research on AV and CAV, with grants from the US DOT, state DOTs, and industry. Projects led by these universities and research centers cover all areas of AV and CAV research, including perception, control, and motion planning for AVs, as well as

safety, human factors, V2V/V2I, transit, and cybersecurity. For example, the University of Michigan (UM) and Ford Motor Company have partnered to form the UM & Ford Center for Autonomous Vehicles (FCAV) to accelerate AV research on perception, control, planning for level-4 self-driving cars, sensor effects, trajectory prediction, aware risk assessment, and pedestrian perception. UF and the CoG have partnered to create a Living Lab that includes smart infrastructure on the UF campus and surrounding highway network. The testbed deploys and evaluates numerous advanced technologies including CAV, smart devices, and sensors. Other prominent universities and research centers include Texas A&M, University of Iowa, Virginia Polytechnic Institute and State University, Maine University, Stanford University, University of Illinois Chicago, UC Berkeley, University of Alabama, The Ohio State University, Mobility 21 at Carnegie Mellon University, Argo AI Center at MIT, Toyota-CSAIL Joint Research Center at MIT, and University of Minnesota.

FDOT is supporting several projects related to AV and CAV. For example, the I-75 FRAME (Florida's Regional Advanced Mobility Elements) project evaluates the communication between devices and compatibility with existing infrastructure to ensure interoperability of applications. The main research centers and institutions in Florida include UF, the Ultimate Urban Circulator (U2C), Central Florida Autonomous Vehicle Proving Ground, University of South Florida – CUTR, SunTrax, FIU - Lehman Center for Transportation Research, University of Central Florida.

As AV and CAV are emerging globally, there are numerous international research centers and agencies in Europe (e.g., BMW Group, C-ITS, C-Roads, Co-AT, Drive C2x, ARCADE), China (e.g., National Intelligent and Connected Vehicle (ICV) Testing Demonstration Base, National Innovation Center of Intelligent and Connected Vehicles, Tsinghua University), Singapore (e.g., Centre of Excellence Testing and Research of Autonomous Vehicles, Nanyang Technological University), and Korea (e.g., KAIST and Seoul National University). Funded by local authorities and companies, their projects cover various topics including infrastructure, AVs, human factors, sensors, cybersecurity, and so on.

2.2 I-STREET™ Living Lab: Foundation and Pillars Toward Enabling Mobility and Safety Innovation

To become the leading global Living Lab for mobility and safety innovators, I-STREET™ is based upon the solid foundation of the Florida Transportation Plan (FTP), the single overarching plan guiding Florida's transportation future. FTP is updated every five years with the collaboration of state, regional, and local transportation partners in the public and private sectors. Based on the foundation of FTP, I-STREET™ has three major pillars: economic development, innovation, and partnerships.

With the support of FTP and the three pillars, I-STREET™ is committed to delivering world-class research, collaborating broadly with public and private partners, testing, and evaluating a wide range of smart transportation technologies, and paving the way for their market delivery, to enable mobility and safety innovation (Figure 1).

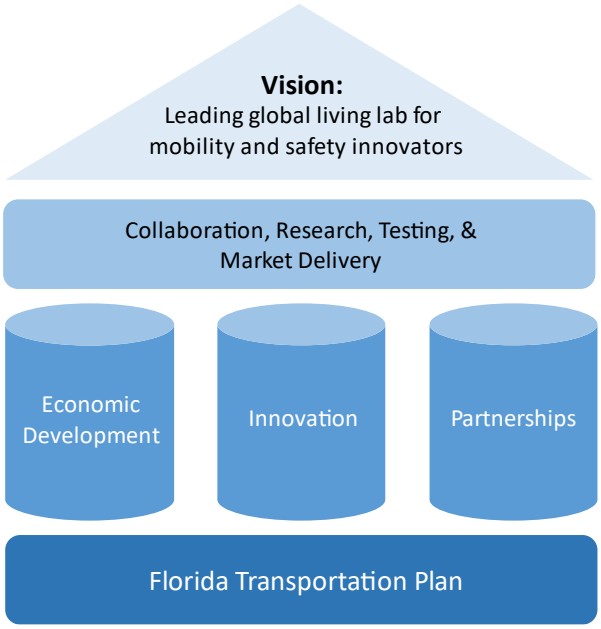

Figure 1: Overview of I-STREET™ Foundation and Pillars

2.3 I-STREET™ Research Clusters, Intermediate Products, & Ecosystem for End-to-End Mobility and Safety Innovation

In the past six years, I-STREET™ has developed and/or tested a wide range of technologies on Florida's highways. Particularly, I-STREET™ has deployed and tested new technologies, such as autonomous shuttles, CVs and their communication with the infrastructure, radar, lidar, and other sensors, it has developed signal control optimization algorithms to leverage CAV capabilities, it has developed new sensors for bike racks on buses and has been working to improve the safety of bicyclists and pedestrians.

Based on the existing work and inputs from the FDOT and private partners across the country, I-STREET™ has identified five major research clusters: AI and Data Analytics, ACES Vehicle Technologies, Privacy and Cybersecurity, Multimodal Transportation, and Smart and Resilient Transportation Infrastructure (Figure 2).

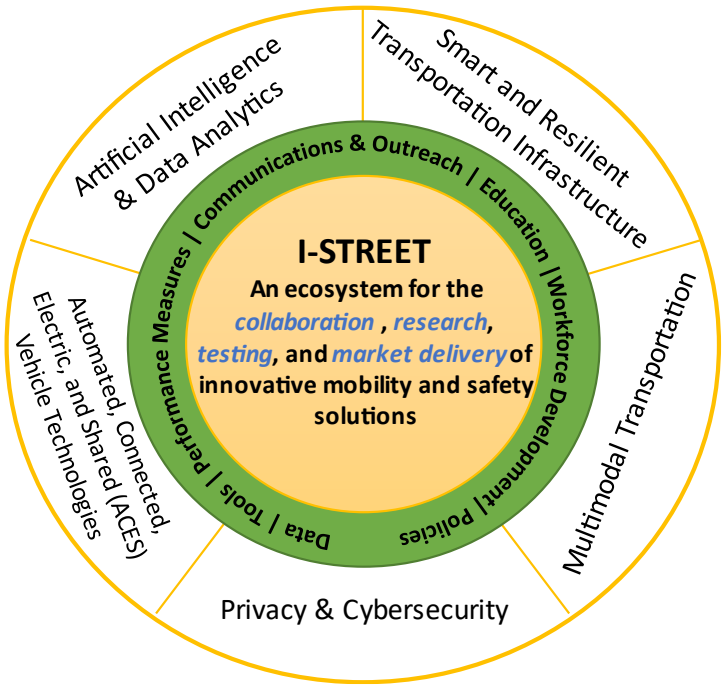

Figure 2: Overview of I-STREET™ Research Clusters, Intermediate Products, and Ecosystem

AI and Data Analytics are powerful tools that are increasingly being used in transportation research. AI refers to the use of algorithms and machine learning techniques to simulate human intelligence and automate tasks, while data analytics involves the use of statistical analysis and data mining techniques to generate insights from large datasets. AI and Data Analytics can be used to identify and predict traffic patterns, optimize route planning, enhance vehicle safety, guide policy making, and develop CAV. AI and Data Analytics will play an increasingly important role in improving the efficiency, safety, and sustainability of transportation systems.

ACES Vehicle Technologies are the latest innovations that drive the development of a new generation of vehicles. AVs use a combination of sensors, cameras, and algorithms to operate autonomously without human intervention. CVs use wireless communication technology to communicate with other vehicles, infrastructure, and the internet to improve safety, reduce congestion, and provide drivers with real-time information. Electric vehicles are powered by electricity and emit zero emissions, making them a more environmentally friendly option. Shared vehicles are designed to be shared by multiple users, reducing the need for individual ownership. These technologies are improving the efficiency and safety of transportation systems, reducing the environmental impact of transportation, and providing new opportunities for innovation and growth in the transportation industry.

Privacy and Cybersecurity research aims to protect transportation systems from cyber-attacks thus protecting the travelers' personal data. Privacy and Cybersecurity research involves identifying potential vulnerabilities in the vehicle's software and hardware systems and developing strategies to prevent and mitigate cyber-attacks. This includes protecting the vehicle's communication systems from unauthorized access or tampering, ensuring the integrity of the vehicle's software and data, and preventing malicious attacks that could cause the vehicle to malfunction or lose control. Privacy and Cybersecurity are critical

aspects of automated vehicle research that must be considered throughout the entire development and deployment process.

Multimodal Transportation refers to the use of integration of multiple modes of transportation, such as cars, buses, trains, and bicycles, to move people and goods from one place to another. By encouraging the use of different modes of transportation, multimodal transportation can help to reduce congestion on roads, highways, and other transportation infrastructure. It can also provide individuals with greater flexibility for getting around and save money on transportation costs. Multimodal transportation can also help to improve access to goods and services, particularly in areas where transportation infrastructure is limited. Research on Multimodal Transportation is important to improve performance and equity of transportation system (e.g., providing access to transportation for low-income individuals, reducing disparities in transportation access across different communities), and help policymakers, transportation planners, and other stakeholders to allocate resources and develop effective transportation policies.

Smart and Resilient Transportation Infrastructure involves the integration of various technologies, including sensors, communication networks, and data analytics, to monitor and manage transportation infrastructure in real-time. This can help to detect and address potential problems before they escalate into major issues, improving safety and reducing the need for costly repairs. It can also help to optimize transportation systems by improving traffic flow, reducing congestion, and providing real-time information to users. In addition, Smart and Resilient Transportation Infrastructure research designs infrastructures that quickly withstand and recover from disruptive events such as natural disasters, accidents, or cyberattacks, improving the safety and reliability of transportation networks.

These five research clusters will generate a suite of intermediate products, including data, tools, performance measures, communications and outreach, education, workforce development, and policies. The research clusters and corresponding intermediate products will ultimately contribute to the realization of I-STREET™'s mission, i.e., to provide a unique ecosystem for the collaboration, research, testing, and market delivery of innovative mobility and safety solutions that scales to urban and rural regions around the world as shown in Figure 1.

2.4 I-STREET™ Research and Infrastructure Plan

The research team proposes a list of research topics (along with their proposed schedule) under each research cluster based on the inputs from several FDOT offices (including Safety Office, Rail and Transit Office, Construction Office, Maintenance Office, and Traffic Operations Office), as shown in Table 2.

The advancements in AI have resulted in better perception software for vehicle and pedestrian detection. Research needs in this area include developing standards for pedestrian detection devices, review of how "near-misses" are defined, measured, and applied in the emerging technology companies. Probe vehicle data is currently provided by several companies with varying degrees of granularity, research is needed to understand the reliability and applicability of such data.

There have been several models of automated driving deployments by turn-key automated mobility providers such as Beep, May Mobility etc. These range from fixed route autonomous shuttles to autonomous taxis or ride sharing services. Research is needed to evaluate various automated solutions being offered under Mobility as a Service (MaaS) models and identify appropriate use cases for each of

these models. Additionally, alternative fuel buses are gaining popularity and being adopted across the state, but it remains largely unknown how to safely implement these alternative fuel vehicles on road.

Table 2: Schedule of Planned Projects

Project	2024	2025	2026	2027	2028
AI and Data Analytics					
- Database and video analytics for mobility and safety applications	■	■			
- Near-miss detection for pedestrians and bicyclists	■	■			
- Eco freight signal priority		■	■		
- AI for pavement evaluation and maintenance		■	■		
- Real-time congestion monitoring, prediction, and mitigation			■	■	
- Urban, suburban, and rural transportation digital twin			■	■	■
- Use of probe vehicle data for traffic evaluation			■	■	■
ACES Vehicle Technologies					
- Automated shuttle pilot and full-scale deployment	■	■	■	■	■
- Safe implementation for alternative fuel buses	■	■	■		
- Connected vehicles for smart work zones	■	■	■		
- In-vehicle alert systems for vulnerable road user safety		■	■	■	
- Use of “Cooperative Perception” to improve road user safety		■	■	■	
Privacy and Cybersecurity					
- Infrastructure cybersecurity			■	■	■
- User privacy			■	■	■
Multimodal Transportation					
- Mobility hub planning and operations	■	■			
- Design of transit driver user interface	■	■			
- Transit-oriented communities	■	■	■	■	■
- Multi-modal systems with rail, freight, and airport infrastructure		■	■	■	■
- Applications of drones in delivery, emergency assistance etc.		■	■		
- Use of current connected vehicle deployments to assist truck operations on freeways		■	■		
Smart and Resilient Transportation Infrastructure					
- Emergency response planning and real-time management	■	■	■		
- Sensor technology	■	■	■	■	■
- Smart urban curb management			■	■	■
- Infrastructure monitoring, evaluation, and maintenance		■	■	■	■
- Signal control optimization and other methods to address traffic congestion on freeway interchanges	■	■	■		

Research is needed to assess potential vulnerabilities and design and deploy efficient defense strategies to protect the security and safety of critical V2X infrastructures such as the I-STREET™ infrastructure and AVs, from adversaries with capabilities to inject false data using (1) malicious network messages, and (2) specially crafted physical perturbations (e.g., electromagnetic interferences, light, and acoustic waves) to manipulate sensors used by infrastructure and vehicles. These maliciously altered data can severely affect close-loop control algorithms and AI-based prediction models’ outcomes, which can cause incorrect traffic signal planning decisions, create false traffic congestion, eavesdrop on sensitive information, and generate dangerous vehicle maneuvering that can undermine the safety of pedestrians and drivers.

FDOT has funded a project on mobility hub planning in Gainesville, but it is necessary to extend the work to further improve the operations of mobility hubs once established. Additionally, FDOT has identified the research needs to study the multi-modal systems with rail, freight, and airport infrastructure, drone applications, and the use of CVs to assist truck operations on freeways. Moreover, with the newly funded Tier 1 University Transportation Center for Equitable Transit-Oriented Communities (UF as consortium member), we will align some of the I-STREET™ research projects with the center's mission.

As frequently impacted by climate disasters, such as hurricanes and flooding, the transportation infrastructure in Florida needs to be smart and resilient. However, research is lacking regarding emergency response planning and real-time management using emerging technologies such as sensors and CVs. Research needs also include implementing new technologies to achieve real-time infrastructure monitoring, evaluation, and maintenance, and developing new methods to address traffic congestion on freeway interchanges.

The projects listed in Table 2 reflect the current needs of FDOT as related to the research team during a series of meetings. The research topics and project ideas listed for 2024 include those that are currently being discussed with FDOT but are yet to be commissioned. Additional feedback will be sought by stakeholders within and outside of FDOT to refine these and adjust them as needs evolve and as additional research findings are published.

The anticipated equipment needs for each research cluster are summarized in Table 3.

Table 3: Equipment Needs for Different Research Clusters

Topic Areas	**Resources**
AI and Data Analytics	High-performance computing resources, web servers, databases.
ACES Vehicle Technologies	High-performance computing resources, automated vehicles, on-board units for connected vehicles, roadside units, data collection sensors, video cameras.
Privacy and Cybersecurity	High-performance computing resources, servers.
Multimodal Transportation	High-performance computing resources, Mobility Data Specification (MDS) data.
Smart and Resilient Transportation Infrastructure	High-performance computing resources, data collection sensors, video cameras, MDS data, Curb Data Specification (CDS) data.

It is expected that the research team will work with FDOT and other stakeholders to refine these topics and craft research problem statements to address Florida's needs. Once underway, the research projects will be posted and updated on the I-STREET™ website (https://istreet.ce.ufl.edu/). The results of research will be widely distributed through a variety of channels, such as social media, policy briefs, webinars, and peer-reviewed publications.

2.5 Summary

This chapter summarized the development and results of the strategic planning process related to the five-year research and infrastructure plan for I-STREET™. This plan is developed considering FDOT

priorities and leverages existing strengths to help advance the state-of-the-practice in safety and mobility. The five research priority areas identified are: AI and data analytics, ACES vehicle technologies, privacy and cybersecurity, multimodal transportation, and smart and resilient transportation infrastructure.

To implement this plan, the research team plans to partner with FDOT and other agencies to pursue research grants and/or other funding opportunities at the federal level (for example, the USDOT SMART and ATTAIN programs and the NSF Regional Innovation Engines). We plan to include this topic in the agenda at every quarterly I-STREET™ stakeholder meeting, to take advantage of potential opportunities and partnerships that advance the state-of-the-practice.

3. Development of Industry Outreach and Engagement Plan

This chapter presents an industry outreach and engagement plan for I-STREET™, which is based on principles of strategic communications. The plan also includes communication-related activities related to the other chapters in support of the I-STREET™ Living Lab.

The information contained in this chapter constitutes a strategy which is the blueprint that will serve to shape details of how we plan to establish and nurture relationships with transportation technology companies. This chapter also includes measurable goals and how we plan to reach those goals via various tactics.

As with the other plans provided in this report, the plan in this chapter is meant to be a living document. The strategies and tasks outlined may change as feedback is received from various stakeholders.

3.1 Overview of the Transportation Technology Industry

The transportation industry includes companies that specialize in data platforms, smart sensors, infrastructure and vehicle applications, smartphone applications, electric vehicles, and ACES vehicles technology. These companies often test their products on public roads.

Since I-STREET™ is a real-world Living Lab with extensive data collection and evaluation capabilities, the industry can benefit from partnering with I-STREET™ to facilitate the deployment of its products. I-STREET™ has identified more than 80 companies (see Appendix A) that could reap the benefits of testing their technology on the I-STREET™ Living Lab.

Traditionally, Detroit, Michigan, and parts of the Midwestern U.S. have been recognized for their heavy automotive manufacturing plants. However, the Southeastern U.S. has been attracting such companies, specifically in states such as Georgia, Alabama, North Carolina, and South Carolina. Although there is no vehicle manufacturing in Florida, the state does offer incentives such as no corporate income tax, making it an attractive prospect for doing business. According to ABAS, a software company for midmarket manufacturers, while the automotive industry is expanding in the Southeast, finding qualified workers may be an issue. They recommend partnerships among academia and the private and public sectors to address skills (training/workforce development) and expansion issues. One of I-STREET™'s goals is to do just that – engage with these sectors.

I-STREET™ operates at the intersection of research and deployment, and it considers the entire multimodal highway system and the interactions between different technologies and modes. The vision for I-STREET™ is to be the place where mobility innovators come to test and refine their technologies. Gainesville, with a variety of different types of road users such as pedestrians, bicyclists, e-scooters, conventional scooters (mopeds), transit users, and cars, provides the ideal environment for testing innovative technologies and their impacts on the entire highway network.

3.2 Industry Outreach and Engagement through the Strategic Communications Plan

The purpose of developing the strategic communications plan is to provide an approach for engaging with transportation technology companies and agencies and disseminating the capabilities of I-STREET™ throughout the country and internationally. The plan defines who we will be communicating with, what we plan to communicate (messaging) or when and how frequently we will engage in our

communications tactics, and how those messages will be communicated (social media, newsletter, website, workshops, events).

The plan developed will create awareness about I-STREET™'s capability and services to prompt transportation technology companies and public agencies to engage with us. Our objective is to build relationships with transportation technology companies so that they will be more inclined to share and access data, test their equipment, and deploy their technology on the I-STREET™ real-world, open-road testing network.

The next section provides the results of an internal assessment regarding strengths, weaknesses, opportunities, and challenges that serve as the foundation for defining the outreach and engagement strategic communications goals. Next, the document discusses KPIs to be used in assessment, target audiences, and messaging voice. The last section discusses specific actions (events, social media, and other potential actions) to achieve the goals and objectives outlined.

3.3 Strengths, Weaknesses, Opportunities, and Challenges (SWOC) Analysis

A SWOC analysis was conducted for I-STREET™, which considered its strengths and weaknesses (which are internal), along with opportunities and challenges (which are external) in terms of industry relationships and is presented in Table 4. The exercise was conducted with key I-STREET™ staff. A SWOC analysis helps communication professionals mold the communications goals, to determine the types of audiences to focus on, tactics to engage in, and KPI metrics that should be tracked to determine whether efforts were successful.

Table 4: SWOC Analysis (Industry)

Internal to I-STREET™	
Strength	**Weaknesses**
• I-STREET™ is a real-world, open road-testing network of roads and highways; it is not a closed circuit, and therefore it is realistic. • The I-STREET™ environment contains different types of road users (pedestrians, bicyclists, e-scooters, conventional scooters/mopeds, transit users, cars). • Faculty researchers working on I-STREET™ projects have extensive interdisciplinary backgrounds. • State of Florida is Connected Automated Vehicle (CAV)-friendly. • Partnerships have already been formulated with the state, city, and university. • I-STREET™ looks at all the components within the highway network (from freeways to arterials to transit to vulnerable road users). This is a major differentiator from competitors.	• No dedicated funding for I-STREET™ expansion (research and development, technology deployments, vehicle instrumentation, data hub, workforce development) • I-STREET™ is relatively unknown nationally and internationally. • There may be a misconception that I-STREET™ is a conventional closed test track. • Existing "differentiators" are not well known (systems approach, research, and deployment). • No established relationships with automakers or CAV companies.
External to I-STREET™	
Opportunities	**Challenges**
• Possibility to secure funds from Florida legislature to guarantee funding for I-STREET™. • I-STREET™ could potentially be used as an example to demonstrate how public outreach should be done when it comes to emerging technologies. • I-STREET™ can be used as an example to demonstrate how education and workforce development programs can help Florida attract industry partners. • Via industry outreach efforts, I-STREET™ has the potential to create solid relationships with transportation technology companies. • Connection with SunTrax can help solidify industry relationships. • Possibility to partner with existing vehicle manufacturing presence in the Southeast.	• Competition from other university-based testing facilities (i.e., Mcity, RELLIS). • No dedicated funding for I-STREET™ makes marketing very challenging (e.g., no funding for booths at various conferences, travel, and outreach to potential industry partners.) • UFTI/UF does not have a long history with industry partnerships.

3.4 Communication Goals and Objectives

Based on the SWOC analysis, the research team has developed the general goals and objectives outlined in the following subsections.

3.4.1 General Goals

1. Create an Industry Council to establish solid relationships with industry partners and automakers (private companies, SunTrax, etc.).
2. Increase awareness about I-STREET™ (i.e., demonstrate the success of our work, refute myths or misconceptions, emphasize its uniqueness, the work of interdisciplinary researchers, in a CAV-friendly state).
3. Secure dedicated funding from the State of Florida for I-STREET™.
4. Enhance the I-STREET™ website (i.e., make it look more like a corporate/commercial website to appeal the to the industry).
5. Create a social media strategy for communications with industry partners and the general public.
6. Create a social media campaign to communicate the results of I-STREET™ research findings to practitioners via education and workforce development activities.
7. Develop signature events to position I-STREET™ as a thought leader.
8. Generate donor actions such as pay-to-use I-STREET™ through Industry Partner memberships.

3.4.2 General Objectives

1. To increase by at least 4 to 5 each year the number of transportation technology companies that have reached out to engage with I-STREET™ for the next five years; the number of companies engaged with I-STREET™ through the FDOT showcase events is 40.
2. To generate at least two, I-STREET™-related articles per year in the next five years in trade publications.
3. To create and release an I-STREET™ newsletter two times a year for the next five years.
4. To institute an I-STREET™ social media presence by creating accounts on Facebook, Twitter, and LinkedIn by the end of 2024.
5. To develop a social media content calendar each month and schedule at least three posts per week on each platform as necessary for each year in the next five years.
6. To increase by at least 10% each year the number of new visitors to the I-STREET™ website in the next five years.
7. To create three major outreach events (Industry Showcase, Facilities Field Trip, Partner Showcase) in the next five years.
8. To retain three industry partnerships each year at any level for the next five years.
9. To recruit one industry champion each year to serve as an “influencer” for a total of five by the end of 2028 from those who have signed up for a membership.
10. To secure at least $6M in dedicated funding for I-STREET™ research, marketing, and outreach efforts in the next three years through industry partnership, legislative lobbying, state and federal grants.

3.5 KPIs

KPIs should be linked to our overall goals and objectives and help measure whether our overall efforts were successful. A baseline measurement should be established to determine the percent change and/or whether we reached our goals. The following KPIs and metrics are recommended:

3.5.1 Goals, Objectives, & KPIs

Goal 1: A 10 % increase in the number of transportation technology companies who have reached out to engage with I-STREET™ each year for the next five years (2024 to 2029).

KPI: Marketing Qualified Leads

- Metric: Number of companies or agencies (leads) who are engaging with I-STREET™
- Baseline: 10

Goal 2: An increase of 10% in trade publication presence in the next five years (2024 to 2029).

KPI: Trade Publication Rate

- Metric: Number of articles in trade publications
- Baseline: 2

Goal 3: A 20% increase in website traffic from baseline to the website each year for the next five years (2024 to 2029) from baseline.

KPI: Website Visitors

- Metric: Number of unique visitors, page views, average time on page, social referrals, new visitor sessions, returning visitors
- Baseline: 0 (Website analytics yet to be setup)

Goal 4: Increase of 20% from baseline in postings to each social media platform in the next five years (2024 to 2029).

KPI: Social Media Engagements on LinkedIn, Facebook, and Twitter

- Number of likes, comments, retweets, engagements, clicks, audience growth, account mentions, impressions, reach, sentiment.
- Baseline: 0

3.5.2 Additional Goals, Objectives, & KPIs to Consider

Goal 5: Organize at least three major outreach events by 2027.

KPI: Event Attendance per year

- Baseline: 0
- Baseline Year: 2024
- Number of events, number of industry participants

Goal 6: By 2029, sign up at least one industry partnership per year at any level.

KPI: "Sales" Qualified Lead Rate

- Baseline: 5
- Baseline Year: 2024
- Number of companies paying to use I-STREET™

Goal 7: Recruit industry champions who have signed up for a membership to serve as an influencer to convince others to access data, test on I-STREET™, and deploy technology by 2029.

KPI: Industry Champions for UFTI

- Baseline: 5
- Baseline Year: 2024
- Number of champions per year

Goal 8: Secure at least $2M/year of dedicated funding for I-STREET™ by 2027.

KPI: Dedicated Funding for I-STREET™

- Baseline: Dedicated funding $0
- Baseline Year: 2024
- Dollar amount of dedicated funding for I-STREET™ per year

3.6 Target Audiences

Target audiences can be internal or external. For example, we want to engage with external stakeholders such as transportation technology companies as potential customers for the pay-to-use feature of I-STREET™. Other external stakeholders would include followers on social media, journalists, legislators, transportation agencies, and lay people. Internal stakeholders include executives of I-STREET™, UF business affairs staff, other UF key staff, and ambassadors (those from external audiences who are supporters/users of I-STREET™, including faculty, students, and partners). To craft the right messages that will resonate with our audiences, we will need to create personas.

3.6.1 Creating Personas

Personas are a representation of a key segment of our audience. Creating personas for our strategy is important because it will help us develop messages along with the appropriate tone and vibe that will appeal to our targeted audiences. Background research needs to be conducted to create these personas.

Persona 1 – Sophia the Company Executive

- 45 years old
- Lives in a major city
- Has an advanced degree
- Key decision maker
- Mid-sized company
- Reserved, serious

- *Social media: LinkedIn, Facebook, Twitter*

Persona 2 – James the Sales Engineer

- 34 years old
- Lives in a big city
- Has a bachelor's degree
- Hybrid work schedule
- Attends trade shows
- Manages sales
- Friendly, outgoing
- Social media: LinkedIn, Facebook, Instagram

Persona 3 – Harper the Senior Engineer at a State Agency

- 38 years old
- Lives in a small city
- Has an advanced degree
- Hybrid work schedule
- Responsible for operations, maintenance, develops plans for future network expansion/improvements
- Friendly and professional
- Social media: LinkedIn, Facebook, Instagram

3.7 Voice, Tone, and Key Messages

As humans, we have the same voice all the time, but we have a different tone to our voice depending on the situation we are in (e.g., talking with a friend or giving a presentation to an advisory board). For example, our voice can be professional, experienced, inclusive, or inspiring, and our tone can be friendly, casual, serious, industrial, conservative, collaborative, or daring to name a few. The messaging we create on our website, social media, and other communication efforts should adhere to the voice and tone that we have identified in this plan.

3.7.1 Voice and Tone

To establish voice and tone, we need to ask ourselves the following questions:

- *What is our brand's personality if it were a celebrity or public figure?*
- *What adjectives would we use to describe our vibe/tone?*

Based on the above explanation and questions, I-STREET™'s voice and tone are as follows:

- I-STREET™'s Voice: Professional
- I-STREET™'s Tone/Vibe: Serious, collaborative, friendly

3.8 I-STREET™'s Key Messages

This section includes the types of messages that will serve to influence our target audiences (personas). What do we want them to remember about us?

Overarching Message

I-STREET™ is a real-world, open-road testing area that includes a heavily used highway network. The testing corridors contain the perfect mix of road users which include transit, cars, pedestrians, e-scooters, bicyclists, and technologies developed, deployed, and evaluated, seeking to improve safety and mobility. I-STREET™ evaluates the entire system, not the individual components to ensure road safety for all users.

Sophia the Company Executive (Persona 1)
Message: Elevate the status of your company with an I-STREET™ *Industry Partnership and become part of the only open-road Living Lab in Florida, where the entire road system that includes a variety of road users is evaluated.* I-STREET™ *is at the intersection of research and deployment*.

James the Sales Engineer (Persona 2)
Message: Make roads safer for all users by developing, testing, and deploying your company's technology with I-STREET™*, the only open-road Living Lab in Florida, where you will have access to research and curated datasets, University of Florida facilities, and world-class students.*

Harper the State Agency Senior Engineer (Persona 3)
Message: Work toward a safer future in Florida by learning about the latest advancements in transportation technologies with the potential to improve safety and mobility for all road users.

3.9 Action Plan

3.9.1 Events

This section outlines the proposed events to achieve the objectives of this plan. The events should be focused on engaging transportation technology companies and making I-STREET™ more visible to the non-technical community (the public).

Event #1 - Industry Showcase (First series was completed in 2023)

Objective: Organize one event per year that brings together at least 10 transportation technology companies to showcase their technology to I-STREET™ executives, researchers, staff, and public agencies.

Tactic: Create a list of transportation technology companies and invite them to present at the showcase.

Event #2 – I-STREET™ Facilities Fieldtrip

Objective: Recruit at least 10 companies to travel to Gainesville by the end of 2024. Hashtag - #IstreetFieldDay

Tactic: An invitation is to be extended to all those who presented their products at the Industry Showcase to come to Gainesville to see firsthand the area associated with the I-STREET™ real-world test bed. This could motivate them to collaborate and/or pay to use the I-STREET™ facilities.

Event #3 – Partnership Showcase

Objective: Organize two partnership showcases in the next 3 years featuring companies who have formed a partnership with I-STREET™. Hashtag - #IstreetPartners

Tactic: This event will feature companies that have formed a partnership with I-STREET™. They will present the types of testing, deployment, or any other activity they have engaged with I-STREET™ on.

Event #4 – Various Social Media Campaigns (see Social Media Section)

3.9.2 Executive and Ambassador Outreach

This section describes the objectives and tactics for engaging I-STREET™ executives and ambassadors. This section contains its own measurable objectives and tactics.

It is important for leaders and others affiliated with I-STREET™ to connect with various audiences as they can help sway our target audience to become potential donors, supporters, etc. These leaders can also help increase brand awareness and make more achievable the goals and objectives stated in this plan. Organizational representatives such as leaders, executives, other key personnel from an organization, and partners can serve as ambassadors to help refute myths or misconceptions, influence policy, and boost organizational credibility, and they can be from internal or external audiences. For example, a representative from a company that is actively working with I-STREET™ could serve as an ambassador.

Objective 1: Create a guide for speaking engagements or presence on social media by the end of 2024.

Tactic 1: Create a specific kit that contains talking points and PowerPoint presentations to use at events and on social media, depending on the audience.

Objective 2: Schedule five speaking engagements or virtual events directed toward the transportation industry by 2029.

Tactic 2: Have I-STREET™ executives or ambassadors talk about the benefits of accessing data, testing equipment, and deploying their technology on the I-STREET™ real-world, open-road, testing corridors.

3.9.3 Website

This section includes a general assessment, recommendations for improvement, and associated measurable objectives and tactics for updating the I-STREET™ website[1]. First impressions matter. For organizations and companies, this is important because most first impressions about an organization will be made online, and usually from a mobile phone. This means that websites must be mobile-friendly, easy to navigate, and clearly organized with search functions. Websites must also have short sections of content and descriptive subheadings and be error-free. The I-STREET™ website must be Search Engine Optimized (SEO) if we want our clients to find us. Another thing to consider about a website is that it must have a good design. Hans Hoffman, a German American abstract expressionist painter of the 20th

[1] https://istreet.ce.ufl.edu/

century once said, “Design is the intermediary between information and understanding.” To be noticed and remembered websites must be visually appealing.

Recommendations for Improvement

- The I-STREET™ website needs to be improved to attract the attention of the transportation technology companies I-STREET™ is trying to appeal to. It also should be at or above the standard of our competitors. For example, Mcity’s website[2] was created by an outside branding company, and it has a modern, clean look to it with the information presented in an organized way. In summary, the I-STREET™ website needs to have a more commercial look to it.
- Consider utilizing a different template or purchasing an outside platform such as Weebly, Squarespace, or Wix.
- If creating a new website, make sure it is SEO optimized. Make a list of keywords or phrases used most often for I-STREET™, and then make sure they appear in our headlines and title of pages.
- The menu needs to be revisited, and more graphics need to be added, as well as images.
- The menu should include News & Events.

Improvement Objective: Revamp the I-STREET™ website to give it a modern look by utilizing an outside platform, if possible, by the end of the year (2024).

Tactics

- Add a variety of videos from the I-STREET™ video collection to the home page, but make it so that the video stretches from one side of the monitor to the other and is played in a loop (see Mcity’s home page[3] for an example).
    - We are waiting for the H.W. College of Engineering at UF to convert the current website template to the newest version. That could take up to 6 months.
- Create graphics with quotes and a picture of companies that have partnered and tested with I-STREET™.
    - See https://istreet.ce.ufl.edu/I-STREET-collaborator-testimonials/.
- Create a News & Events menu and add pages for I-STREET™ in the News, a page for the newsletters, and a page for media resources, which will include press releases, B-roll videos for reporters to use, including hashtags, and potential social media resources.
    - An In the Media page was created that houses various news articles.
    - A Media Box was created under the In the Media menu. This page houses links to issues of the UFTI Newsletter, future issue of the I-STREET™ newsletter, the UFTI annual report, list of key I-STREET™ personnel, press releases, project/product summaries, I-STREET™ presentations, collaborator testimonials, useful infographics, social media assets, logo assets, and other multimedia assets.
    - Link to “Media Box” https://istreet.ce.ufl.edu/media-box/.

[2] https://mcity.umich.edu/
[3] https://mcity.umich.edu/

- Create an I-STREET™ website subcommittee to reevaluate the I-STREET™ website menu to ensure the information is clear, up to date, and has an appealing and modern feel. This may involve looking at competitors' websites.
    - Nothing to report yet.

3.9.4 Social Media

This section includes information on why we want to be on social media, and what we hope to achieve with each platform, recommendations for the types of social media platforms to use, the target audience, content theme ideas, hashtags, suggestions for potential times to share content, and our voice and tone.

After more than a decade, social media has matured into a profession. Social media is the new "I've heard it through the grapevine" of this era. It allows us to share a variety of transformative content. It's a cost-effective way of letting our stakeholders, clients, policymakers, and others know about the work we are doing. A good social media presence will make supporters feel in tune with an organization or company and more willing to collaborate, pay to use, and donate. This feeling of belonging will organically motivate supporters to act like spokespeople for our organization by sharing information through their networks. While, building a following and reaching new audiences is always a top priority for a social media plan, the trend in 2023 focuses on consumers, branding, and customer service. For example: (1) focus on connecting and engaging more with followers; (2) know that followers will be looking to social as the new search platform instead of Google; (3) short-form video will have the best return on investment (ROI); (4) funny and relatable content is preferred by followers/consumers; and (5) resharing of the same content across all platforms will be frowned upon by followers (Hubspot, 2023[4]).

Of utmost importance is to research where our audiences (or clients) are spending their time online. According to Cause Communications Toolkit[5], it's best to choose the top two or three platforms that align with our audiences. Buffer.com[6] recommends that organizations and companies have an account with least the big four social media platforms (Facebook, Instagram, Twitter, and LinkedIn). A deeper dive needs to be conducted into the types of information these companies are posting and the level of engagement (if any) from their followers (Shopify Blog 2022[7]). This will help us determine the types of social platforms to sign up for and the types of posts to create in order to engage visitors to interact with I-STREET™'s social media platforms.

3.9.5 Why does I-STREET™ want to be on social media?

1. We want to increase awareness.
2. We want to drive traffic to the I-STREET™ website.
3. We want to build a community.
4. We want to boost engagement.

[4] https://blog.hubspot.com/marketing/hubspot-blog-social-media-marketing-report
[5] https://causecommunications.org/toolkit/
[6] https://buffer.com/library/social-media-marketing-strategy/
[7] https://www.shopify.com/blog/social-media-marketing-strategy

3.9.6 A competitive analysis of transportation technology companies

With all this background information in mind, a small sample (n=37) of transportation technology companies was assessed from a list of transportation technology companies interested in presenting at I-STREET™'s Industry Showcase (Figure 3). The assessment was undertaken to determine (1) the types of social media platforms they currently use and (2) which ones were used most.

It was found that LinkedIn, Twitter, Instagram, YouTube, Facebook, and in one case Vimeo were used by most in the sample of transportation technology companies. For example, LinkedIn was used by 27 companies, followed by 25 for Twitter, 24 for Instagram, 17 for YouTube, 13 for Facebook, and 1 for Vimeo. 73% of these companies used LinkedIn, followed by 68% for Twitter, 65% for Facebook, 46% for YouTube, 35% for Instagram, and 3% for Vimeo. No social media platforms were found for nine of the companies on the list.

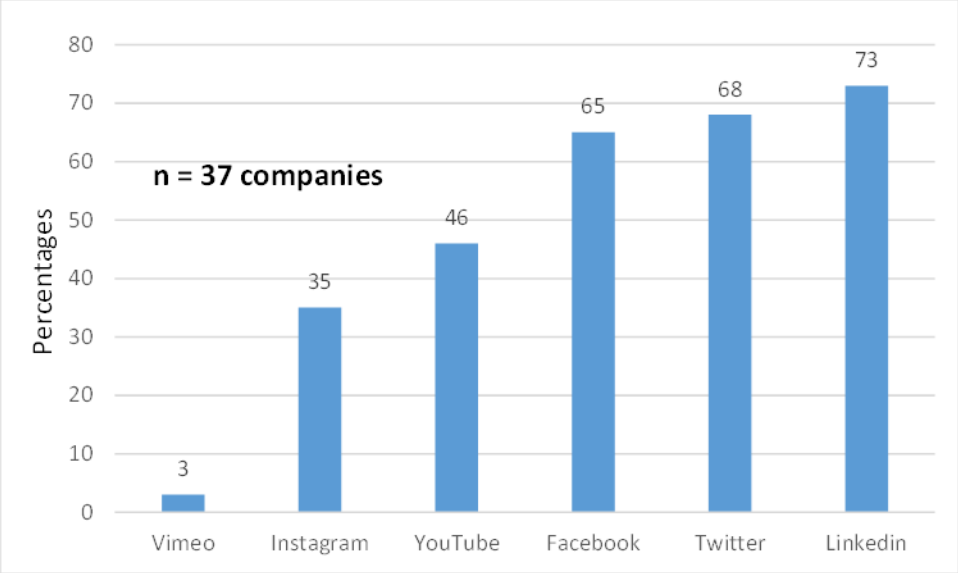

Figure 3: Transportation Technology Companies & Social Media Platforms*

**See Appendix B for a list of companies*

3.9.7 Recommendations for social media platforms to use for I-STREET™

According to Statistica[8], as of 2022, Facebook was the most popular social network in the world. Facebook is a great platform for business, but to have a substantial reach, we will have to pay to promote our posts. Our assessment found that Facebook was the third most popular social media platform used by transportation technology companies.

Twitter was the second social media platform most used by the 37 transportation media companies assessed. When trying to market a product or service, Twitter may not be the best channel to do so. Most people are on this platform for networking with other brands and journalists or to catch up on the news.

[8] https://www.statista.com/statistics/272014/global-social-networks-ranked-by-number-of-users/

LinkedIn was the most used social media platform by transportation technology companies according to our assessment. When it comes to the platform that is most used by professionals, LinkedIn ranks at the top. Shopify's article on Social Media Marketing Strategy: 2022 Engagement Guide[9] suggests that if a target audience is of a specific profession (transportation engineering in our case), if there are businesses that need the products and services that an organization produces, or if we are looking to collaborate or partner with companies, building a stronger presence on LinkedIn would serve I-STREET™ well.

Part 2 of our Competitive Analysis should include a deeper dive into our competitor's social media platforms. For example:

1. The number of followers or people who like their page(s)
2. Look at their hashtags to see how popular they are and what they are posting.
3. When was the last time our competition posted?
4. Do they receive lots of comments and likes or shares on their posts?
5. Which posts seem to garner more attention?

3.9.8 Who is our target audience for I-STREET™ social media?

To determine our audience, we will need to create personas. Personas have already been identified in the Audience section of this strategic plan. These personas also apply to our social media audience. These personas represent a segment of our target audience and help us create content that is relevant. The following have been identified as such:

- Persona 1 – Sophia the Company Executive
- Persona 2 – James the Sales Engineer
- Persona 3 – Harper the Senior Engineer at a State Agency

3.9.9 I-STREET™'s voice, tone/vibe on social media

As already established in this plan's Voice, Tone, and Key Messages section, a person uses the same voice all the time, but the tone varies depending on the situation. Posts created on social media, those that contain text and media (images, video, memes, etc.), are defined as our voice and tone/vibe and must be consistent across our platforms. People begin to build an impression of who we are by our voice and tone. Other things to consider include, avoiding jargon and our writing needs to be casual.

- I-STREET™'s Voice: Professional
- I-STREET™'s Tone: Serious, collaborative, friendly

3.9.11 Themes recommended for I-STREET™ Social Media

It is recommended that a social media strategy include themes or "buckets" to organize types of posts. Themes should reflect I-STREET™'s mission and support goals. This is also important for planning targeted content for personas (audience). These themes and posts should also reflect an organization's voice and tone, and its look and feel. As a rule, Hootsuite.com recommends that 80% of posts should inform, educate, or entertain, and 20% should be about promoting a brand (i.e., I-STREET™). Starting 2025, a content calendar for each month will be prepared, which will include the platform, day, time,

[9] https://www.shopify.com/blog/social-media-marketing-strategy

and message along with appropriate hashtags. The themes below can change from month to month, and new ones may be added, if necessary.

- Impact/Success Stories
- Customer Testimonials/Quotes
- Partner Stories
- Researcher Spotlight
- Graduate Student Spotlight
- Ask an I-STREET™ Expert
- Work With Us
- Research Brief/News
- Events
- Fast Facts Friday

3.9.12 Content format recommended for I-STREET™ Social Media

To avoid scrambling for content to post, we want to provide I-STREET™ followers on social media with some consistency and variety in the types of media formats we choose to use. To do this it is important not only to establish the themes described above but to also have a variety of media content. For example, 54% of marketers say video is the most valuable type of content format, followed by images at 53% and text-based posts at 30%. Video does well on Facebook, YouTube, and Instagram. Below are recommended content formats.

- *Images and videos*
- Website content – posts on social media that followers to the website
- *User-generated content (UGC[10])* – content I-STREET™ would solicit from supporters/fans that includes images, videos, or testimonials about I-STREET™ products on social media. UGC builds community. Encourage UGC via hashtags and tagged photos, and contests/giveaways.
- *Graphs and charts* – Graphs and charts provide followers with visual information, which we know is retained for a longer amount of time than plain numbers. Post pie charts and other data visualization from I-STREET™.
- *Infographics* – According to SproutSocial.com[11], infographics are used by 65% of marketers, making it one of the top five most used content types. People these days are bombarded with so much information that condensing it into bite sized information is ideal for capturing audiences.
- *Polls* – Polls help gauge where your audience's interests are, and it is ideal for engaging audiences.

3.9.13 Hashtags for I-STREET™

Hashtags can help our social media pages to increase engagement, build brand awareness, show support for social causes, and can help people find us on social media.

[10] https://sproutsocial.com/insights/user-generated-content-guide/
[11] https://sproutsocial.com/insights/infographic-marketing/

Below is a list of branded hashtags, those created specifically for I-STREET™:

- #IstreetPartners
- #IstreetFieldDay
- #IstreetCares
- #IStreetTakeOver
- #AskIstreet
- #IstreetInnovates
- #IStreetDoesSafety
- #IStreetDeploys
- #AccessIStreet
- #TestWithIStreet
- #FeedbackFriday

Additionally, below are some industry-specific hashtags we could potentially use:

- #TransportationTuesday
- #SmartCities
- #SmartMobility
- #Transportation
- #RoadSafety
- #FutureofMobility
- #TransportationEquity
- #HappyCities
- #MobilityJustice
- #TrafficDetection
- #ReadyToDeploy
- #Automotive
- #5G
- #SafeStreets
- #AI
- #TrafficFatalities

3.9.14 When do we plan to share information on social media?

Since the I-STREET™ social media pages (Facebook, LinkedIn, and Twitter) would be newly created, we would initially have to make informed guesses on the best times to post. Then, as the posts on each platform begin to generate analytics, we would refer to the data to find out how they are performing. The analytics would show the best days and times to post according to our specific audience. For example, will our personas start scrolling while having breakfast in the morning, when they take a break at work when they have lunch, when they are at an event, or when they are in bed or on the couch after

work? How about weekends, vacations, and sporting events? Hubspot.com[12] has some suggestions per platform on the best times to post, as shown in Table 5.

Table 5: Suggested Times to Post to Facebook, LinkedIn, and Twitter (Hubspot.com)

Platform	Times and Days
Facebook	6 PM to 9 PM 12 PM to 3 PM (Best days to post are Friday and Saturday, avoid Sunday) (Eastern Time Zone)
LinkedIn	9 AM to 12 PM 12 PM to 3 PM 3 PM to 6 PM (Best days to post are Monday, Wednesday, or Tuesday, avoid weekends) (Eastern Time Zone)
Twitter	9 AM to 12 PM 12 PM to 3 PM 3 PM to 6 PM (Best days to post are Wednesday and Friday) (Eastern Time Zone)

3.9.15 Social media content calendar

A social media calendar is a bird's eye view of all upcoming posts organized by platforms, themes, and dates. It is a great way to plan posts, manage campaigns, and determine whether to course-correct a social media strategy. The social media content calendar should be accompanied by a document that describes the following for each date: visuals, date/times, platform, description of visual (or media type), and the text for the message along with appropriate links and hashtags. Below is an example of a social media calendar (Figure 4) using some of the suggested themes from the section discussed above. These themes can change from month to month, if necessary.

[12] https://blog.hubspot.com/marketing/best-times-post-pin-tweet-social-media-infographic

Figure 4: Social Media Calendar for I-STREET™

3.9.17 Examples of social media signature campaigns for I-STREET™

(These can be incorporated into the content calendar as well)

A social media signature campaign is a great marketing tool for promoting a brand, product, idea, or social cause through Facebook, Linked In, X, Instagram, or any other social media site. Signature social media campaigns are crafted to contain unique features or messaging that make them memorable and resonate with a campaign's target audience. These types of campaigns focus on meeting an organization's marketing objectives. In the case of I-STREET™, an objective would be to motivate industry partners to sign up as members of the Industry Partnership Program or to become

ambassadors, helping to encourage others to create, test, and deploy with the Living Lab. These campaigns must include branded hashtags, attractive visuals, or videos, all created to create engagement and brand awareness, encouraging audiences to engage in calls to action.

Below are some examples of social media signature campaigns for I-STREET™. Our ultimate goal, through the objectives and tactics described below, is to increase the I-STREET™ brand, increase our engagement with our target audience, and create and cultivate new relationships with the industry.

Objective 1: Two media takeovers by one or two of our ambassadors in the next five years. This will help us with gaining new followers and help other transportation technology companies to discover our facilities. Hashtag - #IstreetTakeOver

Tactic: Either use our Facebook or LinkedIn accounts and have our ambassadors post videos and images about how they are collaborating with I-STREET™.

Objective 2: Two, 1-hour "Ask I-STREET™" social media events in the next five years. Hashtag - #AskIstreet

Tactic: Have one of our ambassadors (a company) respond to questions about the benefits of collaborating with I-STREET™, advice on how to do so, etc.

Objective 3: Team up with at least two local community organizations on their social media channels to encourage members of the community to learn more about I-STREET™. Hashtag - #IstreetCares

Tactic: Reach out to these entities and have an infographic or video ready to distribute to them.

Objective 4: To capture the attention of the community, create one video competition in the next five years. Hashtag - #IstreetCares (User Generated Content)

Tactic: Graduate students affiliated with I-STREET™ or industry practitioners come up with an entertaining way to tell the story about how I-STREET™ positively impacts the community. The winner will get a prize.

3.9.18 Key Performance Indicators (KPIs) and Metrics

There are a variety of metrics for social media, but Engagement and Awareness are two important KPIs to keep track of. Engagement is where we can see if our audience is interacting with a social media platform. If this number is low, then we will need to rethink our content. Awareness metrics tell if and how we are being seen (I-STREET™'s visibility). These help us track our efforts and are excellent metrics to track if we want to increase visibility. Another interesting KPI to keep track of is Conversion. This will help us measure how many of the interactions on our platforms turn into website visits, newsletter signups, partnership contributions, or how many people left our page without taking action (signals our content is not engaging audiences).

Goal 1: Increase awareness of each of I-STREET™**'s social media pages by 30 % in the next five years.**

KPI: Audience growth rate [% growth rate = (new followers / total followers) x 100]
(We want to see how the number of followers is growing over time)

- Metrics: Followers
- Baseline: 0 (No social media accounts yet)

KPI Post reach [% post reach = (post reach / total followers) x 100]
(We want to see how our posts are performing in terms of views)

- Metrics: Post reach
- Baseline: 0 (No social media accounts yet)

Goal 2: Increase the number of followers on each of our social media pages by 30% in the next five years.

KPI: Audience growth rate [% growth rate = (new followers / total followers) x 100]
(We want to see how the number of followers is growing over time)

- Metrics: Number of new followers
- Baseline: 0 (No social media accounts yet)

Goal 3: Increase post engagements on each of our social media pages by 30 % in the next five years.
(This is where our focus turns to nurture the relationship with our followers. To increase engagement, we can use calls to action, create visually appealing and informative content that people can share, ask our audience about the type of content they are interested in, or conduct polls. Contests are also a great way to engage people.)

KPI: Applause rate [% applause rate = (total likes / total followers) x 100]
(We want to see the rate of positive interactions on our posts)

- Metric: Likes
- Baseline: 0 (No social media accounts yet)

KPI: Average engagement rate [% average engagement rate = (total likes + comments + shares) x100/ total followers]
(We want to see on average how engaging our posts are for our audience)

- Metrics: Likes, comments, shares, or direct messages
- Baseline: 0 (No social media accounts yet)

KPI: Amplification rate [% amplification rate = (shares / followers) x 100]
(We want to see the rate of followers sharing our content with other followers.)

- Shares
- Baseline: 0 (No social media accounts yet)

We could consider paying to boost our posts. These KPIs and metrics are called Conversion rates and include the following:

- Conversion rate (number of users to perform one of our calls to action)
- Click-through rate (number of users who viewed our post and clicked on our call-to-action post)
- Bounce rate (number of users who clicked on our post but quickly left)
- Note: No social media account have been created for I-STREET™ to date.

3.9.19 Newsletter

In addition to social media, newsletters are another way to engage with our audiences. This section includes goals and tactics for the I-STREET™ newsletter.

Goal: An I-STREET™ newsletter be created twice a year for the next five years.

Tactic: The content will be created on the Constant Contact platform. The information will be short and to the point, focusing on new partnerships, the partnership program, customer success stories or highlights, community perspectives, projects, new initiatives, etc. Attractive headlines and imagery will be added to each section. Constant Contact analytics will be tracked to evaluate which content is most popular with our audiences.

3.9.20 Industry Partnership Program (Membership)

An Industry and Corporate Partnership Model has been developed in collaboration with the H.W. College of Engineering's Development Office, which includes a pay-to-use tiered partnership. Funding provided by the partnering companies will be directed to the UFTI Director's discretionary fund as a gift to be used for academic purposes and may support one staff person depending on funding availability. Goals for this program are outlined below:

1. Sign an industry partnership at the Tier 1 Level ($5K) with at least one company in the next 12 months (Year 1).
2. Recruit a champion from the Tier 1 member in the next 24 months to serve as an influencer to convince others to access data, test on I-STREET™, and deploy the technology.
3. If goal #2 is accomplished, move to sign an industry partnership with at least two additional companies in the next 36 months at the Tier 2 Level ($10K to $20K).
4. Recruit a champion in the next 48 months from one of these two companies to serve as an influencer to convince others to access data, test on I-STREET™, and deploy their technology.
5. If goal #3 is accomplished, move to sign an industry partnership with at least two additional companies in the next 60 months at the Tier 3 Level ($25K to $60K).
6. Recruit a champion from the Tier 3 Level, and continue to engage the others in Tier 1 and 2 to serve as influencers for how to work with I-STREET™.

3.9.21 Internal Communications

For our strategic communications plan to succeed, we will need a dedicated team of people who will each be responsible for tasks associated with the communications plan.

Monthly I-STREET™ Communication Meetings – To discuss newsletter, social media, and website content and brainstorm additional ideas for raising awareness about I-STREET™, including what is working and what is not working, by discussing metrics. This will involve the I-STREET™ director, manager, and graduate students working on associated projects, the UFTI communications coordinator and supervisor, and other UFTI key staff.

Newsletter Content Creation –The UFTI communications coordinator will check in each week with the I-STREET™ manager and director for leads on potential stories to generate. If need be, the communications coordinator supervisor may step in to help with writing content.

Social Media Content Creation – The UFTI communications coordinator and supervisor will check in each week with the I-STREET™ manager and director for leads on potential posts to generate. Both the communications coordinator and supervisor will work together on creating a monthly social media content calendar complete with dates, times, and platforms to use, including written messages, and content types (video, graphics, images, infographic, user-generated content, etc.) Newsletter articles can become posts on social media platforms. Another option is to hire a social media intern from the UF College of Journalism and Communications to assist with the content calendar and scheduling posts for each month.

Content Messaging Approval – To divide up the responsibilities, the UFTI/I-STREET™ director will approve newsletter content, and the I-STREET™ manager will approve social media posts. When need be, the I-STREET™ manager will reach out to the UFTI/I-STREET™ director to discuss social media posts. Whoever creates the posts (communications coordinator or the supervisor) will interact directly with the I-STREET™ manager to avoid duplication of efforts.

Website Updates – A scan of the I-STREET™ website should be done quarterly by the UFTI communications coordinator to track for grammatical or spelling errors. Updates will also be conducted as new information is generated.

Metrics (Social Media, Website, and Constant Contact) – If we are running a social media campaign, we will want to look at metrics daily to see how the posts are received. If we are looking at how many followers we have gained or how many people have viewed our website, we will want to look at this number on a yearly basis. For the newsletter, metrics will be assessed each month on Constant Contact. Responsible staff for metrics includes the UFTI communications coordinator who will run reports, confer with the supervisor, and then report out at each I-STREET™ meeting or other meetings as required.

Calls from Journalists – These are to be directed to the I-STREET™ manager.

4. Meetings with Industry

One of the objectives of the project was to engage with the industry through individual meetings with industry representatives. These meetings (a summary is provided in Appendix C) provided a better understanding of the state-of-the-practice, and it also helped disseminate the capabilities of I-STREET™ and cultivate further collaborations and deployment.

The research team met with 26 companies between June 2022 and August 2023. The companies were identified based on referrals from FDOT, referrals from collaborating faculty, and networking during conferences. The meetings were scheduled to gain a better understanding of various products and to explore potential partnerships with the I-STREET™ program. The research team discussed with these companies the concept of industry-sponsored research, collaborative development of solutions, and the use of I-STREET™ data. Some of the meetings were in person while others were via teleconferencing. Most of the meetings were conducted by Dr. Pruthvi Manjunatha with occasional participation of one or two students.

The following were concluded from these meetings:

- These discussions provided a better understanding of the new technologies and existing products, and their potential to improve mobility and safety.
- Not every vendor the team engaged with has a solution that can address FDOT priorities. Having those discussions helped streamline the process of deployment for the solutions and technology with the highest potential to improve mobility and safety.
- These meetings also served as an outreach mechanism for the industry showcase and helped solidify I-STREET™'s engagement, as many of the companies listed here participated in the industry showcase.
- Several of the companies listed here were referred to various public agencies around the state for further collaborations and potential deployment.

While many of these companies were featured in the industry showcase program, to-date there have not been any new I-STREET™ -based collaborations following these meetings. Based on the discussions, these companies are interested in new funding to proceed with pilots. Therefore, the main challenge for expanding deployments and collaborations with I-STREET™ is funding, as indicated by most of the companies we engaged with. Funding dedicated to academia-industry collaborations would help foster deployment and evaluation of emerging technologies in Florida.

Based on our discussions with industry, the following are recommended:

- Continue to engage with industry representatives through meetings, as thesefoster collaborations and a deeper mutual understanding of priorities and opportunities.
- Seek funding for industry collaborations involving joint deployment and development.
- Encourage companies to engage with I-STREET™ through the industry partnership program (to-date, six companies have signed up)
- Work with FDOT to identify companies that are not currently working in Florida, and aim to engage with them, and to invite them to participate in subsequent industry showcase events.

5. Industry Showcase

This chapter describes a series of statewide industry showcases. The main objective of these showcases was to familiarize FDOT and other public agencies in Florida with available advanced technologies and to encourage further deployments of promising solutions. The sections below describe the steps followed to organize the events and provide a summary of the discussions related to each company presenting at these events.

5.1 Event Planning and Initial Industry Response

The UF team developed a list of industry contacts in the area of emerging transportation technology through connections made during conferences, stakeholders and collaborations. More than 80 emerging transportation technology companies were invited to submit an abstract and to be considered for participation in the industry showcase.

The companies were asked to submit an abstract/proposal that included information on:

a) The concept and/or technology they propose to present,
b) Whether this concept and/or technology has been tested in a closed-course environment or in the field,
c) The expected or observed benefits in safety and mobility, and
d) The expected cost for deployment.

The following criteria were used for considering the companies for the industry showcases:

- Demonstration of the potential to improve safety and/or mobility.
- Innovation and technical accomplishment
- Implementation readiness
- Clarity of the written response

UF received nearly 40 responses with the required abstract/proposal for the presentation. We shared these submissions with FDOT, and the submissions were collectively evaluated by the I-STREET™ stakeholders.

Due to the high number of responses received, FDOT recommended that the initially planned single event be changed to a series of events over the course of four months, from January 2023 to April 2023.

Based on the companies expressing interest and the products they proposed to present, the proposed presentations were categorized into four broad themes: data platforms, smart sensors, infrastructure and vehicle applications and ACES.

The invited audience for these events included various departments within the FDOT central office, the eight FDOT district offices, local agencies such as the CoG, Palm beach County (PBC), and non-profits such as Smart North Florida.

Each virtual event was planned to last 3.5 hours with 15 minutes of introduction and 15 minutes of discussion at the end. Each invited company was given 10 minutes for their presentation followed by a 5-minute “Q&A”. The companies were asked to share their slides ahead of the event and register their speakers. When they joined, the registered speakers were initially placed in a “virtual waiting room” to

allow the previous company to complete their presentation before being let in. Immediately after their presentation, the speakers were removed from the virtual event to allow the next company to join. The companies were notified that all materials submitted to the FDOT are subject to public record.

5.2 Summary of the Industry Showcase Events

This section summarizes the proceedings of each of the four industry showcase events. For each event, we provide the main discussion items for each company presenting, in the order the presentations took place.

5.2.1 Event 1: Data Platforms

The showcase event with the theme "Data Platforms" was held on January 18, 2023.

Company: Wejo: Wejo is a technology company that specializes in connected vehicle data. They gather, analyze, and utilize real-time data from vehicles to provide insights and solutions for various stakeholders, including automakers, smart cities, insurance companies, and transportation agencies. Wejo aims to enhance road safety, optimize traffic flow, and improve overall driving experiences through their innovative data-driven approach. The headquarters are in Manchester, United Kingdom.

Wejo presented one project idea of taking advantage of multiple data from vehicle movements and driving events to improve traffic performance.

Speaker: Carl Novelli

- The company provides connected vehicle data, and it is the largest current provider (13 M vehicles/month).
- High accuracy – 3 meters and High frequency – 1 to 3 second data capture rate
- They work with automobile manufacturers, so the data are directly from vehicles.
- Data type:
  (a) Vehicle Movement: trajectory from ignition on to ignition off. It includes the fuel type in their database.
  (b) Event Data: Hard brake and hard acceleration data
- Use cases: Purdue used to evaluate signal control operations, number of hard brakes corelated with crashes – Purdue University analysis. Texas DOT looking into seatbelt use.
- Limitation: vehicle classification available, because the privacy is an issue, it can be classified as a sedan, pickup, etc. age and manufacturer.
- Q&A: GPS accuracy of 3 meters was confirmed. Sample size amounts to 3-7% of journeys in the US. Penetration is lower for rural areas around 3% .

Company: Mobileye: Mobileye is an innovative technology company that specializes in the development of ADAS and automated driving technologies. They are utilizing vision-based solutions to enhance vehicle safety and efficiency, aiming to revolutionize the future of transportation by making driving safer and more automated. Their technology is designed to detect and interpret the environment, providing crucial data for safer driving and paving the way towards a more automated driving experience. The headquarters are located in Jerusalem, Israel.

Mobileye presented one project idea of taking advantage of multiple data from Connected Vehicles to perform road safety assessments, conduct maintenance reports, identify the impact of work zones on mobility and assess the performance of roadway improvements.

Speaker: Mark Davis

- The company provides a vision-based connected vehicle data.
- Collision warning events for vehicles, pedestrians, and bicyclists
- CAV data and risk info available to find correlations
- The vehicles have vision used for automated braking. The AI picks up pedestrians, markings, etc.
- Use cases tied to FDOT strategic improvement areas: Safety, digital infrastructure, work zones, project performance
- Mobileye overview pioneering ADAS, and 100% of state DOT owned roads mapped.
- Examples- Road safety assessment with Center for Urban Transportation Research (CUTR), and work zones One.Network, working with Volpe etc.

Q&A: Penetration of less than 2% of cars in US. Trajectory information available within a few seconds. Follow-up communication on inventory of road assets

Company: GM Future Roads: GM company uses connected vehicle data to make smarter infrastructure decisions to make cities safer. With 15 million GM connected vehicles in the United States and Canada, properly equipped vehicles have sensors and connected service options that can help enhance safety on the road. The company is headquartered in Detroit, MI, USA.

GM company presented GM's SaaS platform that leverages connected vehicle data, advanced analytics skills, and knowledge of the vehicle to create actionable insights about road and driving conditions in real time.

Speakers: Carolyn Volan and Derek Ancrum

- The company provides a Road Measurement System, it is a SaaS platform that leverages connected vehicle data
- Provides vehicle speed, G forces, hard braking and accelerating data
- The focus is evaluating the driver behavior impacts on traffic flow or quantify disruption score. It can implement near-real time monitoring.
- Example: Study in Utah showed how hard breakings correlate with speed drop. Also, weather data for context. Pilot proposal: I-95 from Ft. Lauderdale to Miami. It can include lane changing in the future.
- Q&A: Questions on piloting in Orlando/D5.

Company: iProbe: Using car-mounted sensors, i-Probe offers the capability and deep industry knowledge necessary to help assess road conditions. Road deformities such as potholes are identified by iProbe Road sensor and transmitted to the cloud in real-time allowing partners such as local and state road operators to quickly gain insight into their roads, saving significant time and resources. The headquarters are located in McLean, VA, USA.

iProbe presented their product called “RSM” (Road Surface Monitoring) that automatically detects and records pothole locations during the daily inspections from a vehicle.

Speakers: Shinya Shimada

- The company provides a real-time pothole detection with connected cars. The product leveraging big data with Honda data, exclusive.
- Real time pavement roughness, using Global Positioning System (GPS) and sensors in the vehicle.
- Types of findings: pothole, patches with cracking, soon to be pothole, severe cracking, rough surface, bump
- Road Surface Monitoring index is evaluated, and it can provide data for pavement management.
- Examples: North Virginia, Honolulu, Caltrans, Ohio DOT, to detecting and recording pothole locations. Caltrans Phase 1 white paper, challenges to be addressed in Phase 2 by April 2023.
- Q&A: D1 has looked at a similar product called Roadbotics.

Company: Iteris: Iteris is a technology company that focuses on smart mobility and safety solutions for transportation networks. Iteris leverages advanced data analytics, sensors, and software to enhance traffic management, optimize traffic flow, and improve overall transportation efficiency. Their solutions encompass a range of applications, including traffic signal control, transportation analytics, roadway sensors, and weather monitoring, all aimed at creating safer and more efficient journeys for drivers, pedestrians, and cyclists. The headquarters are located in Austin, TX, USA.

Iteris presented their project that leverages existing connected vehicle data that provide real-time information to travelers to enhance decision-making on arterials. The goal is to maximize mobility and safety in trips in and around Collier County, FL.

Speakers: Anita Vandervalk (Tallahassee) and Steve Garbe (Tampa office)

- Collier County Connected Traveler Information System (CTIS)
- Deployment in the next couple months, the company proposed a tool to leverage existing connected vehicle data, and provide real-time information, pushing data to traveler information big data cloud.
- It combines Blue Toad travel time, with V2X cellular communication. It is available in the Blue ARGUS (from Iteris). It is a cloud hosted solution.
- Can be applied to signal request message, Signal Phasing and Timing (SPaT) applications, and traveler information, Travel SMART Smartphone Mobile app with connectivity, data analytics and data sharing.
- Unique application: test benefits of Transit Singal Priority (TSP), have On-board Units (OBU) on transit vehicles
- They are trusted advisors to various entities, and they have several data sources, dedicated data processing engine. Capability to bring various types of data to allow for mobility and safety.

Q&A: Clarifications on data protocol, data aggregating since acquisition of Trafficast.

Company: INRIX: INRIX is a leading technology company specializing in connected car services and mobility analytics. INRIX provides real-time traffic information, parking data, and transportation

analytics to help individuals, businesses, and cities make informed decisions about their journeys. Their solutions contribute to reducing traffic congestion, improving urban mobility, and creating more efficient transportation systems. The headquarters are in Kirkland, Washington, USA.

INRIX presented two projects called Safety View and Drivewyze.

Speakers: Shaun Quayle

- The company provides Signal analytics. GPS streaming signal performance measures – requires no extra equipment.
- The tool allows developing time space diagrams, and perform relative comparison, travel time reliability. Data from Signal 4, safety view by GM Future Roads and Inrix, historic crash data and predictive safety risk data.
- Safety View: new cloud-based analytics solution that uses historic crash data and predictive safety risk data
- Safety view project examples: Speed management, VRU exposure, Safe routes to school. Partnership with DriveWyze partnering to reduce truck crashes.
- Within FDOT the following applications used are licensed: Signal analytics, Data Showcase, Developer Console. Eastern Transportation Coalition – Data Marketplace (evaluations through UMaryland). Its data are API explorable.
- Q&A: GM wiling do data pilots with safety view. Demographic data from 2019 census.

Company: Urban SDK: Urban SDK, a Techstars company, is a next-generation planning tool that helps smart cities transform mobility, transportation, sustainability and safety operations with real-time location analytics. They connect public agencies, policymakers, and the community with better data to make more informed policy and budgeting decisions. They also enable customers to quickly gather, analyze, and visualize performance indicators to make decisions with a higher degree of confidence. Headquarters are located in Jacksonville, FL, USA.

Urban SDK presented one idea of a single platform of Data Management tools for performance reporting, visualization, and analysis.

Speaker: Chris Warren

- The company provides custom dashboards, with KPIs. It streamlines data, predict, evaluate performance, and share insights.
- Florida Highway Patrol (FHP) wanted faster information, so they built application to predict crashes
- Algorithm based on volume, speed, road conditions, weather – predict three days ahead of time of where high probability crash may take place
- Integrated mobility analytics software to make better decisions in real-time and for the future
- It includes GIS data, visualization studio, insights management, Census data and labor statistics data into Data Hub.
- Examples: crash reporting for FDOT District 2, North Florida TPO (using cars and Signal4 data), Kentucky Transportation Cabinet.
- Q&A: Working on data validation for FHP project, to follow-up with UFTI.

Company: Gridmatrix: GridMatrix is a cloud-based software platform that is compatible with any existing roadway sensor, turning it into a 24/7/365 stream of data on congestion, signal performance, emissions, and safety data. GridMatrix's software is built for traffic engineers and is designed to help them solve some of their most common and challenging problems. Headquarters are in San Fransisco, CA, USA.

Gridmatrix presented their Data Cloud Platform that helps cities promote sustainability, safety and alleviate congestion.

Speakers: Elizabeth DeGhetto and Kyle Pickett

- The company provides a real-time cloud-based data processing, lidar, and sensor data.
- Integrated data cloud platform with no personally identifiable data.
- AI detects and classifies the data, then populates the dashboard.
- Use cases: In New Jersey - Quantify and reduce their emissions, it quantified for an intersection. With the product, it was possible to change the signal control to improve emissions at this intersection. Quantifying capital improvement impact in San Diego. Metrics to improve traffic flow. FDOT hurricanes, flooding, climate change. US DOT selected Gridmatrix to develop risk score. The product can integrate various data sets related to safety, crashes, weather, traffic flow.
- Q&A: Detection of six classes of road users, clarified the technology agnostic nature of data processing.

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Company: Derq: Derq is a company specializing in artificial intelligence and predictive analytics for traffic safety. Derq focuses on using advanced AI algorithms to enhance road safety and reduce accidents. Their solutions leverage real-time data from various sources, such as traffic cameras and sensors, to predict and prevent potential collisions, improve traffic flow, and make urban mobility safer for all road users. Derq's innovative approach aims to make cities and roadways smarter and safer. Derq is headquartered in Detroit, MI, USA.

Derq presented their platform that provides solutions for Traffic Management and CAVs.

Speaker: Peter Ganci

- The company provides a video analytics platform that leverages AI. It ingests video streams and producing results for end users
- Has patents on prediction of intent and stitching the images
- Hardware agnostic, traffic cameras and other hardware in the field. It can layer with Iteris or Econolite. It can include SPaT data, lidar, and Radar, to product insights related to safety and traffic, or near misses, etc.
- Broadcasting for CV will be possible from one location to another. The data they collect are stored and are visually available.
- Derq Sense: J2735 Message generation. Software can build it, format it and broadcast. Generation of Basic and Pedestrian Safety Messages (BSM and PSMs).
- Use case: Pedestrian advisory sends message and broadcasts to the vehicle. It compares, and calculates TTC, then warns the driver. Dashboard: It assigns safety score. It was deployed in Osceola County, city of Sarasota, I-275 Integrated Corridor Management (ICM).
- Q&A: Yet to develop lidar module, have done trajectory prediction for peds. Interest from D2 and CoG about this product.

Discussions and general comments:

- UFTI to share notes and hold follow-up discussions.
- Interest about Derq and INRIX in general
- Pricing of products important consideration for pilot implementation

5.2.2 Event 2: Smart Sensors

The showcase on theme “Smart Sensors” was held on February 6, 2023.

Company: AEYE – lidar for ITS Application: AEye is a prominent technology company known for its development of adaptive, vision-driven AI systems for AVs and other applications. With headquarters in Dublin, California, AEye combines solid-state lidar (Light Detection and Ranging) with low-light cameras and embedded AI to mimic the human perception process, enabling AVs to intelligently assess and respond to dynamic environments in real-time. Their technology improves safety, efficiency, and overall performance in the realm of autonomous mobility, making significant strides toward the future of transportation.

AEye presented one idea, that of their 4SightM Intelligent Sensing Platform.

Speaker: Matt Bretoi

- The company presented the product: AEye 4sight: Adaptive lidar PLATFORM
    - What is it: AI / Adaptive lidar (4Sight)
    - How could it be used: Urban Mobility, Rail Mobility, Highway mobility
- Detection sensor devices have evolved over the years; lidar itself is evolving
    - 1st gen was the spinning lidar
    - AI lidar is next generation, and provides more granular data (solid state)
- The solid state lidar can be used in urban environment to detect vehicles and road users.
- It can detect cyclists and pedestrians at crosswalks in direct sunlight
- A minimum of 2 units needed per intersection for full coverage
- In a few months a new version with 120 degrees FOV will be available
- AEye supports
    - Urban Mobility (Intersection Management)
        - A single sensor can perform/support multiple use cases, where other tech requires dedicated sensors for each use case; stop bar detection, dilemma zone, pedestrian detection/safety, data, CV Near misses
    - Highway Mobility (Bridges/Tunnels/Highways & Tolling)
        - WWD, Tolling, Work zone safety (possibly very limited), Automatic incident detection
- Q&A: Cost of $9k/unit, need not be mounted over lanes, lidar can be side-fired. Life span of 10 years for solid-state, as opposed to 3-year for spinning lidar
    - Pete Vega is interested in a demo unit for testing if anyone else wants to contact him
    - AEye has a demo truck rolling through the state
    - Matt Bretoi is working with the Traffic Engineering Research laboratory (TERL) for Approved Product Listing (APL)

Company: Umojo: Umojo is a tech company that creates communication, data analytics, and automation solutions that work with virtually everything. They connect teams to each other and to the data they need to make the best decisions. Headquarters are in Chicago, IL, USA.

Umojo presented their NexCity solution, a cloud-based platform that digitizes your mobility asset so administrators can make informed, data-driven decisions.

Speaker: Chris Perry

- “Loading Zone and Curb Management”
    - End to end mobility management using data driven solutions
    - Combines GPS with code for a software
- Growing problem of more entities vying for space at the curb
    - Increased awareness of issues related to equitable access, Vision Zero, etc.
    - “It’s Complicated”, not a new problem, difficult for different stakeholders to share space for all to benefit
    - Double Parking is a traffic and safety issue
- NexCity Solution: Cloud based platform digitizes mobility asset
    - Most companies look at the issue in pieces, Umojo looks at it holistically
    - “Digitize your infrastructure”, use existing GIS Data, uses lidar for mapping

    - Connect the data between parking systems to develop reports.
    - Collect data on Double-parking citations in areas without proper loading zones
    - Can detect that curbside policy is not enforced. Delivery parking in the middle.
    - Loading Zone Management, able to track vehicles parked in loading zones for enforcement of curbside policy
- Components for a pilot
    - Physical Infrastructure
    - Regulatory Data
    - Mobility Data
    - Reporting and Analytics
    - Curb Management
- Q&A
    - Working with TNCs: tracked TNCs through characteristics of data, but not specific to a company; logo detection is possible, but not always the best approach; better to track behavior of "pick-up/drop-off"
    - Worked with IBI Group. Association of Southern California Governments.
    - Q: Counts (ped, bike, vehicles) per lane and approach – Umojo apply their AI engine to perform analytics for each lane with its own rules, so able to track pedestrians vs vehicles, close to 96% accuracy.
    - API available to access data

Company: NavTech – Radar: Navtech Radar is a leading technology company specializing in radar-based solutions for various applications, including AVs, industrial automation, security, and traffic management. Headquartered in Oxfordshire, United Kingdom, Navtech Radar utilizes advanced radar technology to provide accurate and reliable detection and monitoring of objects and activities in both complex and challenging environments.

NavTech presented the capabilities of their radar at collecting large amounts of data in a small amount of time.

Speaker: Daniel Flynn

- The company has completed more than 150 projects using radars (4500+) in Europe
- The radar can detect vehicles and pedestrians. It is approved for use in US, met ISO standards.
- Compared with other radars, this one has more frequency, and more information for the software, which results in high resolution and higher range.
- Traditional sensors include loops, side fire radar, cameras, and clearway. Clearway is different: 360-deg, long range, can see 1000m of roadway with one sensor.
- It includes flexible rules-based software, and it can change rules every 100 meters.
- Use-case: it was used for accidents inference in UK.
- APL process will be completed in a few months.
- In the UK, have been deployed several sensors, and the minimum accuracy required in UK is of 85%. In Australia, the required is more than 90%, and they have matched that.

- Q&A: Cost of $22k/unit, currently in step 3a of the FDOT APL application, ideal mounting height of 15 ft, expected life span of 10 years.

Company: Miovision: Miovision is a technology company specializing in traffic data and intersection management solutions. Headquartered in Waterloo, Ontario, Canada. Miovision provides advanced traffic monitoring, analysis, and optimization tools to transportation professionals and urban planners. Their technology helps cities and organizations make data-driven decisions to improve traffic flow, reduce congestion, and enhance overall urban mobility.

Miovision presented its hardware platform that is to be deployed at intersections to collect data for further safety analyses.

Speaker: Joel Quigley

- The company presented a solution for Signal Performance and safety data analytics.
- The solution includes video collection and video processing.
- It includes predictive safety analytics and use of Surrogate Safety Measures related to pedestrians in the intersection.
- Provides pedestrian volume for the intersection.
- Can evaluate pedestrian compliance with spatial compliance, a heatmap of pedestrian activity to see when the pedestrian is moving in an intersection.
- It is very flexible, and it can save the videos locally.
- Q&A: Costs $19k/unit, data storage and access can be customized to confirm to local laws and requirements.

Company: Harman DTS: Headquartered in Stamford, CT, HARMAN designs and engineers connected products and solutions for automakers, consumers, and enterprises worldwide, including connected car systems, audio and visual products, enterprise automation solutions; and services supporting the Internet of Things. HARMAN has a workforce of approximately 30,000 people across the Americas, Europe, and Asia.

Harman presented one solution, the Video AI Powered Smart Transportation System.

Speaker: Nigam Singla

- The company presented a solution called AI Video Analytics
- It can detect vehicles and pedestrians using image processing and tracks vehicles count and density.
- Use cases: passenger arrivals at the airport, pedestrian analysis, wrong way detection, traffic congestion, vehicle density, incident detection, and speed violation.
- It provides traffic patterns, and traffic prediction with a dashboard.
- Smart Parking solution: End-user solution for live booking, easy payment, and access.
- Provide hardware if needed.
- Q&A: Equipment hardware is not provided, Harman only provides AI and IoT for existing infrastructure, currently implemented in India, 99% accuracy in good lighting.

Company: Cubic: In the transportation sector, Cubic delivers intelligent travel solutions, fare collection systems, traffic management, and real-time passenger information systems to help optimize transportation operations and improve the overall commuter experience. They specialize in creating technology-driven solutions to address the challenges of urban mobility and public transportation. The company is headquartered in San Diego, CA, USA.

Cubic presented one project. The GRIDSMART Protect system detects pedestrians and bicyclists and accurately places calls to traffic controllers that modify signal timings to ensure safe passage of VRUs through the intersection.

Speaker: Travis Topa

- It was presented the GRIDSMART Protect
- The tracking system, classify object and model 3D. The tracking system communicates with the camera in the intersection, pedestrian bike and vehicle
- It can make a call to modify the intersection signal phasing.
- Counts pedestrians and can set the pedestrian clearance time.
- It can be deployed with any controller.
- Minimum of 2 units needed per intersection.
- Customize the clearance interval (slow or fast crossing speed)
- Allows for quickly gather traffic data to improve traffic safety
- Pedestrian crosswalk zone for counting pedestrians
- Touchless actuation at curb
- Implemented in Bay area, CA , Huntington, NY, Pittsburgh and Harrisburg, PA
- Q&A: Clarifications on usage of “ped call”, $15-20K for a stand-alone system to deploy.

Company: Skydio: Skydio is a leading American drone manufacturer and technology company that specializes in autonomous drone technology. The company is based in Redwood City, CA, USA. Skydio is known for its advanced AI and computer vision capabilities, allowing drones to navigate and avoid obstacles autonomously.

Skydio presented their idea of the AI-driven engine, Skydio Autonomy for drone inspections.

Speaker: Bryan King, Chris Mauser, Brian Doherty

- The company is a drone manufacturer of autonomous drones using computer vision, deep learning neural networks, and workflow automation.
- Autonomy makes drone usage much more approachable to more people and agencies.
- It can be used for streaming: real-time visibility from a mobile device.
- Skydio Dock- can be deployed in field. Small footprint; just needs power and connectivity.
- It includes multiple connectivity options.
- Can fly itself, go back to dock, and shares video by itself. Remote piloting/teleoperate available
- Example scenario: Controlling a drone in California from Palm Beach Co. Florida
- It can map crashes, used by FHP. Also used during hurricane Ian for infrastructure decision making.
- Battery about 27 minutes. Max distance 6 km from the controller.

- Q&A: Cost - $30k to $50k docking systems $4k to $16k per drone. Need Federal Aviation Administration (FAA) clearance for areas near airfield or stadiums.

Company: Street Simplified: Street Simplified uses breakthrough, cost-effective technology to improve safety. To be more specific, the company uses video analytics to help agencies understand why crashes and what to do about them. These data include near misses, red-light running, speeding, crossing off crosswalks, and others. In a single day, they claim to be able to capture 20 times more risk data than a year of crash reports. They use these data to generate insights into why collisions occur and develop practical solutions to reduce them.

Street Simplified presented their platform of video-based AI analytics, which allow engineers to capture the metadata surrounding crash events by analyzing driver and vulnerable road user behavior.

Speaker: Ben Griffard

- The company presented a safety solution based on AI video data.
- Portable cameras for 1 to 7 days for short-term studies and fixed cameras for longer studies.
- The solution collects data and delivers reports and suggestions for safety.
- Helps agencies respond to grant opportunities. 10 agencies have received grant funding.
- Can identify red light running or pedestrian crossing on the green lights or in the middle blocks, vehicle yield compliance to vulnerable road users.
- Includes traffic metrics and a report with crash data, high risk areas, and countermeasures.
- Q&A: Post-encroachment time used in near-miss analysis; no data needed from local agencies for short-term studies.

Company: Rosco Vision: Rosco is recognized for manufacturing and distributing high-quality vision safety products such as backup cameras, side-view cameras, rearview mirrors, and other vision-related safety systems for commercial trucks, buses, vans, and specialty vehicles. Their solutions are designed to improve safety, reduce accidents, and enhance overall visibility for drivers, especially in challenging or obstructed environments. The company is headquartered in Jamaica, NY, USA.

Rosco, presented its Mobileye® Shield+TM V4 w/APAS system, a pedestrian safety and collision avoidance system.

Speaker: Nadav Weizman

- Presented the product Mobileye Shield+, a collision avoidance system for a large vehicle to reduce collision or fatalities.
- Passive system which does not take control of the vehicle.
- Additional cameras provided for articulated buses.
- It monitors the blind spot to provide the driver time to react.
- Detect pedestrians or other road users based on vision detection.
- Create an awareness for the drivers to know from where the pedestrian is coming.
- Provide a heatmap based on aggregated information for the agencies.
- It can distinguish between different road users, but it emits just one type of alert.

- Q&A: Can provide audio alerts in any language, this product is better than radars used on RVs, better in identifying the human form

Company: SmartMicro: Smartmicro is a provider of radar technology solutions for a variety of applications, including traffic management, automotive safety, and industrial applications. The company specializes in developing high-quality, high-performance radar sensors and systems that are used for traffic monitoring, intersection management, speed enforcement, and more. The headquarters are located in Braunschweig, Germany.

SmartMicro presented its product, the smartmicro TRUGRD line (FDOT APL approved), which consists of 4D, Ultra-High Definition, forward-firing sensors.

Speaker: Peter Ganci

- This is a German company that uses radars for detection. Deployed over 100,000 sensors worldwide. Supplies Iteris.
- The first product is the Forward Firing radar: radar with technology with higher accuracy, precise trajectory tracking, occlusion minimized, and up to 12 plates.
- Type 48 radar: can detect approaching and departing traffic, and optional integrated HD camera. Count flow, movements, missed events, jaywalkers, and wrong-way movements. Latest sensors are APL approved.
- Working with Derq for video merging and analytics
- Q&A- 4 units at an intersection could cost between $22k to $25k, considering opening direct US operations.
  Discussions and general comments:
- UFTI to share notes and hold follow-up discussions.
- FDOT District 2 Pete Vega interested in pilot of AEYE and Skydio, trusts the products from Connected Technologies (Derq, Smartmicro etc.)
- Emmanuel Posadas suggests comparison and validation from different AI video detection, also interested in AEYE.
- FDOT District 4 Arlene Willis, FDOT District 6 Erik Kuchenaur and general consensus that comparing different sensors and evaluating them using same performance metrics would be useful for the districts.
- Need for studies comparing the different computer algorithms for road user detection.

5.2.3 Event 3: Infrastructure and Vehicle Applications

The showcase on theme “Infrastructure and Vehicle Applications” was held on March 6, 2023.

Company: Notraffic: NoTraffic has set out on a mission to harness next-generation technology to bridge the innovation gap and make the roads intelligent and safe. Their systems utilize AI algorithms and data from various sources, including sensors and traffic cameras, to optimize traffic signals and improve traffic flow at intersections. By dynamically adjusting traffic signal timings based on real-time traffic conditions, NoTraffic aims to reduce congestion, minimize waiting times, and enhance overall transportation efficiency. Headquarters are in Tel Aviv, Israel.

NoTraffic presented its System which comprises of sensors (video and radar all-in-one), control units and MobilityOS a cloud-based traffic management platform that provides access to video streams, detection zones, performance measures, and alerts.

Speaker: Tyler Houston

- Tel Aviv, founded 2017, video and radar fusion, digitizes the cabinet – operations, analytics, safety.
- NoTraffic operations center monitoring and troubleshooting.
- Object classification, one sensor per approach. BSM message generated for each vehicle. Active learning for their system. Automated Traffic Signal Performance Measures (ATSPM), optimization
- Q&A: No product for freeways yet. Allows wired connections. Cost of $22K per intersection. Can be standalone without connecting to the cloud.

Company: Connected Signals: Connected Signals is a company that focuses on providing intelligent transportation solutions related to traffic signal information. The company aims to enhance the driving experience and optimize traffic flow by leveraging real-time traffic signal data. Connected Signals often offers applications or services that provide drivers with real-time information about traffic signal status, such as when a light is about to change, helping drivers make informed decisions and potentially improve traffic efficiency and reduce wait times. Headquarters are in Irvine, CA, USA.

Connected Signals presented three solutions. The cloud-based ecosystem, the signal priority system, and Enlighten/GlobalLight.

Speaker: David Etherington

- Cloud based system, performance monitoring, signal prioritization.
- Real time predictive information, traffic signal priority, devices already on the bus.
- Uses existing connections, pedestrian signal applications. Very quick to install, no new hardware needed. Pedestrian call based on routing.
- Security baked into the system. Implemented in Arcadia, CA. Found to reduce stops and delays.
- Q&A: Map provider Google maps, not a partnership; Latency around 0.5 s; System yet to be proven with multiple vendors; They use National Transportation Communications for ITS (Intelligent Transportation Systems) Protocol (NTCIP) communications, work with Traffic Management Centers (TMCs) through cloud services.

Company: LYT: LYT is a cloud-based software platform that uses state-of-the-art connected vehicle and machine learning technologies to prioritize the flow of vehicles in a city and across a corridor. By optimizing public transport, emergency and other vehicles they enable shorter travel times, less congestion, improved air quality, and more reliable mass transit. The company's headquarters are in Santa Clara, CA, USA.

LYT presented its solution named Transit Signal Priority. This is a set of operational improvements that use technology to reduce dwell time at traffic signals for transit vehicles by truncating and extending green intervals. TSP may be implemented at individual intersections, across corridors, or entire agencies.

Speaker: Pete Ganci

- CA based, transit signal priority and emergency vehicle preemption.
- TSP based on machine learning. Feed data to calibrate the model. 8 weeks' worth of data used, updated each week.
- Estimates time of arrival for the transit trip.
- Software based, leveraging existing hardware.
- Dashboard with layers showing status of each signal, positioning of buses and the status of each bus. Green shows the bus has a current priority request.
- Q&A: Signal Control security is ensured through a micro server interfacing between cloud and traffic network.

Company: Valerann: Valerann is a global leader in intelligent road traffic management solutions (ITS) and is passionate about redefining modern mobility and roadway operations. They do that through leveraging data and the power of AI to enable actionable, accurate, and timely data-driven decision-making. They use information from multiple disparate sources and deploy their sophisticated proprietary AI & computer vision algorithms, to extract value from Big Data. They deliver a clear and comprehensive vision of the entire road situation in real-time. Established in 2016, Valerann has headquarters in London, UK.

Valerann presented its product called Lanternn which is used for effective Traffic Management.

Speaker: Jodi Brown

- Started in 2016, manufactured their own sensor. Interest was on their management system
- Deployed in 6 countries, now in Virginia, US
- Roadway in Israel monitoring, brings in a lot of data.
- Layers provide road assets, data, weather, all the way to recommended actions.
- Showed incident, Waze detection has automatically brought up the location of the incident.

Company: Q-FREE: Q-Free is a global company that provides intelligent transportation systems and solutions. They specialize in tolling systems, parking management, traffic management, and advanced transportation software. Q-Free's solutions aim to improve traffic flow, reduce congestion, enhance tolling operations, and contribute to smarter and more sustainable transportation infrastructures. The company's headquarters are in Trondheim, Norway.

Q-FREE presented its solution, the ATC-compliant Signal Controllers aiming to minimize waiting times at intersections.

Speaker: Pete Ganci

- Based in Norway, new to US, they bought Intellight, now rebranded to Q-Free.
- GDOT deployment of 9,500 – Their central system supports third party controllers.
- Applications: CV, ramp metering, adaptive signal control.
- Max-time adaptive requires their own controller.

Company: Brandmotion: Brandmotion is a company that focuses on providing vehicle technology solutions. They offer a range of automotive accessories, safety products, and connected vehicle solutions. Brandmotion specializes in developing products related to vehicle safety, connectivity, and customization, including backup cameras, collision avoidance systems, vehicle integration solutions, and more. The headquarters are in Novi, MI, USA

Brandmotion presented its solution called SmartHUD which provides in-vehicle visual and audible alerts for drivers.

Speaker: Jeff Varick

- Retrofit solutions to save lives. They provide engineering solutions.
- Retrofitting heavy vehicles.
- Phones not good enough: They propose Smart HUD (Heads-up display), quickly upgradeable with new apps. Several phases of deployment.
- Interface with other infrastructure: Their current HUD has security.
- Key to faster deployments: engagement of stakeholders, increase awareness.
- One network data – they will receive data for work zones, not requiring LTE subscription.
- Q&A: HUD comes with OBU/SCMS; system existing data sources that FDOT uses-. HASS Alert, TTS; HUD is a developmental project, it does not require a LTE scubscription.

Company: Nexar: Nexar-powered dash cams enable new vision-based applications for better driving. When drivers pair Nexar-powered dash cams with the Nexar app, they join a network that powers new applications for driving and seeing the world. Using anonymous, aggregated data captured from this network, Nexar has developed a portfolio of vision-based data services for public and private sector partners to make roadways safer and more efficient. The company is headquartered in Tel Aviv, Israel.

Nexar presented its solution called Real Time Work Zone (RTWZ).

Speaker: Ludo Fassati

- Based out of Israel, digital twin for entire network.
- 700K cameras around the world. They anonymize everything. Crowd sourced vision.
- How is this used by agencies: Remote check before sending out people. Work zone status, manage inventory.
- Q&A: Handling PII- Every driver has secure personal cloud access, no one else has access. All data are anonymized; depending on the location, signal condition is updated every 7 to 48 hours.

Company: TTS: Traffic Technology Services (TTS) is a technology company and information service provider for connected and automated vehicle applications. TTS includes a team of experienced professional traffic engineers, software programmers, data scientists, and business development directors who understand traffic controller systems and traffic operations. They foster partnerships with private and government entities to improve the movement of people and goods through their services. The headquarters are in Beaverton, OR, USA.

TTS presented its solution Personal Signal Assistant that is integrated via the Prediction API and available by subscription for any consumer.

Speaker: Kiel Ova

- Compatible with SAE J2735. In 2016 they introduced a system for CV2X.
- They are in between traffic agencies and business-to-business (B2B).
- They predict traffic signal operations, Personal Signal Assistance.
- They had partnered with Audi.
- They provide signal intelligence report to agencies. 100 intersections in Gainesville
- CEVE is a separate company out of Tampa that has a smart phone app for end users.
- They have a statewide agreement with FDOT.

Company: Tappy Technologies: Tappy Technologies presented the Tappy Guide, which is designed to safely navigate people with disabilities and senior citizens in unfamiliar areas and situations and to ensure they can locate and identify their form of transportation. With a user-friendly interface and an intuitive platform, Tappy Guide aims to provide a clean straightforward experience for everyone.

Speaker: John Petrous

- Help people with disabilities with real-time navigation.
- They are helping parking spaces become more accessible.
- Disabled travelers need real-time information. Uses live google map. Navigation indoor as well.
- They cater to multiple disabilities and to seniors.
- App is free to users.
- Q&A: There is a setup and monthly fee for cities/municipalities; data on call initiation and resolution collected.

Discussions and general comments:

- UFTI to share notes and hold follow-up discussions.
- Need a clear roadmap of what is next.

5.2.4 Event 4: ACES

The showcase on theme “ACES” was held on April 28, 2023. Following are the summaries:

Company: CADIAT: CADIAT designs and manufactures intelligent vehicles and trailers with distributed battery electric powertrains for the global logistics industry. The company headquarters are in Phoenix, AZ, USA.

CADIAT presented its solution to improve logistics operation by installing a fully autonomous suite in each trailer.

Speaker: Kyle Scott

- Solution to improve logistics operations. Track and trace technology with perception stack.
- Trailers to follow the lead vehicle with connectivity.

- Safety: regardless of what the lead does, the follower does not have to follow. It allows the follower to stop.
- Use cases: Freeway, drayage operations
- Q&A: This is similar to automated truck platooning, early stage company, no field implementation yet.

Company: Perrone Robotics: Perrone Robotics, Inc. is a technology company specializing in the development of autonomous vehicle systems and robotics. Headquartered in Charlottesville, Virginia, Perrone Robotics is known for its innovative AV platform called "MAX" (Mobile Autonomous X). MAX is an adaptable and flexible platform designed to facilitate the development and deployment of AVs across various industries and applications. The company focuses on providing autonomous vehicle solutions for transportation, logistics, industrial automation, and last-mile delivery. They offer software platforms, middleware, and development tools that help accelerate the development and commercialization of autonomous systems.

Perrone Robotics presented its solution for automating the driving task in specified zone with an outfitted modular AV kit running on a proven full AV stack.

Speaker: Nick Pilipowskyj

- Retrofit AV kit with universal stack
- Currently in L2, L3 and L4. Awaiting National Highway Traffic Safety Administration (NHTSA) approval for L5.
- Application in Texas soon, Johns Hopkins, Univ. of Wisconsin, Virginia. They want to work with universities and share the data gathered.
- Currently retrofitted 30 different types of vehicles. Also offer software support.
- Q&A: No infrastructure support required, operating speeds up to 35 mph, mapping accuracy up to 1cm; Need to work with technical team for pavement quality applications.

Company: EMCSV: EMC Squared Vehicles is a prototype-ready mobility start-up based in Irvine, CA, USA. The company is committed to improving the quality of travel & significantly lowering the operating cost of vehicle fleets. Their vehicle platform is highly scalable & best suited for shared usage.

EMCSV introduced its product, the Store2Home Delivery Electric Vehicle.

Speaker: Mandar Padhye

- EVs for last mile service. Two models: One personal vehicle, and one delivery vehicle.
- Fully enclosed, high electric efficiency, easy to park, they can be plugged in to a regular outlet. 50 miles range. Cost/unit is $8,000.
- State of the art for safety features, including airbags. One radar is adequate.
- Q&A: Working prototype available, no implantation yet. Operating speed of 32 mph. Swappable batteries. No new licensing required as the vehicles are classified as motorcycles.

Company: Via: Via transforms transport and logistics systems into highly efficient digital networks. From branded apps to sophisticated algorithms, their fully integrated and customizable platform gives its ultimate flexibility and control over its network. The company is headquartered in New York City, NY, USA.

Via presented its solution for autonomous transit. The goal of the company is to strengthen public transit by deploying AVs to fill transit gaps, fortify existing systems, draw in new riders & tap into AV funding.

Speaker: Eric Garner

- Transportation technology/mobility company. Digital infrastructure for anything that moves across a community. On-demand planning. Paratransit, emergency medical, dynamic campus systems, school bus solutions.
- They have 600 partnerships around the world. 110 mil. Trips. Providers are May Mobility, Navya, EasyMile, Pony, Motional. In Florida: Miami-Dade, Sarasota, Palm Beach, St. Lucie, City of Key West.
- Arlington TX, conventional micro transit, expanded to 60 vehicles now. City is very forward looking, they launched a one-mile square downtown, to complete downtown rides requested. Success story. 7x ridership growth.
- Q&A: Challenge to overcome societal obstacles for transit and AV adoption, higher speeds matter for adoption; Good fit for last mile applications in isolated areas.

Company: Qualcomm Technologies: Qualcomm is a key player in the development of mobile communication technologies, particularly in the design and marketing of wireless telecommunications products and services. They are recognized for their contributions to the evolution of 3G, 4G, and 5G technologies, which power smartphones and other mobile devices. In addition to mobile technologies, Qualcomm is involved in various other sectors, including Internet of Things (IoT) devices, automotive technologies, data centers, AI, and more. The company is headquartered in San Diego, CA, USA.

Qualcomm Technologies presented its solution, which is a V2X ecosystem that aims to drive the future of smart transportation.

Speaker: Praveen Singh

- CV2X software and hardware solutions. Federal Communications Commission (FCC) finally granting waivers for deployments.
- They work with all automotive suppliers and have solutions in their products. Work closely with ecosystem partners. Incorporate chipset, also to ensure interoperability, meet performance requirements.
- Future of mobility: connectivity, safety, better user experience. Robust CV2X ecosystem is ready.
- Q&A: Large R&D division, opportunities to collaborate with universities.

Company: Kyra Solutions: Founded in 1997, Kyra Solutions has emerged as one of the State of Florida's leading information technology service providers. Headquartered in Lakeland with an office in

Tallahassee, this firm has successfully completed dozens of projects and employed and managed hundreds of IT professionals.

Kyra Solutions presented a technology-agnostic software solution for safety and compliance, providing messaging and information services for traffic management and motorists called IntelliConncet.

Speaker: Barry Pelletteri

- IntelliRoad is division of Kyra solutions.
- Partnership with Florida Turnpike. CV2X use cases. Smart phone with app, fully connected, partially connected, non-connected options.
- Data enabled partnership between motorists and TMCs.
- Q&A: Perpetual licensing not available, custom licensing packages.

Company: Information Logistics: Information Logistics creates apps for gathering internal data for public distribution, for internal dispatch/tracking, and for providing geo-centric information to the public in a hands-free eyes-free manner. The company's headquarters are in Pennsauken, NJ, USA.

Information Logistics presented the HELP platform. HELP is a web-based service that allows a DOT to establish an information link with travelers. The system is cloud-hosted and scalable. The core HELP system leverages Federal Emergency Management Agency FEMA's Wireless Emergency Alert (WEA) system to send a WEA message targeted to a specific geofenced area. The message describes the emergency and requests travelers to opt-in for information exchange with the DOT, just for the duration of this emergency.

Speaker: John Farrell

- Focus on traveler information messages: How to get in touch with your travelers, when they don't use 511?
- Help Alerts: Geo-targeted alerts for road closures and incidents. Case studies in NJ, PA.
- IRIS Eyes: Get live video streams from remote cell phones into your operation center.
- Working with state DOTs for implementation.
- Q & A: Targeted geo-fence solutions; little feedback from communities except users during launch programs.

Company: AI Waysion: Founded by Dr. Yinhai Wang and Dr. Wei Sun of the University of Washington, this company provides smart mobility solutions using AI and edge computing. Among them are the Mobile Unit for Sensing Traffic (MUST) and the WaysionNet, a web and mobile application for device management, data analytics, and visualization communication and control.

Speaker: Wei Sun

- Leverage Edge AI for Traffic Safety. Sensor fusion for comprehensive monitoring.
- Camera based hazardous events detection, visualization and insights. Can send 10 sec video clip of event.
- Comprehensive traffic sensing. Detection, counting, tracking of all road users. Tracking pedestrians. Vehicle RE-ID. Roadway conditions monitoring.

- Most projects in WA state.
- Open to work with Dynamic message sign (DMS) vendors to update the signs automatically, currently the information is sent to WADOT users.

Company: Rhythm Engineering: Rhythm Engineering is a traffic management and intelligent transportation systems (ITS) company based in Lenexa, Kansas, USA. The company is known for developing innovative solutions to improve traffic flow and reduce congestion at intersections.

Rhythm Engineering presented its solution code/Green that does not include hardware, and performs TMC analysis to come up with timing plans for signals in the most effective way possible.

Speaker: Reggie Chandra

- Intersection optimization with a dashboard
- Data is extracted from Axis cameras. The solution can include data detection using AI-based detection or an existing detection system.
- Track each vehicle's speed and direction of travel. Pedestrians can also be tracked.
- The solution includes a unique generation of timing plans and self-optimization cycles.
- Q&A: Vehicle detection utilizes YOLO, timing system applicable for both at intersection and corridor levels.

Company: Terbine: Terbine offers TerbineLink, the first purpose-built platform for monitoring and managing large multi-vendor EV charging systems. TerbineLink is designed to synchronize all the key elements involved with EV charging infrastructure. Operating in the cloud, the software-based platform has been developed to give system operators the ability to monitor and manage increasingly complex multi-vendor environments spread across wide geographies. The company is headquartered in Las Vegas, NV, USA.

Terbine, presented its solution TerbineLink which monitors vehicle locations and battery levels in order to collect data. TerbineLink makes correlations using machine learning technology to provide real-time optimized solutions for the suggested location to charge the EVs.

Speaker: David Knight

- Innovative EV charging company specializing in developing and operating charging infrastructure for electric vehicles.
- The company offers a comprehensive network of charging stations strategically located in key urban areas, making it convenient for EV owners to charge their vehicles.
- Charging network is compatible with various EV models, ensuring accessibility for a wide range of electric vehicles and promoting the adoption of sustainable transportation options.
- Q & A: Plans to work with FEMA.

Discussions and general comments:

- UFTI to share notes and hold follow-up discussions.
- Slides to be uploaded on FDOT SharePoint.
- Need a clear roadmap of what is next.

5.3 Summary and Next Steps

To organize the industry showcase the project team first compiled a list of industry contacts and invited over 80 emerging transportation technology companies to submit abstracts for consideration. The announcement solicited abstracts that provide information about the proposed concept or technology, testing details, safety and mobility benefits, and deployment costs. The abstracts received were evaluated based on several criteria including the technology's potential to improve safety and mobility, innovation, technical accomplishment, and clarity of response.

The research team received abstracts from 40 companies. Due to the high number of responses, the originally planned single event was changed to a series of showcase events spread over four months from January to April 2023. Each showcase event had a theme (data platforms, smart sensors, infrastructure, and vehicle applications and automated, connected, shared and electric vehicles) based on the participating companies and their proposed products.

The showcase events were virtual, lasting 3.5 hours each, with 10-minute presentations and 5-minute Q&A sessions for each invited company. The audience included various departments within the FDOT central office, FDOT district offices, local agencies, and non-profits.

The companies presented technologies ranging from video and radar fusion for traffic operations to cloud-based systems for signal prioritization, transit signal priority, and real-time navigation for people with disabilities. Overall, these showcases provided a platform for industry companies to showcase their technologies while allowing FDOT and other agencies in Florida to stay informed about the latest advancements in emerging transportation technology.

One of the recommendations stemming from these events was to create a system for sharing the presentations with other local agencies, MPOs and TPOs. A second recommendation was to hold follow-up discussions with industry to encourage more participation from local agencies. A third recommendation was to make sure the companies invited to present at future showcase events address or seek to address Florida-centric issues and challenges.

Based on the interest expressed by participating agencies for specific technologies presented, the UFTI research team is developing scopes of work with the specific technologies/solutions in focus. These projects are designed to advance the state-of-the-art and facilitate the deployment of promising adavanced transportation technologies. These scopes are being submitted to FDOT as part of the research cycle. UFTI also plans to partner with some of the companies and apply for national grants.

6. Outreach and Engagement with Public Agencies and Communications Strategy

We began our strategic planning process by compiling an extensive roster of agencies we have engaged with (Appendix D). We categorized agencies into federal, state, and local groups. We then provided a detailed account of UFTI/I-STREET™'s existing interactions with some of these agencies and also those whom we intend to establish connections within the near future.

A SWOC analysis was conducted to evaluate and assess internal and external factors influencing UFTI/I-STREET™. Based on the insights gained from the SWOC analysis, we discussed how we plan to reach out to public agencies and where we plan to engage with them (i.e., industry showcases, conferences, industry-specific events, etc.).

We also included a section related to goals and objectives to provide direction on what we plan to accomplish and how we will measure our progress. Goals are the broad, high-level outcomes of what we plan to achieve (where we want to go), and our objectives are how we want to get there. Our objectives are specific, measurable, quantifiable, achievable, relevant, and time-bound (SMART). Our SMART objectives will help in defining our strategic direction. We also provide a set of KPIs that will provide us with quantifiable data to measure our progress in achieving our objectives.

The strategies and plans contained within this document are expected to evolve as technology and conditions change and as feedback is received from multiple stakeholders. This plan is being developed to identify, communicate with, and engage agencies to (1) access I-STREET data, (2) test equipment in a real-world setting, and (3) deploy technology/products developed and tested at the I-STREET Living Lab. This strategic plan will help generate public sector awareness about I-STREET, leading to an interest in deploying I-STREET technologies.

6.1 Agencies that UFTI/I-STREET™ Currently Engages With

This plan focuses on public agencies (local, state, and national) interested in specific I-STREET™ projects and the deployment of technologies. Therefore, transportation agencies are the primary target audience for communication/outreach and engagement. Below are the agencies that UFTI/I-STREET™ currently engages with and others we intend to establish meaningful connections within the future.

Federal Agencies

At the federal level, UFTI/I-STREET™ is well-connected to the U.S. Department of Transportation through its University Transportation Centers (UTC) program and other projects. UFTI has been the recipient of three competitively awarded UTCs. The Tier-1 UTC (Center for Multimodal Solutions for Congestion Mitigation) was selected in 2006 and ended in 2013. Two Regional UTCs (Southeastern Transportation Research, Innovation, Development & Education (STRIDE) were awarded from 2013 to 2016 and 2016 to 2023, respectively. The centers focused on congestion mitigation. The UFTI is also well-connected with programs in the FHWA, such as the CARMA, where I-STREET™ researchers evaluate the program for use on the road network, which makes up the I-STREET™ Living Lab. In addition, the UFTI/I-STREET™ has been expanding its reach (through responding to requests for proposals) to the Federal Transit Administration (FTA). Moving forward, there are opportunities for growth within the Federal Railroad Administration and the Federal Aviation Administration (FAA).

State Agencies

UFTI/I-STREET™ has an excellent relationship with FDOT's Central Office in Tallahassee, FL. Moving forward, UFTI/I-STREET™ should strengthen its ties, engage with various offices beyond Traffic Operations, Safety, and Transit, and include Construction, Freight and Rail, Maintenance, and Aviation. At the FDOT district level, UFTI/I-STREET™ has a strong working relationship with District 2 (Lake City). Additional outreach and engagement should be established with District 1 (Bartow), District 3 (Chipley), District 4 (Ft. Lauderdale), District 5 (Deland), District 6 (Miami), and District 7 (Tampa).

Metropolitan Planning Organizations (MPOs), Transportation Planning Organizations (TPOs), Local Agencies, and Other Entities

At the local level, UFTI/I-STREET™ has enjoyed a long-standing and robust relationship with the CoG and its MTPO. UFTI has also been conducting research in FDOT District 2, District 4, District 5, and District 7. The next step will be for UFTI/I-STREET™ to collaborate with local agencies in major metropolitan cities in Florida such as Jacksonville, Miami, Tampa, Orlando, St. Petersburg, Hialeah, Port St. Lucie, Cape Coral, Tallahassee, and Ft. Lauderdale, which are cities with large populations. Initial outreach will begin by emailing these local agencies' directors to request an online or in-person meeting to discuss their priorities and needs. The email will include information related to I-STREET™ capabilities and projects underway. It will also emphasize how I-STREET™ can solve their transportation issues. Every attempt will be made to ensure that meetings can occur during conferences and other activities related to these local agencies. Connecting with the MPOs and TPOs in these major cities via in-person or remote meetings would be most effective.

By connecting and engaging with these local agencies, we can tap into other groups, such as non-profits that advocate for transportation, transit, and planning. A great example of how a transportation non-profit in the Tampa Bay area engages with various transportation groups is The Tampa Bay Mobility Alliance (TBMO). The non-profit Transportation for America may serve as a resource at the national level. Other resources include the Florida Metropolitan Planning Organization Advisory Council (MPOAC), which is a statewide transportation planning and policy organization created by the Florida Legislature that serves to elevate the role of MPOs in the cooperative transportation planning process (MPOAC supports all 27 MPOs within the state) and the Association of Metropolitan Planning Organizations (AMPO) which is an organization that promotes MPOs. AMPO often hosts trainings, conferences, workshops, and other forums.

AMPO will be an excellent resource for UFTI/I-STREET™ to engage with because they are an organization with an active membership. Presenting the work and research currently being undertaken at the I-STREET™ Living Lab at AMPO will be one of the outreach activities associated with this plan.

Other entities we will continue to engage with include SunTrax and the Florida Chamber of Commerce (Dr. Elefteriadou is a member of its "Autonomous Florida" group).

We will also continue to engage with researchers at Florida International University, Florida State University, University of Central Florida, University of South Florida, and Florida Atlantic University. For example, current engagement with these entities includes partnering on FDOT funded research (USF, UCF, Florida Poly), USDOT funded research (FIU))

A SWOC analysis was undertaken in the next section. A SWOC analysis is a strategic planning tool that helps to evaluate and assess the internal (Strengths and Weaknesses) and external (Opportunities and Challenges) factors that influence an organization.

6.2 SWOC Analysis

A SWOC analysis was conducted with crucial I-STREET™ staff to understand the Living Lab's strengths, weaknesses, opportunities, and challenges for creating a communications/outreach and engagement plan that will resonate with public agencies in the state. A SWOC analysis helps communication professionals develop communications goals, determine the types of audiences to focus on, tactics to engage in, and KPI metrics that should be tracked to determine whether efforts were successful. The SWOC analysis conducted for this project enabled the development of outreach and engagement plan. Table 6: SWOC Analysis (Public Agencies) provides the results of the SWOC analysis.

UFTI/I-STREET™'s strengths are due to its extensive industry connections and robust relationships with key entities such as the CoG, FDOT, and USDOT, fostered through its research endeavors in emerging technologies. UFTI/I-STREET™ will benefit from fortifying its ties with MPOs, and TPOs in major metropolitan areas. Additionally, fostering a relationship with the FAA and SunTrax holds promise. An important avenue for growth involves exploring AI integration to innovate and develop novel solutions for I-STREET™. As for the weaknesses identified during the SWOC analysis, I -STREET needs to develop connections with offices within FDOT it doesn't currently engage with. Furthermore, it could prove advantageous to foster relationships with major cities like Tampa, Orlando, Sarasota, and St. Petersburg, along with their respective MPOs. UFTI/I-STREET™ should also strive to develop stronger relationships with the FTA, FRA, and FAA. As for the challenges identified, variations exist from one public agency to another in the understanding of emerging technologies, meaning UFTI/I-STREET™ will have to tailor their engagement activities accordingly. And finally, securing dedicated funding for I-STREET™ is crucial to supporting the outreach and engagement efforts outlined in this document.

The insights obtained through the SWOC analysis were instrumental in shaping the subsequent sections of this report. These sections delineate the methodology behind compiling the agency list, the criteria for agency selection, and our strategies for effective engagement and outreach. Additionally, the report details our goals and objectives, providing a detailed plan of our proposed efforts, while ensuring measurable progress. This chapter also includes measurable goals and KPIs and details on how to reach those goals via various tactics. The final section of this chapter focuses on the communication tactics. The strategies and plans contained within this document are expected to evolve as technology and conditions change and as feedback is received from multiple stakeholders.

Table 6: SWOC Analysis (Public Agencies)

Internal to I-STREET™	
Strengths	**Weaknesses**
• Leading center for emerging technology research in Florida • Extensive industry connections. • Excellent relationship with the FDOT central office and several districts through quarterly meetings and project initiatives • Excellent relationship with the CoG with a Memorandum of Understanding (MoU), data and services agreements. • Excellent relationship with USDOT through the leadership of the UTC program • Well-connected with FHWA programs such as CARMA • Robust research and field deployments • Engagement with Texas and Ohio on emerging technologies • UF partnership with Nvidia	• Not well connected with other central offices in FDOT, such as rail, maintenance, construction • We do not have established connections with the cities of Tampa, Orlando, Sarasota, St. Petersburg • We do not have relationships with MPOs, TPOs in Tampa, Orlando, Sarasota, St. Pete, Boca Raton, Ft. Lauderdale • We don't have strong relationships with FTA, FRA, FAA
External to I-STREET™	
Opportunities	**Challenges**
• Strengthen our relationship and engagement with Jacksonville Transportation Authority (JTA) • Strengthen our relationship with the City of Miami/Miami Dade County • Grow relationship with SunTrax • Strengthen the relationship with Smart North Florida, a non-profit with North Florida TPO. • Establish a relationship with the FAA through Florida Atlantic University (FAU) • Expand our relationships with transit and other local agencies around Florida. • Explore using AI to develop new solutions	• No dedicated funding for UFTI/I-STREET™ to explore these relationships and pay for traveling and conference booths. • Level of understanding of emerging technologies may significantly vary from one public agency to another.

6.3 Identifying and Engaging with Key Partner Agencies

This section outlines the engagement activities proposed for public agencies. In this context, engagement is defined as meaningful interactions and connections with stakeholders where a productive dialogue occurs and where concerns are addressed, insights gathered, and collaborative relationships fostered. The key stakeholders for UFTI/I-STREET™ include FDOT, MPOs, and specific federal agencies.

6.3.1 Developing a List of Public Agencies

Our SWOC analysis revealed the strengths of UFTI/I-STREET™ in its connections to public and private entities. It also revealed that more work is needed to engage with other public agencies that we are currently not involved with. Since our intended audience for this task are those working in public agencies at the federal, state, and local levels in Florida, we created a database containing selected federal agencies and the seven district offices associated with FDOT, including its Central Office in Tallahassee, FL.

Drilling down further into the local agency core, we added MPOs and TPOs related to each district. This information was found by tapping into the Florida Metropolitan Planning Organization Advisory Council's website, which lists Florida's 27 MPOs and TPOs by county. The database (Appendix D) contains the agency's website, contact information of a representative of the agency, address, and social media presence. The list includes more than 60 agencies and was created to assess the types of agencies that exist primarily in the state.

We intend to explore relationships with non-profit transportation advocacy groups in the future. Engaging with advocacy groups is essential as it provides a bottom-up approach to our efforts. Research in the social sciences sphere has shown that when the community is included and engaged (i.e., MPOs, TPOs, non-profits) in discussions related to new efforts or initiatives, there is a stronger sense of collective ownership and acceptance of new technology, for example, rather than directives coming from the top-down *(Medugorac & Schuitema, 2023)*. The UFTI/I-STREET™ may want to consider this when working with agencies and selecting the technologies to be tested and deployed that have the potential to make a difference in a community, state, or nation.

6.3.2 Selected Public Agencies to Engage With

UFTI/I-STREET™ aims to engage with agencies that are relevant to its mission of advancing transportation through the creation, testing, and deployment of innovative transportation technologies. For example, the agencies listed in Table 7 have been chosen for their involvement in cutting edge technologies such as CAVs, AVs, connected vehicle infrastructure, autonomous shuttles, micro transit and (Automated Driving Systems (ADS). Through engagement with the public agencies outlined in Table 7, UFTI/I-STREET™ will be able to collaborate with key public agencies on important research that will push innovation forward for transportation in the public space.

Table 7: Partners for Potential Engagement

Agency	Reason for Engagement
FDOT District 2, District 4, District 5, and District 7	These districts deploy emerging technologies such as autonomous shuttles and CV infrastructure. We currently engage with these districts.
MPOs – North Florida TPO, JTA, Miami-Dade County, and Lynx Orlando	These MPOs are testing new strategies such as ADS, micro transit, and ADAS. We currently engage with these MPOs.
FHWA and FTA	The Cooperative Driving Automation (CDA) program at FHWA is a key initiative addressing the gaps and challenges of transition to automated driving. FTA in recent times has been highly interested in ADAS and automated shuttle related research.

6.3.3 Initiating Engagement with Public Agencies

Meetings with public agencies will center around understanding their priorities and needs. Depending on local agencies' interests, I-STREET™ can contribute to finding suitable technology-based solutions to local issues, develop and implement pilot studies with new technology, or help with full-scale implementation of a technology already implemented/evaluated at I-STREET™. The meetings will also provide agencies with information on accessing data, testing, and deploying emerging technology in partnership with I-STREET™.

The initial phase of engagement will begin with the UFTI/I-STREET™ team reaching out via email to contacts at both state and local agencies, specifically targeting FDOT and MPOs. The email will extend an invitation to public agencies for either an in-person or online meeting, providing a platform to explore their priorities and needs in collaboration with the UFTI/I-STREET™ team.

The email will include comprehensive information about ongoing I-STREET™ projects. It will encourage public agencies to actively engage with I-STREET™ data, test equipment, and implement cutting-edge technologies in partnership with I-STREET™. The email will emphasize how I-STREET™ serves as a viable solution to address their transportation challenges. Additionally, the email may incorporate illustrative graphics showcasing how I-STREET™ is actively contributing to resolving transportation issues.

For example, UFTI/I-STREET™ has engaged with some FDOT district offices through the Industry Showcase held in Spring 2023. Nevertheless, every attempt will be made to ensure in-person meetings can occur during conferences and other activities related to these local agencies. An essential aspect of this engagement process is gaining a profound understanding of the unique priorities and needs of every agency that UFTI/I-STREET™ interacts with.

Table 8 outlines our suggestions for initiating engagement with FDOT district offices, MPOs, and federal agencies, complete with details on how we intend to proceed and suggestions for the timing and locations of these activities.

Table 8: Suggestions for Engagement

Agency	Potential Activities for Initiating Engagement with Public Agencies
FDOT District 2, District 4, District 5, and District 7	• Contact via email to request an in-person or online meeting. • Attend industry events/conferences. • Showcase I-STREET™ work relevant to the specific district. • Engage with the district or agency on social media by commenting, tagging, and sharing relevant information. • Present at agency events.
MPOs – North Florida TOP, JTA, Miami-Dade County, and Lynx Orlando	• Contact executive directors, planners, or community engagement coordinators via email to request an in-person or an online meeting to discuss partnership and research opportunities that align with their needs and interests. • Participate in meetings hosted by MPOs or workshops and present about I-STREET™ during those events. • Researchers associated with I-STRIDE should utilize LinkedIn to connect with professionals from Florida's MPOs and share insights related to I-STREET™. • Propose to collaborate on projects related to a Florida-specific challenge related to an MPO and offer solutions.
FHWA and FTA	• Participate in the FHWA CDA stakeholder groups and workshops. Seek collaboration to develop CDA use cases. • Meet FTA representatives and understand their research priorities. Apply for RFPs in ADAS and ADS domains.

6.3.4 Engaging with Public Agencies

To continue to build relationships with transportation agencies and their staff, UFTI/I-STREET™ plans to actively engage with public agencies. UFTI/I-STREET™ has already engaged with some FDOT district offices through the Industry Showcase held in Spring 2023 and plans to continue. Table 9 includes potential venues and a time frame.

What can agencies expect when engaging with I-STREET™?

- Comprehensive evaluation of emerging technologies, quantitatively and qualitatively, before proceeding to full-scale implementation.
- I-STREET™ serves as a facilitator, fostering dialogues among industry, academia, and the public sector.

Based on the SWOC analysis and the agencies identified in this section, we describe the I-STREET™ goals and objectives for engagement with public agencies in the next section.

Table 9: Potential Venues and Time Frame

Agency/Audience	Potential Activities for Engaging with Public Agencies
FDOT District 2, District 4, District 5, and District 7	• Annual industry showcases (Q1 – January to March) • Executive roundtable with FDOT leadership on partnerships (Quarterly/Bi-yearly) • Emerging technology roundtable with local agencies at the FAV Summit annually (Q4 – October to December) • Participating in state-level conferences/events such as National Autonomous Day, FLPRITE events, etc. (Annually)
MPOs – North Florida TOP, JTA, Miami-Dade County, and Lynx Orlando	• Annual industry showcases (Q1 – January to March) • Presenting about I-STREET™ at the Florida American Planning Association (APA) Annual Conference (Annually) • Hosting a meeting with MPOs at the FAV Summit (Q4 – October to December) • Hosting a workshop or meeting related to smart cities in Florida via the Smart Cities Alliance in Tampa Bay (Q2 – April to June)
FHWA and FTA	• Participate in the FHWA CDA stakeholder groups and workshops. (Annually) • Interview FTA representatives as part of FDOT funded research on Autonomous Mobility and meet them annually.

6.4 Goals and Objectives for Engagement with Public Agencies

Our overarching engagement mission is to heighten awareness among numerous transportation agencies regarding I-STREET™ and drive a decisive call to action: to test, access data, develop, and deploy I-STREET™ technologies. We intend to strengthen our existing relationships and initiate engagement with agencies where collaboration has not yet been established. Thus, guided by the SWOC analysis, the research team has formulated the subsequent set of goals, objectives, and KPIs.

6.4.1 Goals

1. Establish more robust relationships with agencies in the federal government we have been collaborating with (FHWA and FTA) and create new ones with other agencies such as the FAA and FRA.
2. Continue to engage with and cultivate a relationship with the following Offices at FDOT's Central Office: Aviation, Construction, Freight and Rail, Maintenance, Public Transit, and Safety.
3. Grow the relationship with the following FDOT district offices: District 2 (Lake City), District 5 (Deland), District 6 (Miami), District 1 (Bartow), District 3 (Chipley), District 4 (Ft. Lauderdale), and District 7 (Tampa).
4. Develop relationships with MPOs and TPOs in Florida, such as North Florida TPO, JTA, Miami-Dade County, or Lynx.
5. Identify agencies that are interested in accessing I-STREET™ data.
6. Identify agencies interested in testing and deploying their equipment through collaboration with I-STREET™.
7. Work with agencies to deploy products that have been developed and tested on I-STREET™.

8. Develop relationships with transportation non-profit organizations in Florida and nationally.

6.4.2 Objectives

1. Schedule meetings with several key federal agencies (FAA, FRA, and FTA) by February 2024
2. Schedule meetings and seek collaboration with at least three of FDOT's Central Offices by October 2024
3. Schedule meetings and seek collaboration with at least two of the FDOT district offices by October 2024
4. Schedule meetings and collaboration with one major TPO (or MPO) by December 2025
5. Enlist at least one public agency that will access I-STREET™ data by the end of 2026
6. Enlist at least one public agency willing to test equipment with I-STREET™ by the end of 2027
7. Enlist at least one public agency to deploy products tested on I-STREET™ by 2028

6.4.3 KPIs

1. Number and type of public agencies that accessed I-STREET™ data
2. Number and type of public agencies that tested their equipment on I-STREET™
3. Number and type of public agencies that deployed a product on I-STREET™
4. Number of funded projects or contracts because of engagement with public agencies
5. Number of technologies (equipment) tested due to engagement
6. Number of deployments of technologies due to engagement

The outreach materials are a fundamental element of the outreach and communication plan presented in this chapter. The section below details our approach to developing various outreach materials and how we considered social media an essential component of this effort.

6.5 Outreach/Communication Tools for Engaging with Public Agencies in the Transportation Space

Given social media's broad audience reach, targeted messaging, cost-effectiveness, real-time interactions, networking potential, and capacity for building relationships, social media stands as a potent and indispensable tool for integrating into any initiative or campaign that requires the creation of outreach materials. Social media is indispensable to outreach because it is used proactively to disseminate information, raise awareness, or elicit participation from our stakeholders (public agencies). In this section, we first wanted to understand social media usage by transportation agencies to keep the flow of information active beyond initial in-person meetings. For example, UFTI/I-STREET™ could post real-time updates to social media related to its various ongoing projects, including calls to action encouraging public agencies to access data, test their equipment and technology, or deploy with the I-STREET™ Living Lab. Compelling calls to action help prospective users with their decisions; they tell them what to do next after reading the post on X, Facebook, or LinkedIn. With calls to action, we reduce the risk of having our prospective users click away from our social posts and can increase traffic to the I-STREET™ webpage. Calls to action include action verbs such as "Be the first to know," "Sign up today," or "Start testing today." Alternatively, for a call to action to collaborate with UFTI/I-STREET™, "Let's start collaborating today!" could be an example. The analysis detailed in the subsection below outlines transportation agencies' utilization of social media.

6.5.1 Analysis of Public Agencies' Social Media Presence

The use of social media to build, foster, and maintain working relationships with public agencies in the transportation space is an important consideration. Social media can highlight UFTI/I-STREET™ research and disseminate information on case studies and success stories related to the public agencies utilizing data, testing, and deploying on the Living Lab. UFTI/I-STREET™ can use social media to engage with public agencies' content. Social media can also highlight UFTI/I-STREET™ collaborations or propose potential ideas that could entice public agencies to work with UFTI. Additionally, social media can be used as a networking opportunity, engaging with agency personnel on platforms such as LinkedIn, and the agency's public-facing social channels such as Facebook, X (previously known as Twitter), and Instagram. And finally, let's not forget the power of creating compelling, informational content with colorful and expressive graphic visuals (i.e., infographics, short-form videos, carousels, or polls).

To gain a preliminary understanding of the prevalence of social media use amongst public agencies in the transportation space, 60 public agencies in Florida, which include a handful of transportation agencies at the federal level, were assessed for their social media presence. Our assessment showed that public agencies use LinkedIn less than other social media platforms. LinkedIn is primarily utilized by business-to-business (B2B) entities, and public agencies are not selling a product; they are disseminating information to the general public.

Public agencies use social platforms for information dissemination purposes. Their primary target audience includes the general public, communities, academia, legislators, policymakers, and other public stakeholders. Since information dissemination via social media is critical to public agencies to build trust and engage with citizens, it is strategic for them to be active on platforms popular with the general public. As of March 2023, Statistica reports that Facebook still dominates the social media scene in the United States, taking the number one spot, with X (formerly Twitter) and Instagram coming in at second and third, respectively (Dixon, 2023)[13]. Pinterest, YouTube, Reddit, LinkedIn, and Tumbler ranked lower in visits made to their respective platforms.

Our analysis found that Facebook and Instagram, followed by YouTube, are the top three social media platforms used by the 60 public agencies on our list. Figure 5 shows the results of our analysis.

Following our analysis, UFTI/I-STREET™ has identified the top three social media platforms, including X (formerly Twitter), as critical channels for engaging with transportation agencies online. Additionally, regarding LinkedIn, we recommend that individual researchers associated with UFTI/I-STREET™ connect with agency staff and officials through their respective profiles, as this will help foster meaningful professional relationships and collaboration.

[13] Dixon, S.J. (2023). *U.S. market share of leading social media websites 2023.* Website. https://www.statista.com/statistics/265773/market-share-of-the-most-popular-social-media-websites-in-the-us/

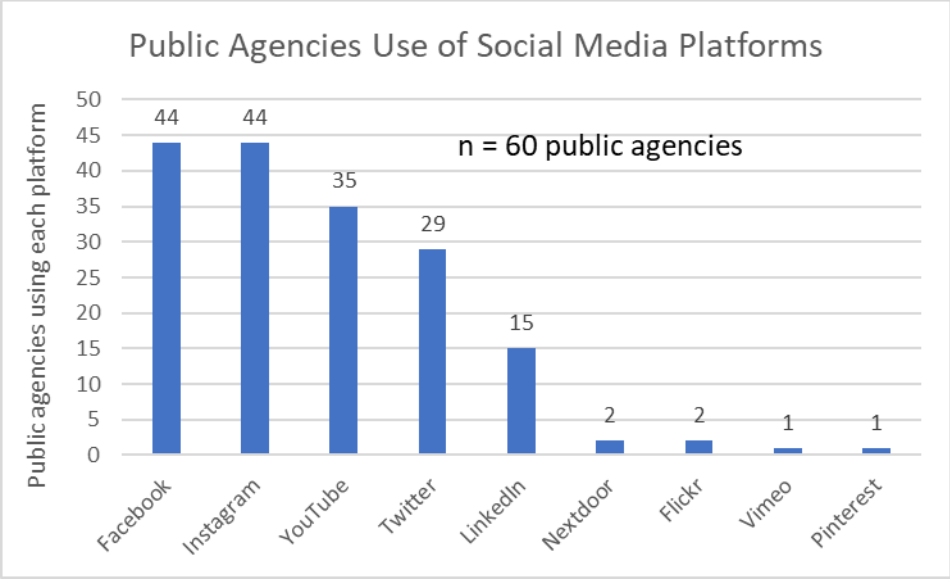

Figure 5: Public Agencies Use of Social Media Platforms

6.5.2 Media Box for Outreach Activities

The media box will provide UFTI/I-STREET™ stakeholders (i.e., public agencies, legislators, and the media) with targeted, easy-to-understand, visually appealing, and comprehensive information. It will be helpful for those who may be interested in learning more about, reporting, or supporting UFTI/I-STREET™.

A designated page for the Media Box has been created on the I-STREET™ website at https://istreet.ce.ufl.edu/media-box/.

Below are the elements that the media box will contain. Contents will be modified as needed. See Appendix E for more information.

- Links to the most recent I-STREET™ newsletter and the UFTI newsletter. (Note: The I-STREET™ newsletter is still under development. See Appendix E for mock-up.)
- I-STREET™ or UFTI annual report – Only UFTI annual reports available. The I-STREET™ annual report will be posted as it becomes available.
- Press releases – A section in the media box has been created for press releases and will be updated as these become available.
- List of key I-STREET™ personnel who can be reached for collaboration or interviews
- One-page project/product summaries (graphically created) posted to social media, created on a content creation platform.
- Infographic(s) showing/telling a story about I-STREET™ impacts
- Graphics of testimonials from collaborators from public agencies
- Logo assets

- Graphics and videos for social media (FB, IG, YouTube, and Twitter) announcing collaborations, testing, data usage, deployments, etc. Agencies or the press can access these to post on their social accounts.
- I-STREET™ Presentations to public agencies
- Multimedia Assets

7. Agreements and Outreach Material

This chapter discusses the development of agreements generated for various industry and public agency collaborations for I-STREET™. These agreements provide the necessary framework for data use and equipment use with a broad set of stakeholders (industry, academia, and other agencies). These agreements can be used as templates for future collaborations with changes made as necessary to accommodate the needs of the specific agencies. The agreements developed are discussed in the next section. This chapter also developed outreach material for disseminating to potential industry partners outlining the capabilities of I-STREET™ and opportunities for engagement.

7.1 Development of Agreement Templates

The UF team along with various stakeholders developed agreements for service, data, and software use. These agreements are available in the appendices to this report and can serve as the starting point in negotiating terms with other similar entities and for similar purposes. The process for developing such agreements typically starts with one entity (often UF) providing initial language for the agreement to the other entity. The initial language is developed by the legal department of the initiating entity and must be reviewed by the legal department of the other entity. UF maintains a variety of such agreements and has been able to provide suitable language as needed.

In all cases, the negotiation between the two legal departments entailed relatively minor language changes. Most of the issues encountered centered around intellectual property and data ownership.

The title, intent, and overview of each agreement developed to date are as follows:

1. MOU with a city or county (Appendix F)
   This agreement served to facilitate data sharing between I-STREET™ and a local agency. The original language was provided by the city and modified through a negotiation process between the entity and UF. The example provided in Appendix C was developed to allow participation in I-STREET™ activities and data sharing between the two parties. Through this agreement, I-STREET™ was able to create a mechanism to access and store traffic data.

2. Data Agreement with a city or county (Appendix G)
   This agreement was developed to ensure that individual users from UF that access city/county data understand and agree to terms that are in the MOU. The original language was provided by the city and modified through a negotiation process between the entity and UF. The agreement language was crafted by modifying the standard language the city/county previously had.

3. Data Use and Transfer Agreements with a transit operator (Appendices H and I)
   These two agreements allowed UF researchers to access field data from an autonomous transit operation and transfer vehicle data for research use. The initial agreement language was crafted in collaboration with UF legal and was adjusted with additional terms from the transit operator.

4. Data Use Agreement with a data platform company (Appendix J)
   This agreement allowed UF to access a web platform which included a signalized intersections data dashboard. The platform included a few hundred intersections that were part of a study area in Florida. UF was able to help partner universities on this project get access to this data.

The agreement language was provided by the data platform company, and it was vetted by UF legal for consistency with Florida laws and UF policies.

5. Data Evaluation Agreement with an automobile data services provider (Appendix K)
   This agreement allowed UF to access and evaluate vehicle data for the Gainesville area for a limited time period. The initial agreement language was provided by the automobile data platform company, and it was modified in collaboration with UF legal to meet UF policies.

6. Data Agreement with a traffic safety smartphone application company (Appendix L)
   This agreement allowed UF to access summary metrics for usage of a safety-based smartphone application and use a custom data visualizer tool to visualize the alerts received by road users. The agreement language was provided by the automobile data platform company, and it was modified in collaboration with UF legal to meet UF policies.

7. Research Services Agreement with a sensor company (Appendix M)
   This agreement allowed UF to provide research services to a sensor company to evaluate their sensing capabilities for a field implementation in Gainesville. The agreement was drafted in collaboration with UF legal and was accepted by the sensor company with minimal modifications.

7.2 Outreach Material

The research team in collaboration with UF and FDOT communications teams, developed a tri-fold brochure for I-STREET™ (Appendix N). The brochure describes the I-STREET™ program and provides useful information through a section called “fast facts” along with a timeline of major events since the inception of the program in 2017.

The research team has also developed the initial version of the “media box” for I-STREET™ (Appendix O) which can be used to disseminate information about I-STREET™ and emerging technologies in an effective way.

7.3 Summary

In summary, UF has developed several types of agreements with various entities, primarily to share data and to conduct evaluations. Such agreements help facilitate the conduct of research services, allows us to access data, and to collaborate with stakeholders and partners. The process used to develop these agreements consists of one entity proposing suitable language to the other entity. Then the receiving entity proposes modifications as needed, which may or may not be acceptable to the initiating entity. Note that the agreements are always negotiated between the legal departments of the two entities. When the two entities agree on the language, the document is signed by both parties.

The agreements developed to date can be used as templates to initiate similar agreements with other entities. They can also serve as building blocks for similar partnerships in the future. Given our experience to date, the language in the agreements we have already implemented is likely to serve the purposes of the majority of potential collaborators.

The outreach materials developed from this project will help disseminate the information about the I-STREET™ program in an effective way to industry, public agencies and other stakeholders.

8. Education and Outreach Plan

This chapter provides an education and outreach plan for I-STREET™ that aims to disseminate research program findings to practitioners, academia, local, state, and federal agencies across the US.

In parallel to this project, UFTI researchers have been collaborating with FDOT to develop a new MS degree for transportation leadership, aimed at transportation professionals. As part of this, we have developed a new introductory course for transportation professionals, attended by several FDOT employees. The degree has been approved by UF and is advertised broadly to the profession. To address the needs identified in this project, additional courses can be developed with FDOT's assistance and based on the recommendations from this project.

The research team (1) developed a list of priorities related to education and outreach considering federal, state, and local priorities and I-STREET™ research project results, (2) sought feedback from FDOT and other stakeholders regarding the list of priorities proposed, and (3) discussed the plan during I-STREET™ stakeholder meetings to adjust accordingly.

The information contained in this chapter constitutes a strategy, which is the blueprint that will serve to shape details of how we plan to establish education and outreach programs in the future. Similar to previous chapters, the plan outlined in this chapter is meant to be a living document. The strategies and plans contained within can change, as feedback is received from various stakeholders.

8.1 Overview of the I-STREET™ Education and Outreach Plan

I-STREET™ will provide academic learning and workforce development opportunities in emerging technologies to develop an exceptional talent pool of future transportation professionals. The I-STREET™ Education and Outreach Plan summarizes existing programs offered at UF and other universities and organizations nationwide. Based on this information, the research team has identified gaps and opportunities where I-STREET™ can develop cutting edge educational programs. It is envisioned that the I-STREET™ stakeholder group will review these and develop an action plan for development and deployment.

I-STREET™ has three potential audiences for educational outreach: professionals, undergraduate/ graduate students, and K-12 students. Each of these audiences requires a unique educational and outreach approach.

To develop the I-STREET™ Education and Outreach Plan, a summary of existing transportation education programs was conducted for each of these three audiences. This summary is provided in the three appendices of this plan (Appendices P, Q and R)

8.2 Education Goals

The goals of the I-STREET™ Educational efforts are to

1) Inform and train audiences about advanced transportation technologies.
2) Build an exceptional talent pool of future transportation professionals.
3) Establish a self-sustaining income stream for I-STREET™.

Each of these goals should be further defined by the I-STREET™ Stakeholder group to be "SMART" (specific, measurable, achievable, relevant, and time-bound).

8.3 Research Priority Areas

During its first six years, I-STREET™ tested a wide range of new technologies such as autonomous shuttles, connected vehicles, and field devices, to optimize signal control and improve safety of bicyclists and pedestrians. Going forward, this project has identified research clusters for the next five years: AI & Data Analytics, Smart and Resilient Transportation Infrastructure, Transportation Access, Privacy & Cybersecurity, and ACES. The I-STREET™ educational efforts will likely follow these research priorities as they provide unique opportunities to educate audiences about emerging technologies and the research around them.

8.4 Educational Priorities: FDOT Input

In April 2023, I-STREET™ met with FDOT employees from several departments during a series of meetings. In each meeting, FDOT representatives were asked to provide input on what the most pressing educational needs are within the transportation industry. The following topics were identified as areas of interest by FDOT employees:

- **Safety Messaging**: FDOT would like to improve the messaging surrounding three desired behavioral changes: lane departure, intersections, and bicycles/pedestrians. There are two aspects of this need that were identified. First, messaging for the public needs to be researched and improved and, second, transportation professionals need to be aware of what technologies and messages have proven effective.
- **Safety Technology**: Transportation professionals need access to the latest information and research on how to improve safety including innovative technologies.
- **Alternative Fuels**: Professionals would benefit from more information on the future of alternative fuels and the issues that may arise from their use.
- **CV Technology:** There is a general interest in learning more about this field and innovations and issues that are related to this technology.
- **Transit Safety**: FDOT expressed a desire for training in any topic that relates to transit safety. It was noted that there is a Transit Research Sharepoint site that is available to anyone with an interest and in this site a variety of research needs have been identified. This could serve as a resource for I-STREET™.
- **AV Transit**: Given the increasing popularity of AV shuttles, there is an interest in more training on this technology.
- **Applicable Research**: In general, FDOT is interested in research that is applied and useful to their work.
- **Construction Zones**: There is a need for information on emerging technologies related to construction.
- **Pedestrian Accommodation in Work zones**: There is a need for information and strategies on how to provide safe accommodation for pedestrians in work zones, particularly when they cannot be detoured.
- **Worker Safety**: There is a need to increase the awareness of workers in work zones. An emerging area of interest is looking at how CV technology can be used in work zones. For example, how can CV improve the awareness of workers in a work zone.
- **ADA:** The general topic of ADA was mentioned as a high priority for the department.

Some of these topics (such as safety technology, alternative fuels, AV transit, ADA etc.) fall under the five I-STREET™ priority research areas, while others fall outside these areas. A key next step for the I-STREET™ Stakeholder group is to supplement this list with other topics that may be important for the department to consider, align educational topics with research priorities, and then prioritize which topics I-STREET™ is uniquely positioned to address.

The following educational strategies were of interest to the FDOT offices.

1) **Webinars** – Webinars provide an easy, accessible, and low-cost introduction to topics and technologies. Webinars are an excellent entry point for professionals to engage with I-STREET™.
2) **Database** – A database of new and emerging technologies and the research related to their efficacy would be a valuable reference resource for transportation professionals to access on an on-going basis.
3) **Courses** – In-depth courses can provide important professional development as well as training in specific technologies.

8.5 Proposed Educational Strategies

Based on both the background research and the input from FDOT employees, I-STREET™ has developed educational strategies for each of the three audiences (professionals, Undergraduate and Graduate students, and K-12 students) as described below.

8.5.1 Professionals

a) Develop Fee-Based Short Courses

I-STREET™ can develop online short courses for professionals on advanced transportation technologies. Courses will be fee-based. I-STREET™ can work with Technology Transfer center to provide appropriate PDH hours and certificates. There are various formats that the short courses could take:

- Specific times or on-demand, available anytime
- A few hours to multiple days
- Courses could be taken individually or, in some cases, combined to complete a group of courses and attain a certification
- Courses could be self-guided with quizzes during the course and/or at the end of the course

b) Develop an Innovation Library

The I-STREET™ Innovation Library can serve as a database for emerging technologies. The library can include short introductory videos (1-5 min), recordings of webinars, and 1- to 2-page information sheets. Videos and briefs can describe (1) what the technology is, (2) what the technology does and how it would benefit the participant, (3) general information on how the technology works and what is needed to deploy it, (4) who developed the technology, (5) how they can work with I-STREET™ and its partners to implement the technology in their agency. Resources in the Innovation Library would be available on-line and free-of-charge. The UFTI has developed these types of resources in the past. Figures 6 and 7 are provided as examples.

Example Video
Congestion Web Mapping Tool for School Districts & Transit Agencies

This 2:22 minute video, developed for the 2021 STRIDE Product Showcase, showcases a technology tool developed at the STRIDE Center.

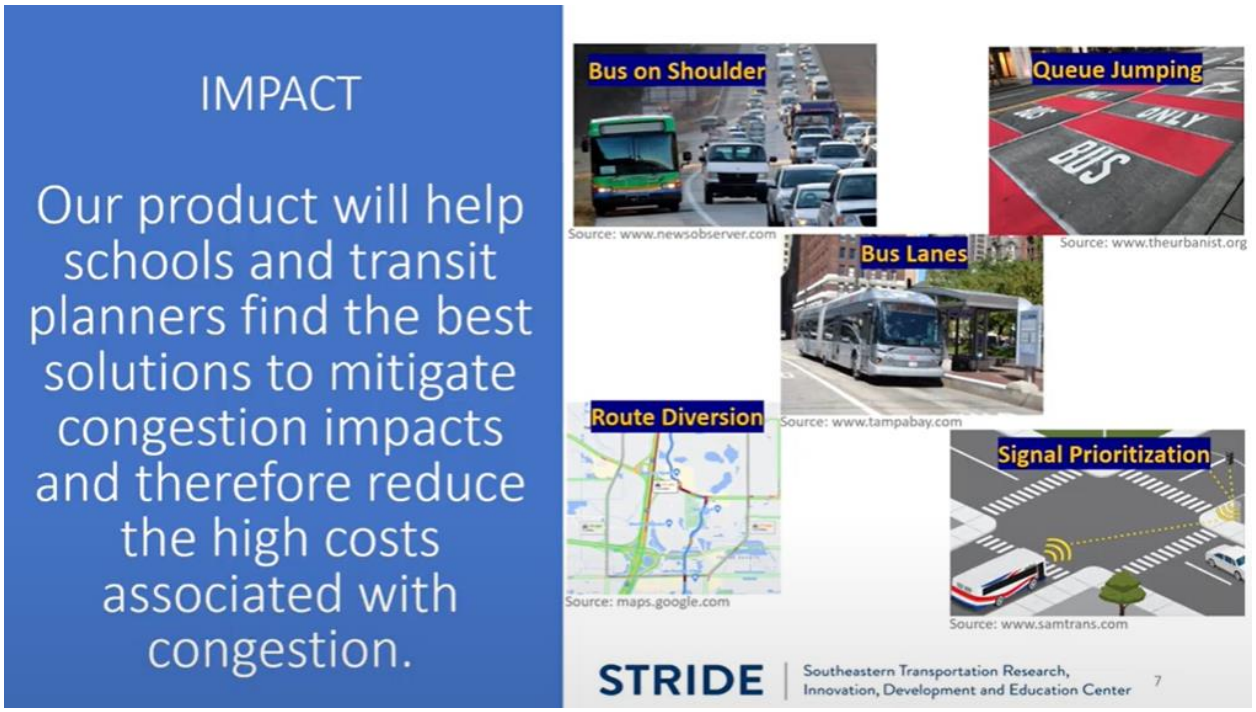

Figure 6: Congestion Web Mapping Tool Video

Example Information Sheet

[Simulation Extension to Evaluate the Impacts of CAVs on Traffic Congestion & Emissions]

This 2-page project brief describes a product that was developed by UF researchers that would enable a wide-scale assessment of how CAVs impact traffic congestion and emissions.

PROJECT BRIEF

UF Transportation Institute UNIVERSITY of FLORIDA STRIDE

Simulation Extension to Evaluate the Impact of CAVs on Traffic Congestion & Emissions

(STRIDE Project D: Evaluation of Advanced Vehicle & Communication Technologies through Traffic Microsimulation)

PROJECT OVERVIEW

As connected and autonomous vehicles (CAVs) begin operating alongside conventional vehicles on roads, there are many "what if" scenarios that need to be considered. Specifically, how do CAVs impact traffic management and emissions? Researchers developed an extension to be used with the traffic simulation software VISSIM that would test the impact of potential "what if" scenarios.

GOAL

The goal of this project was to develop a robust microscopic simulation extension for VISSIM that evaluates traffic operational quality and emissions considering the presence of CAVs.

FINDINGS

In this project, the researchers developed and tested a simulation extension with CAV functionality. This extension was integrated with emissions modeling.

Several traffic scenarios were simulated using different demand and CAV penetration levels. The results showed a net improvement in traffic operational measures (travel time and speed) when CAVs were in the traffic stream.

However, emissions did not follow the same trend. While increasing AV penetration rates resulted in emissions reductions, increasing CV and CAV penetration rates resulted in higher emissions. A deeper analysis showed that while VISSIM's CV logic seeks to maximize the likelihood of vehicle arrival-on-green, the algorithm likely results in oscillation of the second-by-second speeds leading to overall higher emissions. The results are based on a small and relatively simple network, and operations may be different for larger and more complex networks.

PRODUCT

A **simulation extension with CAV functionality** was developed for VISSIM. The extension evaluates how CAVs may impact traffic management and emissions when operating alongside conventional vehicles.

IMPACTS

Adoption of the simulation extension would enable wide-scale assessment of how CAVs impact traffic congestion and emissions.

CLIMATE CHANGE IMPACTS

The simulation extension is helpful in evaluating the impact on CAVs emissions. When suitably integrated with an optimization algorithm with a goal to reduce emissions, this extension can have significant impact on mitigating climate change impacts.

WHO BENEFITS?

- CAV research community
- Simulation modeling research groups
- State Departments of Transportation (DOTs)
- Federal Highway Administration (FHWA)

RESEARCH TEAM

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University of Florida

Figure 7: Project Brief Example

c) Develop Visiting Scholar Programs

This program would allow for short visits by FDOT staff and other agency staff, to become engaged with I-STREET™ research. The visit may be as short as a week and as long as a semester, and the intent would be to gain a better understanding of a specific type of technology that would be useful for the visitor's home agency.

8.5.2 Undergraduate and Graduate Students

a) Expand and Enrich Existing Programs

I-STREET™ can provide **educational modules, resources, and field trip opportunities** for students to learn about advanced transportation technologies in the context of existing courses, majors, and certificate programs. The I-STREET™ Innovation Library and short-courses can provide content that can

be integrated into existing university courses. Faculty can schedule field trips to the I-STREET™ lab to learn about research efforts and technologies. This program can be made available to other universities within Florida and beyond.

b) Establish Internships & Assistantships

Industry Internships: Industry partners can provide internship opportunities for UF students. UF students would spend a semester at a host agency or with a private agency.

Funded Assistantships: Through the UFTI Industry Partnerships, I-STREET™ can provide funding for graduate student assistantships to engage in applied research related to emerging technologies. Through these assistantships, students work collaboratively with researchers and industry partners to develop, deploy, and evaluate cutting-edge technologies.

c) Engage with Engineering Ambassadors Campus Tours

Prospective engineering students at UF can take a special campus tour with the Engineering Ambassadors focused on undergraduate engineering programs (https://www.eng.ufl.edu/engineeringambassadors/). These tours visit various labs and feature innovative engineering opportunities at the UF. The new I-STREET™ lab space could serve as a stop on these tours which could raise the visibility of I-STREET™ while also serving as a recruitment opportunity for engaging future students in the transportation field.

8.5.3 K-12 Students

a) Develop a new Curriculum Module on Transportation Technology

I-STREET™ can develop an educational module on innovative transportation technologies that are being tested and developed. The module can include a lesson plan and hands-on activity that can be implemented in either a standard classroom or a camp environment. The module can be made available for free on the I-STREET™ website. Collaboration with another partner such as the Institute for Transportation Engineers (ITE) would enhance the marketability of the lesson because ITE has experience with developing and marketing K-12 lesson plans (ITE lessons).

b) Implementation

To implement the education plan outlined in this project, the following future actions are recommended in coordination with the I-STREET™ stakeholder group:

1) Review the three broad I-STREET™ educational goals (8.2 Education Goals) and adjust them as necessary to ensure each is “SMART” (specific, measurable, achievable, relevant, and time-bound).
2) Review the educational priorities identified by FDOT employees (8.4 Educational Priorities: FDOT Input) and supplement them with other FDOT priority topics. These should be prioritized to identify the education I-STREET™ is uniquely positioned to provide.
3) The group can identify which strategies are most appropriate for each topic and audience. These strategies should be aligned with one of the three I-STREET™ educational goals.

9. Overall Strategic Planning and Coordination

To become the leading global Living Lab for mobility and safety innovators, I-STREET™ is based upon the solid foundation of the FTP, the single overarching plan guiding Florida's transportation future. FTP is updated every five years with the collaboration of state, regional, and local transportation partners in the public and private sectors. Based on the foundation of FTP, the development of I-STREET™ is aligned with and based on three major pillars: economic development, innovation, and partnerships.

This chapter builds on these founding principles and provides an action plan considering the feedback received by the research team during discussions held at quarterly I-STREET™ stakeholder meetings. This document and its contents are meant to be a living document. The strategies and plans contained within can change, as feedback is received from various stakeholders, and as technologies evolve.

9.1 Summary of Plans and Activities

This section summarizes the results of the planning efforts conducted during this project in four categories: research, industry engagement, public agency engagement, and education.

9.1.1 Research Activities

In the past six years, I-STREET™ has developed and/or tested a wide range of technologies on Florida's highways. Particularly, I-STREET™ has deployed and tested new technologies, such as autonomous shuttles, connected vehicles and their communication with the infrastructure, radar, lidar, and other sensors: it has developed signal control optimization algorithms to leverage CAV capabilities: it has developed new sensors for bike racks on buses and has been working to improve the safety of bicyclists and pedestrians. The testing and evaluation of autonomous shuttles has shown that generally riders are comfortable with the technology, and they tend to become more comfortable with exposure. Our research also found that the main obstacle for wider deployment of autonomous shuttles is their speed: they are too slow for most highways, and drivers stuck behind them may get impatient and attempt unsafe passing. The testing and evaluation of connected vehicle technologies has shown that drivers who receive warnings related to pedestrians and signal control are generally satisfied with such information and have recommended it be integrated with their navigation apps. Research that developed and deployed sensors that can be used on bike racks on buses showed that the technology could be deployed widely if it could be integrated with the corresponding bus arrival app. Previous research has also found that apps that provide warnings to drivers regarding bicycle presence and school zone presence can be effective in reducing crashes.

During this project, the research team met with all relevant FDOT offices to discuss priorities and challenges and to help develop a list of research topics and research projects to address these.

Based on the existing work and inputs from the FDOT and private partners across the country, I-STREET™ has identified five major research focus areas for further development over the next five years: AI and data analytics; ACES vehicle technologies; privacy and cybersecurity; multimodal transportation, and smart and resilient transportation infrastructure. The research team developed a plan regarding recommended activities in each of these focus areas.

These five research focus areas, developed in consultation with FDOT and other stakeholders, will generate a suite of intermediate products, including data, tools, performance measures, communications and outreach, education, workforce development, and policies. The research results and intermediate products will ultimately contribute to I-STREET™'s mission, i.e., to provide a unique ecosystem for the collaboration, research, testing, and market delivery of innovative mobility and safety solutions that scales to urban and rural regions around the world.

This plan can help fill current gaps by fundamentally transforming the research in AI and data analytics, ACES vehicle technologies, privacy and cybersecurity, multimodal transportation, and smart and resilient transportation infrastructure.

9.1.2 Industry Engagement and Priorities

Throughout this project the research team developed an industry outreach and engagement plan for I-STREET™, which is based on principles of strategic communications. The research team developed strategies that can serve as the blueprint to establish and nurture relationships with transportation technology companies. The research team also developed measurable goals and the plan to reach those goals via various tactics.
In summary, the research team developed plans and engaged with industry in three ways (meetings, industry showcase, and industry partnership program). The results of the strategic planning and initial actions for each of these activities are discussed in the following paragraphs.

Meetings with industry

The research team had individual meetings with 26 companies. These meetings accomplished the objective of chapter 5, which was to engage with industry and explore data sharing, deployments, and joint development of advanced transportation technology products. The meetings were organized by Dr. Pruthvi Manjunatha and allowed the research team to understand the latest progress and activity in sensors, data platforms, in-vehicle technologies, and other products. The research team discussed potential collaboration options including industry sponsored research, collaborative development, and using I-STREET™ data.

The following were concluded from these meetings:

- These discussions provided a better understanding of the new technologies and existing products, and their potential to improve mobility and safety.
- Not every vendor the team engaged with has a solution that can address FDOT priorities. Having those discussions helped streamline the process of deployment for the solutions and technology with the highest potential to improve mobility and safety.
- These meetings also served as an outreach mechanism for the industry showcase and/or helped solidify I-STREET™'s engagement, as many of the companies listed here participated in the industry showcase.
- Several of the companies listed here were referred to various public agencies around the state for further collaborations and potential deployment.

While many of these companies were featured in the industry showcase program, to-date there have not been any new I-STREET™ based collaborations following these meetings. Based on the discussions, these companies are interested in new funding to proceed with pilots. Therefore, the main challenge for

expanding deployments and collaborations with I-STREET™ is funding, as indicated by most of the companies we engaged with. Funding dedicated to academia-industry collaborations would help foster deployment and evaluation of emerging technologies in Florida.

Based on our discussions with industry, the following are recommended:

- Continue to engage with various industry representatives through small meetings, as these foster collaborations and a deeper mutual understanding of priorities and opportunities.
- Seek funding for industry collaborations involving joint deployment and development.
- Encourage companies to engage with I-STREET™ through the industry partnership program (to-date, 6 companies have signed up.)
- Work with FDOT to identify companies that are not currently working in Florida, and aim to engage with them, and to invite them to participate in subsequent industry showcase events.

Industry showcase

The research team compiled a list of industry contacts and invited over 80 emerging transportation technology companies to submit abstracts for consideration. The announcement solicited abstracts that provide information about the proposed concept or technology, testing details, safety and mobility benefits, and deployment costs. The abstracts received were evaluated based on criteria such as the technology's potential to improve safety and mobility, innovation, technical accomplishment, and clarity of response.

The research team received abstracts from 40 companies. Due to the high number of responses, the originally planned single event was reorganized to a series of showcase events spread over four months from January to April 2023. Each showcase event focused on a theme (data platforms, smart sensors, infrastructure and vehicle applications and automated, connected, shared and electric vehicles) based on the main functionality of the proposed products.

The companies presented technologies ranging from video and radar fusion for traffic operations to cloud-based systems for signal prioritization, transit signal priority, and real-time navigation for people with disabilities. Overall, these showcases provided a platform for industry companies to showcase their technologies while allowing FDOT and other agencies to stay informed about the latest advancements in emerging transportation technology.

Based on the interest expressed by local agencies attending the showcase, the UFTI research team has developed scopes of work for projects proposed by these agencies. As of this writing, one of these scopes of work (pedestrian detection evaluation) is under consideration for funding by FDOT.

Industry partnership program

The UFTI launched the I-STREET™ industry program in October 2023 with five founding partner companies. This partnership aims to establish collaboration between the institute and companies serving the transportation technology sector. It also aims to create a platform for industry to collaborate, to create suitable workforce development programs, and to provide internship and other educational opportunities to UF students.

Former Sen. Jeff Brandes (R-FL) also participated in the industry partnership launch event. He facilitated a panel discussion that included three venture capitalists from the automated vehicles sector: Ben Patz

of DeepWork Capital, Olaf Sakkers of RedBlue Capital, and Jake Wieseneck, a principal at Maniv. The venture capitalists spoke about potential investments, trends, the start-up landscape, and the regulatory environment. The event helped provide a better understanding of the potential for commercialization of I-STREET™-developed technologies.

9.1.3 Engagement with Local, State, and National Agencies

The research team developed a plan to identify, communicate with, and engage agencies to (1) access I-STREET data, (2) test equipment in a real-world setting, and (3) deploy technology/products developed and tested at the I-STREET Living Lab. This strategic plan will help generate public sector awareness about I-STREET, leading to an interest in deploying I-STREET technologies. In Step 1 we compiled an extensive roster of agencies at the federal, state, and local level, including existing collaborators. This list was compiled to understand the existing landscape and to inform our evaluation and planning activities in subsequent steps. In Step 2 we conducted a SWOC analysis to evaluate and assess internal and external factors influencing UFTI/I-STREET™. This process relied on the results of Step 1 and identified key stakeholders that I-STREET™ should target for collaboration in the near future. In Step 3, based on the SWOC analysis, we formulated goals and objectives to provide direction on what we plan to accomplish and how we will measure our progress.

In summary, the research team outlined the following goals for engagement with public agencies:

1. Establish more robust relationships with agencies in the federal government we have been collaborating with (FHWA and FTA) and create new ones with other agencies such as the FAA and FRA.
2. Continue to engage with and cultivate a relationship with the following Offices at FDOT's Central Office: Aviation, Construction, Freight and Rail, Maintenance, Public Transit, and Safety.
3. Grow the relationship with the following FDOT district offices: District 2 (Lake City), District 5 (Deland), District 6 (Miami), District 1 (Bartow), District 3 (Chipley), District 4 (Ft. Lauderdale), and District 7 (Tampa).
4. Develop relationships with MPOs and TPOs in Florida, such as North Florida TPO, JTA, Miami-Dade County, or Lynx.
5. Identify agencies that are interested in accessing I-STREET™ data.
6. Identify agencies interested in testing and deploying advanced transportation tools and strategies through collaboration with I-STREET™.
7. Work with agencies to deploy products that have been developed and tested on I-STREET™.
8. Develop relationships with transportation non-profit organizations in Florida and nationally.

The following goals (or strategies) were outlined:

9. Schedule meetings with several key federal agencies (FAA, FRA, and FTA) by February 2024
10. Schedule meetings and seek collaboration with at least three of FDOT's Central Offices by October 2024
11. Schedule meetings and seek collaboration with at least two of the FDOT district offices by October 2024
12. Schedule meetings and collaboration with one major TPO (or MPO) by December 2025
13. Enlist at least one public agency that will access I-STREET™ data by the end of 2026
14. Enlist at least one public agency willing to test equipment with I-STREET™ by the end of 2027
15. Enlist at least one public agency to deploy products tested on I-STREET™ by 2028

9.1.4 Education

The research team developed a list of priorities related to education and outreach considering federal, state, and local priorities and I-STREET™ research project results. We also sought feedback from FDOT and other stakeholders regarding the list of priorities proposed and discussed the plan during I-STREET™ stakeholder meetings to adjust accordingly.

I-STREET™ has three potential audiences for educational outreach: professionals, undergraduate/ graduate students, and K-12 students. Each of these audiences requires a unique educational and outreach approach.

The I-STREET™ Education and Outreach Plan developed by the research team considered existing programs offered at UF and other universities and organizations nationwide. Based on this information, the research team identified gaps and opportunities where I-STREET™ can develop cutting edge educational programs. It is envisioned that the I-STREET™ Stakeholder group will review these and develop an action plan for development and deployment during subsequent research efforts.

In April 2023, I-STREET™ met with FDOT employees from several departments during a series of meetings. Several topics were identified as areas of interest by FDOT employees. Some of these topics (such as safety technology, alternative fuels, AV transit, ADA etc.) fall under the five I-STREET™ priority research areas, while others fall outside these areas. A key next step for the I-STREET™ Stakeholder group is to supplement this list with other topics that may be important for the department to consider, align educational topics with research priorities, and then prioritize which topics I-STREET™ is uniquely positioned to address.

The following educational strategies were of interest to the FDOT offices:

4) **Webinars** – Webinars provide an easy, accessible, and low-cost introduction to topics and technologies. Webinars are an excellent entry point for professionals to engage with I-STREET™.
5) **Database** – A database of new and emerging technologies and the research related to their efficacy would be a valuable reference resource for transportation professionals to access on an on-going basis.
6) **Courses** – In-depth courses can provide important professional development as well as training in specific technologies.

In summary, it is recommended to review the educational priorities identified by FDOT employees and supplement them with other FDOT priority topics. These should be prioritized to identify the education I-STREET™ is uniquely positioned to provide. It is also recommended to identify which educational strategies are most appropriate for each topic and for each of the three audiences listed above.

9.2 Discussions during the I-STREET™ Stakeholder Quarterly Meetings

This section discusses input received during I-STREET™ stakeholder quarterly meetings related to each of the four categories of interest: industry engagement, research, education, and public agency engagement.

9.2.1 Research

During the stakeholder meetings, in addition to the updates on on-going projects, several new research ideas were proposed. Some of the examples include:

- Digital twin for I-STREET™ with use cases for signal control and transit priority
- Consideration of data merging and data acquisition such as trajectory data from auto companies
- Signal control for alternative routes around Ocala/Gainesville
- Use of I-75 FRAME to assist truck operations.
- Evaluation of pedestrian detection systems and recommendations to update FDOT standards.
- Impact of AVs on city transportation planning

9.2.2 Industry

During the stakeholder meetings the research team discussed all industry engagement activities conducted throughout the project. We discussed technologies and tools that were proposed by industry during individual meetings and during the industry showcase events. Technologies that were identified by local agencies as promising were specifically discussed and plans were formulated to advance their deployment, when appropriate. We also discussed specific challenges identified by FDOT offices and local agencies, in order to develop suitable solutions that take advantage of new technologies.

Examples of related discussions and draft scopes of work that have been developed include:

- Partnering with the OmniAir consortium and/or others within Florida to organize one or more CV2X testing events that can be labeled “Florida Plugfest”
- Pilot testing of autonomous shuttles to address mobility needs around UF campus.
- Design and development of optimal transit OBU display prototype with an industry partner to maximize pedestrian and bicycle safety.
- Implementing “Cooperative Perception” on I-STREET™ with an advanced pedestrian detection company to improve pedestrian and bicyclist safety.

9.2.3 Public Agencies

FDOT districts such as D2 and D5 participated in the I-STREET™ stakeholder meetings. Florida’s Turnpike Enterprise (FTE) staff were introduced to UF and a successful collaboration resulted in organizing the Florida Plugfest event as well as testing of I-STREET™ products at SunTrax. Discussions during the quarterly meetings led to the consensus that other local agencies, MPO/TPOs and non-profit organizations could be invited to future industry showcases.

9.2.4 Education

The UF research team presented our work during I-STREET™ stakeholder meetings and received feedback from attendees. An important recommendation from the group was to meet with FDOT offices to identify priorities and challenges. The plan and conclusions presented in the previous section reflects the input received during the stakeholder meetings as well as the meetings with FDOT offices.

10. Summary, Conclusions and Recommendations

The recommended action items for implementing the I-STREET™ strategic plan are organized in the four categories discussed earlier: research, industry engagement, public agency engagement and education.

Research and Infrastructure Plan: The research and infrastructure plan was developed considering FDOT priorities and leverages existing strengths to help advance the state-of-the-practice in safety and mobility. The five research priority areas identified are: AI and data analytics, ACES vehicle technologies, privacy and cybersecurity, multimodal transportation, and smart and resilient transportation infrastructure. To implement this plan, the research team plans to partner with FDOT and other agencies to pursue research grants and/or other funding.

Industry Outreach: A strategic plan was developed to provide an approach for engaging with transportation technology companies and agencies and disseminating the capabilities of I-STREET™ throughout the country and internationally. The plan defines who we will be communicating with, what we plan to communicate (messaging) or when and how frequently we will engage in our communications tactics, and how those messages will be communicated (social media, newsletter, website, workshops, events). Given the potential for changes in transportation technology and in communications, we recommend reassessing these metrics and generating new goals in 5 years.

To organize the industry showcase the project team first compiled a list of industry contacts and invited over 80 emerging transportation technology companies to submit abstracts for consideration. The announcement solicited abstracts that provide information about the proposed concept or technology, testing details, safety and mobility benefits, and deployment costs. The abstracts received were evaluated based on several criteria including the technology's potential to improve safety and mobility, innovation, technical accomplishment, and clarity of response. Due to the high number of responses, the originally planned single event was changed to a series of showcase events spread over four months from January to April 2023, and included a total of 40 presentations. Each showcase event had a theme (data platforms, smart sensors, infrastructure, and vehicle applications and automated, connected, shared and electric vehicles) based on the participating companies and their proposed products. The showcase events were virtual, lasting 3.5 hours each, with 10-minute presentations and 5-minute Q&A sessions for each invited company. The audience included various departments within the FDOT central office, FDOT district offices, local agencies, and non-profits.

Engagement with Public Agencies: The research team developed a strategic plan based on a SWOC analysis and provided recommended actions for outreach. The plan includes specific goals and objectives to provide direction on what we plan to accomplish and how we will measure our progress. We also provide a set of KPIs that will provide us with quantifiable data to measure our progress in achieving our objectives. The plan identifies specific agencies to engage with to (1) access I-STREET data, (2) test equipment in a real-world setting, and (3) deploy technology/products developed and tested at the I-STREET Living Lab.

Education: The education and outreach plan for I-STREET™ aims to disseminate research program findings to practitioners, academia, local, state, and federal agencies across the US. The research team (1) developed a list of priorities related to education and outreach considering federal, state, and local priorities and I-STREET™ research project results, (2) sought feedback from FDOT and other

stakeholders regarding the list of priorities proposed, and (3) discussed the plan during I-STREET™ stakeholder meetings to adjust accordingly. I-STREET™ has three potential audiences for educational outreach: professionals, undergraduate/ graduate students, and K-12 students. Each of these audiences requires a unique educational and outreach approach. The I-STREET™ Education and Outreach Plan contains a list of strategies suitable for each of these three audiences.

10.1 Findings and Key Takeaways

The major findings and key takeaways from this project are as follows:

- The meetings with FDOT offices helped identify crucial research needs and tailor the research plan in a way that helps support FDOT priorities.
- The industry showcase concept had an overwhelmingly positive response. Participants (both from industry and from participating public agencies) indicated a desire to continue offering such opportunities.
- The one-on-one meetings with the companies helped provide important information and details regarding the state-of-the-practice in emerging transportation technologies. Such meetings help guide further discussions such that industry showcase events can be more productive for both parties.
- The SWOC analysis was found to be effective in understanding the needs and formulating action plans for fostering industry and public agency relationships.
- The education plan developed addresses three important audiences (professionals, undergraduate/ graduate students, and K-12 students) and its implementation can be facilitated through existing programs at UF and FDOT.
- The plans developed during this project lay a blueprint for I-STREET™ to achieve its mission of being the leading global Living Lab for mobility and safety innovation.
- This document is intended to serve as a living document which is updated based on evolving needs, priorities, and technological advancements.

The success of the I-STREET™ program in general can be attributed to deeper and regular engagement of stakeholders (public and private) with an understanding of various facets of technology to deliver mobility and safety solutions. For example, the Gainesville autonomous shuttle was one of the nation's first AV shuttles to be able communicate with traffic signals[14]. This was possible by ensuring interoperability between the shuttle and the traffic signal equipped through the Gainesville SPaT project[15]. It was a value addition made possible by bringing together vendors (Yunex, EasyMile, Transdev) from two different projects and coordinating this effort with FDOT and CoG.

The open road-testing environment that I-STREET™ provides makes it possible to identify common behavioral patterns across multiple projects and understand human-behavior in response to emerging technologies. For example, naturalistic driving studies[16], focus groups and surveys conducted as part of various I-STREET™ projects have helped understand how best to deliver alerts to ensure the safety of all road users.

[14] https://www.transportation.institute.ufl.edu/2022/03/gainesville-autonomous-shuttle-communicates-with-traffic-lights/
[15] https://www.fdot.gov/traffic/teo-divisions.shtm/cav-ml-stamp/cv/maplocations/gains-trapezium.shtm
[16] https://trid.trb.org/view/1758620

In addition to the industry showcases and meetings documented in this report, I-STREET™ in the past seven years has been a key facilitator of collaboration and discussions between industry and public agencies. I-STREET™ serves as a vital conduit bridging the world of technological innovation and Florida's dynamic workforce landscape. For example, in 2023 I-STREET™ played a major role in bringing the OmniAir Consortium to Florida and hosting a the CV2X testing event called “Florida Plugfest”.

The I-STREET™ program has been successful in workforce development, and considering a variety of audiences (professionals, graduate and undergraduate students, and K-12 programs). The UFTI has employed undergraduate students as part of the Summer Undergraduate Research at Florida (SURF) Program. These students have had the opportunity to work on emerging technology research and become part of the I-STREET™ ecosystem. Also, I-STREET™ faculty have mentored middle and high school children as part of College Reach-Out Program (CROP) sponsored by the Florida Department of Education. CROP is designed to expand the academic achievement and college readiness of low-income, educationally disadvantaged, and underrepresented school students.

10.2 Recommendations

The following are key recommendations stemming from this project:

- Based on the existing work and inputs from FDOT and other stakeholders, I-STREET™ has identified five major research clusters: AI and Data Analytics, ACES Vehicle Technologies, Privacy and Cybersecurity, Multimodal Transportation, and Smart and Resilient Transportation Infrastructure. There is a need to develop specific deployments and use cases around each of these clusters to maximize the use of advanced technologies and develop suitable solutions that can enhance safety and mobility.
- The industry showcase and the associated engagement with industry partners were very positively received by all participants. It is recommended that such events be conducted frequently to help enhance Florida’s standing as a leader in this space.
- In addition to the DOT districts, many local agencies expressed interest to participate in the industry showcase events. For future industry showcase events, it is recommended expanding the list of participating local agencies.
- It is recommended that I-STREET™ employ the engagement plan developed to reach out to public agencies and identify areas of need at local, state, and national levels. The plan developed and outlined earlier will help identify crucial challenges and facilitate the application and deployment of new technologies that can improve mobility and safety.
- The educational plan developed should be implemented to address workforce development needs related to advanced transportation technologies around Florida. An immediate need is to create short online courses for transportation professionals (an “innovation library”) to help provide the “who-what-why-how” of emerging transportation technologies.

References

Medugorac, V., & Schuitema, G. (2023, January 6). *Why is bottom-up more acceptable than top-down? A study on collective psychological ownership and place-technology fit in the Irish Midlands*. Energy Research & Social Science. https://www.sciencedirect.com/science/article/pii/S2214629622004273

Appendix A – Transportation Technology Companies That Could Benefit from Working with I-STREET™

Company	Contact	Email
AceApplications LLC	Courtney Powell	cpowell@aceapplications.com
Advanced Mobility Analytics Group	Roger Book	roger.brook@metersys.com
Aramco	Husham Al-Kaisy	husham.kaisy@aramco.com
Beep	Brandon Corsentino	brandon.corsentino@ridebeep.com
BlueMAC Analytics	Baldwin, Bill	bill@bluemacanalytics.com
Bosch	Alissa Cleland	Alissa.Cleland@US.Bosch.com
Boulder AI	Patrick Reilly	pat@boulderai.com
Brandmotion	Dave McNamara	dmcnamara@brandmotion.com
CADIAT	Jake Merhige	Jake@Cadiat.com
Cardno	Cindy Barnes	cindy.barnes@cardno.com
CEVE IO	David Aylesworth	david@ceve.io
Connected signals	Luke Faubion	luke@connectedsignals.com
Cubic	Greg Freel	greg.freel@cubic.com
Day Communication Company	Day Communication Company	aday@daycommunications.com
EMCSV	Mandar Padhye	mandar.padhye@emcsv.com
EXP	Qian (Cherry) Xiong	Cherry.Xiong@exp.com
Flapmax	Dave	dave@flapmax.com
Ford	Hamilton, Brennan (B.)	bhamilto@ford.com
General Motors	Carolyn Volan	Carolyn.Volan@gm.com
Gravy Analytics	Megan Ryan	mryan@gravyanalytics.com
Harman DTS Smart City	Pullin, Joseph	Joseph.Pullin@harman.com
Hexagon	Robert Hambrick	Robert.Hambrick@hexagon.com
InNovo Partners LLC	Claudia Paskauskas	Cpaskauskas@innovopartners.com
Inrix	Shaun Quayle	shaun.quayle@inrix.com
Intelight ITS	Craig Gardner	craig.gardner@intelight-its.com
Iteris	Anita Vandervalk-Ostrander	avandervalk@iteris.com
Kyra solutions	Apurva Desai (AD)	adesai@kyrasolutions.com;
Miovision	Andrew More	amore@miovision.com
Navtech Radar	Kieron Parker	kieron.parker@navtechradar.com
Notraffic	Tom Cooper	tom@notraffic.tech
Park trans solutions	Christopher Perry	christopher.perry@parktranssolutions.com
Parking Specialists	GERALD SALZMAN	gsalzman@desman.com
PARKIT ENTERPRISE	Avi Geller	avig@parkitenterprise.com
Perrone Robotics	Nick Pilipowskyj	npilipowskyj@perronerobotics.com

Qualcomm Technologies	Jim Misener	jmisener@qti.qualcomm.com
Robotic Research	Taylor Smith	tsmith@roboticresearch.com
Rosco Vision	Ross Braddock	ross.braddock@roscovision.com
Shotl	Albert Tresserras	atresserras@shotl.com
Siemens	Jadhav, Venkateshawar	venkatesh.jadhav@siemens.com
Siemens Mobility	Buckel, Wolfgang	wolfgang.buckel@siemens.com
SinWaves	Timothy Menard	tsmenard@sinwaves.com
Skydio	Jenn Player	jenn.player@skydio.com
Street Simplified	Ben Griffard	ben@streetsimplified.com
Tappyguide	John Petrous	john@tappyguide.com
Toyota	Ketan Ranade	Ketan.Ranade@toyota.com
Toyota Autono-MaaS	Tyler J. Brown	tyler.j.brown@toyota.com
Transoft Solutions Inc.	Andres Velez	a.velez@transoftsolutions.com
TRCPG	J Every	EveryJ@trcpg.com
Umojo	Rick Neubauer	rneubauer@umojo.com
Urban SDK	Justin Dennis	justin.dennis@urbansdk.com
Visionaries 777	David	david@visionaries777.com
Waycare Tech/ Rekor	Maria Kolar	maria.kolar@waycaretech.com
Wejo	Bethany Haslam	Bethany.Haslam@wejo.com
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ClearRoad	Paul Salama	psalama@clearroad.io
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Ecolux	Steve Lai	steve@**ecolux**-tech.com
Transcore	Sunny Jaipuria	Sunny.Jaipuria@TransCore.com
Nissan	BRIAN BROCKMAN	brian.brockman@nissan-usa.com
Honda	Chuck Schifsky	chuck_schifsky@ahm.honda.com
GM	Jornada Strosberg	jordana.strosberg@gm.com
BMW	Ralph Huber	Ralph.Huber@bmwgroup.com
Chrysler	Jordan Wasylyk	jordan.wasylyk@chrysler.com
Stantec Autonomous Mobility	Kate Jack	kate.jack@stantec.com
Volvo Group North America	Aravind Kailas	aravind.kailas@gmail.com
Fortellix	Gil Amid	gil.amide@fortellix.com
Honda R&D/iProbe	Sue Bai	sbai@hra.com
Compass	Richard Mudge	dick@compasstranstech.com
Automated Roads	Paul Carlson	paul@automatedroads.com
MITRE	Chris Ford	cford@mitre.org
Mobileye	Mark Davis	Mark.Davis@Mobileye.com
Robocist	Jeff Barghout	
MAP traffic management	Jaap Vreeswijk	jaap.vreeswijk@maptm.nl

Control Technologies	Pete Ganci	PGanci@cttraffic.com
AEYE Inc	Steve Frey	sfrey@aeye.ai
Valerann	Matthew Cooper	matthew.cooper@valerann.com
Gridmatrix	Elan Silver	esilver@gridmatrix.com
Mercer	Robert Dingess	rdingess@mercerstrategic.com
Elektrobit	Steffen Kuhn	steffen.kuhn@elektrobit.com
LYT	Timothy Menard	tim@lyt.ai
Q-FREE	Pete Ganci	PGanci@cttraffic.com
Derq	Pete Ganci	PGanci@cttraffic.com
Smartmicro	Pete Ganci	PGanci@cttraffic.com
Information Logistics	Mary Farrell	mfarrell@ilogcorp.com

Appendix B – Transportation Technology Companies Used in the Social Media Competitive Analysis

Company	LinkedIn	Twitter	Instagram	YouTube	Facebook	Vimeo
AEYE Inc	x	x		x	x	
Brandmotion	x		x	x	x	
CADIAT	x	x			x	
CEVE IO	x		x		x	
Connected Signals*						
Cubic^	x	x	x	x	x	x
Derq	x	x	x		x	
EMCSV*						
General Motors^	x	x	x	x	x	
Gridmatrix*						
Harman DTS Smart City	x	x		x	x	
Information Logistics*						
Inrix	x	x			x	
iProbe (work with Honda R&D) *						
Iteris	x	x		x	x	
Kyra solutions^	x	x	x	x	x	
LYT*						
Miovision	x	x	x		x	
Mobileye^	x	x	x	x	x	
Mixon Hill*						
Navtech Radar	x	x		x	x	
Nexar		x	x	x	x	
Notraffic	x	x			x	
Perrone Robotics ^	x	x	x	x	x	
Q-FREE	x	x		x	x	
Qualcomm Technologies^	x	x	x	x	x	
Rosco Vision	x	x		x	x	
Skydio^	x	x	x	x	x	
Smartmicro	x			x		
Street Simplified*						
Tappyguide*						
Umojo	x	x			x	
Urban SDK	x	x				
Urban Logic	x	x			x	
Valerann	x	x				
Via	x	x			x	
Wejo	x	x	x	x		

Company	LinkedIn	Twitter	Instagram	YouTube	Facebook	Vimeo
Total	27	25	13	17	24	1
Percent in Industry	73	68	35	46	65	3

*Companies with no social media accounts

^Companies with five or more types of social media accounts

Appendix C – Summaries of the Meetings with Industry

Company name: Street Simplified
Headquarters: North Richland hills, Texas
Day: June 7, 2022

Description:

- The company offers services in data collection and analysis applied to safe transportation.
- It includes the collection of high-resolution videos, processing vehicle trajectories with artificial intelligence on the cloud.
- The output are data reports describing the analyses.

Website: https://www.streetsimplified.com/
Name: Benjamin Griffard
Email: ben@streetsimplified
Outcome: The company participated in the FDOT industry showcase. The company offered to partner on applications for federal grants such as the Safe Streets for All (SS4A) program.

Company name: Perrone Robotics
Headquarters: Charlottesville, Virginia
Project in Florida: Delivered AVs to Jacksonville Transportation Authority
Day: June 9, 2022
Description:

- The company sells several types of electric and automated vehicle kits.
- For example, the TONY-SEV (Small low-speed Electric Vehicle) is a public road-ready vehicle that can be used for passenger or delivery services at speeds up to 25 mph.
- Each vehicle is equipped with an automated system, the Perrone Robotics TONY (To Navigate To You) retrofit kit.
- TONY embeds inside any vehicle for any job to provide a complete "artificial driver" solution that provides full autonomy.

Website: https://www.perronerobotics.com/tony-lsv
Name: Nick Pilipowskyj
Email: npulipowskyi@perronerobotics.com
Outcome: The company participated in the FDOT industry showcase. They offered to provide discounted quotes for the purchase of their kits for UFTI's educational/research use.

Company name: INRIX
Headquarters: Kirkland, Washington
Project in Florida: Provided the FDOT traffic information to help locate bottleneck regions.
Day: June 9, 2022
Description:

- The company offers services for traffic analytics, parking, safety analyses, and a parking app.
- For example, the product Signal Analytics is a cloud-based application that uses big data from connected cars to help traffic professionals identify and understand unnecessary delays at signalized intersections area-wide – no hardware or fieldwork is required.
- The traffic signal software provides valuable mobility insights to enhance urban traffic flow.

- Another example is INRIX AI Traffic updates roads, it is an ADAS that provides traffic conditions instantaneously for drivers — from roadwork to crashes to everyday congestion.

Website: https://inrix.com/
Name: Shaun Quayle
Email: shaun.quayle@inrix.com
Outcome: The company participated in the FDOT industry showcase. UFTI was able to procure time-limited access to INRIX dashboard for the I-4 corridor and share it with partner universities (USF, UCF and Florida Poly) for the I-4 FRAME evaluation project.

Company name: Traffic Tech Services (TTS)
Headquarters: Beaverton, Oregon
Day: July 13, 2022
Description:

- The company provides connected vehicle technologies for CV2X and automated vehicle applications.
- The cloud-based platform enables increasing safety and efficiency for drivers by connecting vehicles to traffic signals and other roadway infrastructure.
- The Personal Signal Assistant® service provides predictive traffic signal data to enable vehicle-to-infrastructure (V2I) applications such as Green Light Optimized Speed Advisory (GLOSA) and red-light countdown for signalized intersections.
- TTS provides three distinct architecture options for consuming the Personal Signal Assistant® IaaS product. Each option is supported by fully documented APIs.
- The company also provides a live signal status information service specifically addressing the needs of Smart City technology and analytics service providers.

Website: https://www.traffictechservices.com/
Name: Kiel Ova
Email: kiel.ova@traffictechservices.com
Outcome: The company participated in the FDOT industry showcase.

Company name: Brandmotion
Headquarters: Novi, Michigan
Project in Florida: Tampa Connected Vehicle Pilot
Day: August 10, 2022
Description:

- Brandmotion has developed retrofit product solutions for all major ADAS systems, including Forwarding crash warning, Lane departure, Parking sensors, Blind spot monitoring and detection, and Camera vision systems.
- The company also offers integration services for suppliers, OEMs, emerging mobility companies, and technology developers seeking to build AVs and CAVs for demonstration purposes. The major focus of the products and services is to manage large-scale Smart City Connected Vehicle deployments.
- For example, Magna Autonomous Vehicle Building is a high-quality integration of sensors for their fleet of Autonomous Grand Cherokees. Also, Brandmotion worked on the Tampa Connected Vehicle Pilot project to enhance traffic safety for vehicles and pedestrians.

Website: https://brandmotion.com/
Name: Jon Formella
Email: jformella@brandmotion.com
Outcome: The company participated in the FDOT industry showcase. Proposal submitted to FDOT to design and implement an optimal alert display unit for transit drivers.

Company name: Gridmatrix
Headquarters: San Francisco, California
Day: August 12, 2022
Description:

- GridMatrix's software is built for traffic engineers and designed to help them solve some of their most common and challenging problems.
- Using advances in AI, Grid Matrix's software can process hours of traffic camera video data and extract standard traffic study information like count, speed, and approach direction.
- The algorithm works in real-time, processing information from live traffic feeds as it is recorded. It also works with historical video data, allowing city traffic engineers to analyze traffic patterns at intersections to understand the flow and other patterns.
- The product has data visualization capabilities via a web dashboard, allowing city traffic engineers. It is not tied to any one camera type or inductive loop system architecture.

Website: https://www.gridmatrix.com/product/software.html
Name: Elan Silver
Email: esilver@gridmatrix.com
Outcome: The company participated in the FDOT industry showcase.

Company name: AEYE
Headquarters: Dublin, California
Day: August 13, 2022
Description:

- The company claims to provide a software-defined adaptive lidar solution that can help navigate in a safer, more efficient, and more productive way.
- Eye's 4Sight Intelligent Sensing Platform with its sensor-based operating system enables patented bistatic architecture to keep transmit and receive channels separately, allowing optimization for both.
- The company also provides smart infrastructure, for example, 4Sight™ Smart Infrastructure is a software-configurable product that meets the diverse array of performance and functional requirements for intelligent traffic systems with its adaptive lidar performance.
- 4Sight delivers detection, perception, and classification of both long and short-range objects. The company claims the software-driven system can target objects 10-20X more precisely than camera-only systems and detect pedestrians at over 300 meters.

Website: https://www.aeye.ai/
Name: Matt Bretoi
Email: mbretoi@aeye.ai
Outcome: The company participated in the FDOT industry showcase.

Company name: Mobile Eye
Headquarters: Jerusalem, Israel
Project in Florida: Autonomous Vehicle Testing in Miami, Florida
Day: August 16, 2022
Description:

- The company presents several ADAS solutions. For example, Mobileye is bringing its camera-only automated driving technology to the ADAS realm with Mobileye Supervisions.
- With surround camera coverage, the Mobileye Roadbook™ includes navigation technologies, Mobileye's driving policy, and end-to-end implementation.
- The features include lane changes, urban driving, automated parking, automatic preventative steering and braking, and an end-to-end system.

Website: https://www.mobileye.com/
Name: Mark Davis
Email: Mark.davis@mobileye.com
Outcome: The company participated in the FDOT industry showcase.

Company name: Valerann
Headquarters: Tel Aviv, Israel
Day: August 16, 2022
Description:

- The company is specialized in Artificial Intelligence (AI), Big Data, and Data Fusion technology.
- The company describes the results as rich, accurate picture of the road, traffic, infrastructure, and conditions, including the most relevant disruptions and safety incidents.
- The applications include monitoring events detection, verification, prioritization with risk prediction, and alerting for control centers; and managing road traffic operations through automated push notification directly to VMS, patrol vehicles, social media, business communication channels, and connected vehicles for timely alerting.
- The solution provides reports for accurate and efficient assets and resources management for the entire operations.
- It aims to support road traffic operators to maximize revenue, reduce expenses, minimize CO^2 emission, and achieve their operational thresholds.

Website: https://www.valerann.com/
Name: Matthew Cooper
Email: matthew.cooper@valerann.com
Outcome: The company participated in the FDOT industry showcase.

Company name: BlueCity, Velodyne
Headquarters: San Jose, California
Day: September 2, 2022
Description:

- The company provides AI software solution integrated with the lidar sensor to monitor traffic networks and generate real-time traffic data and analytics.

- The company claims that unlike any camera-based solutions, this technology works in any weather and lighting conditions, collects real-time traffic data about all types of road users with a single sensor at the corner of intersections.
- Data collected from sensors and installed at intersections is sent to the traffic signal's processor, which uses the data to optimize the signal timing so traffic can flow efficiently.
- This data is also sent to the cloud to be aggregated for use in transportation studies and simulation software used by city engineers.
- Based on the data, a machine learning-based approach predict the behavior of road users approaching the intersection to identify the risk of an accident and share this information with other road users over V2X and 5G communication protocols to improve the safety of road users.

Website: https://velodynelidar.com/automated-with-velodyne/blue-city-technology/
Name: Asad Lesani
Email: asad.lesani@bluecity.ai
Outcome: The company was discussed in the immediate I-STREET™ stakeholder meeting with a potential to implement a "cooperative perception" based sensor and alert system.

Company name: Via
Headquarters: New York City, New York
Day: September 9, 2022
Description:

- The company provides operational services of ride-sharing using AVs.
- In March 2021, the City of Arlington, Texas, launched RAPID (Rideshare, Automation, and Payment Integration Demonstration) in partnership with Via, May Mobility, and the University of Texas at Arlington (UTA).
- The service integrates five AVs (including one wheelchair-accessible e-vehicle) into Arlington's public transit system — the first example of on-demand, dynamically routed AVs integrated into public transit in the United States.
- RAPID has delivered more than 28,000+ rides, with most riders traveling to essential destinations, including work, school, and medical facilities.

Website: https://ridewithvia.com/autonomous-mobility
Name: Maddie Pena
Email: madeline.pena@ridewithvia.com
Outcome: The company participated in the FDOT industry showcase.

Company name: NEXAR
Headquarters: Tel Aviv, Israel
Day: October 11, 2022
Description:

- The company provides video data from dashcams and fixed cameras over the road network, and services for a major part of AV manufacturers, some DOTs, insurance companies, and mapping companies.
- Nexar's dash cam network maps transient road elements such as work zones, road sign change detection, and speed limits. It then assists you in filling in the accurate map data you need - at scale and on time, with the required visual verification. Map and monitor all road work zones and

road blockages in your area of interest. The function "Real time road work blockage insight" enables constant, immediate updates.

- Nexar uses vision based-AI to automatically identify, collect and ascertain roadway impact – both existing and removed - based on lane closure and directionality.
- Nexar produces corner case scenarios for simulation, using 3D reconstruction on top of collision and near-collision data. This data includes full 1st party and 3rd party reconstruction, raw data (such as geo-location and timestamps), and additional insights for training outcomes.
- The product offers a record of how other vehicles drive in the same road segments. It enables AV companies to understand, measure, and benchmark safety-related behavior (stop lines, school zones, etc.), and drive better based on road conditions, visibility, and more. By showing human behavior per road segment and overlaying it on a map, AVs can know where a lane change is a common practice or where deceleration is taking place when cornering.

Website: https://data.getnexar.com/solution/autonomous-vehicles/
Name: Ludo Fassati
Email: ludovico.fassati@getnexar.com
Outcome: The company was invited to the FDOT industry showcase.

Company name: Urban Logiq
Headquarters: Vancouver, Canada
Day: October 13, 2022
Description: The company provides a tool for integrates and visualizes data to generate insights for public officials.

- Measure and manage changes in travel time as they result from traffic projects, construction, and more. Access pre-populated, real-time or historical travel time and speed data and easily interact with data through map-based visualizations and charts.
- Analyze crashes, to visualize crash data alongside relevant contextual information to uncover insights without time-consuming manual calculations, mapping, or data cleaning.
- Measure the performance of safety countermeasures and vision zero policies over time with dynamic reporting.

Website: https://urbanlogiq.com/
Name: Arub Dawit
Email: arun@urbanlogiq.com
Outcome: The company participated in the FDOT industry showcase.

Company name: Terbine
Headquarters: Las Vegas, Nevada
Day: October 17, 2022
Description:

- The company provides a scalable software based Terbine Data Exchange Platform.
- In implementation the platform forms the center of a comprehensive system for the managed exchange of machine-generated data between vehicles, charging networks, individual chargers, electrical utilities and government agencies.

- It proposes focus in EV charging disparities and solving 'range anxiety' with its initial rollout. Terbine provides a comprehensive data-handling environment for Level 4 and 5 autonomous operations.
- The main idea is data exchange of EV and network to connect and provide energy for electric and AVs.

Website: https://terbine.com/
Name: David Knight
Email: reed@terbine.com
Outcome: The company participated in the FDOT industry showcase.

Company name: Dekra
Headquarters: Stuttgart, Germany
Day: May 8, 2023
Description:

- Provides a range of services like consulting, auditing, and inspection solutions focused on increasing speed to market, profitability, and compliance.
- Connected car test area in Málaga, Spain, replicates real-life operation and behavior. This includes real and simulated infrastructure elements and vehicles as well as replicas of elements that interact with devices during testing. It is the ideal environment for R&D testing, pre-testing and testing for certification. It is Europe's largest independent testing center for connected and automated driving.
- Connectivity testing lab in Virginia that has a Cybersecurity hub.

Name: Fernando Rodriguez
Email: fernando.rodriguez@dekra.com
Outcome: To be considered for closed-testing collaborations in the future.

Company name: TrafficLogix
Headquarters: Spring Valley, New York
Day: May 8, 2023
Description: The company has its main focus on traffic-calming solutions that are claimed to be an effective, low-cost, and simple way to slow speeders.

- The traffic tables in Gainesville were sold by the company.
- Pilot projects with University of Connecticut and Winter Garden, FL police department
- System of cameras with multiple lane operation captures images of speeding vehicle license plates from multiple lanes simultaneously. Gets up-to-the minute traffic data and reports from cameras anywhere on the cloud. Sends customized warnings to speeding drivers to encourage safer driving.

Name: Sean Coupland
Email: scoupland@trafficlogix.com
Outcome: To be considered for traffic calming projects in the future.

Company name: Hesai Tech

Headquarters: Palo Alto, California
Day: May 15, 2023
Description:

- Pilot projects in Chattanooga, Tennessee.
- Their model PANDAR128 has 2 cm of accuracy and range of 200 m.
- The cost would be about $3k for a lidar for ITS applications.
- It could be employed to AVs, mapping road, detect pedestrians and cyclists.

Name: David Samuel, James Byun
E-mail: billy.evers@hesaitech.com
Outcome: The company offered to partner on applications to federal grants.

Company name: Currus AI
Project in Florida: Business Incubation Program at the University of Central Florida (UCF)
Headquarters: Orlando, Florida
Day: May 15, 2023
Description:

- Precision localization using connected AI-powered sensors.
- AI-powered traffic sensors include cameras and lidars equipped with artificial intelligence (AI) capabilities and capable of processing and analyzing visual data in real time to localize and track vehicles, pedestrians, and other objects in the surrounding area.
- Smart traffic sensors can be used to provide real-time traffic alerts to drivers, help reduce congestion, and automate transportation safety.

Name: Yaser Pourmohammadi Fallah
Email: Yaserpf@currus.ai
Outcome: Potential to implement a "cooperative perception" based sensor and alert system. The company offered to partner on applications to federal grants.

Company name: Keysight Technologies
Headquarters: Santa Rosa, California
Day: May 15, 2023
Description:

- The company product provides robust radar sensors and algorithms for ADAS / AV with capabilities of full scene emulation in the lab with actual components in a hardware-in-the-loop setup.
- NORDSYS V2X wave BEE Solutions: is designed for V2X requirements of the automotive industry and infrastructure manufacturers. The series includes development platforms, on board units, roadside units (ITS stations), simulation, visualization, and analysis. Explore complete testing equipment that proves grounds for V2X field tests in highly scalable expansion stages.
- Nordsys, now part of Keysight Technologies, is combining its automotive software integration team with Keysight's physical layer solutions and PathWave test automation and management platforms.

Name: Aaron Newman
Email: aaron.w.newman@keysight.com
Outcome: Potential to collaborate on V2X testing, develop V2X products.

Company name: SEA
Headquarters: Troisdorf, Germany
Product: Software and Hardware for V2X and V2I applications
Day: May 15, 2023
Description:

- S.E.A. provides a comprehensive portfolio of innovative test tools for all different aspects of V2X test and development.
- The S.E.A. tools serve all V2X technologies, regional standards and user groups involved in the development and roll-out of V2X communication components (ECU, RSU, vehicles) and V2X application software.
- V2X interfaces are conformed to communication standards and RF-regulations.
- The competing V2X communication standards are implemented alternatively by 802.11p based on IEEE Wi-Fi standards or 4G/5G cellular technology (LTE-V, 5G-NR) based on the 3GPP communication standards.

Name: Tony. Vento
Email: Tony.Vento.Ext@sea-gmbh.com
Outcome: Potential to collaborate on V2X testing, develop V2X products.

Company name: Vialytics
Headquarters: Stuttgart, Germany
Product: Intelligent Road Management System
Day: May 20, 2023
Description:

- The Vialytics system takes a photo of the asphalt surface every 4 meters including GPS track and time stamp.
- Record the road conditions in a targeted manner or let the system work in parallel to your operational tasks.
- Uses Bluetooth button on the steering wheel to set markers while driving.
- The Vialytics algorithm analyses the image data of the route recording for damage to the road surface in 15 damage categories.
- All license plates and faces are pixelated for privacy.
- As results, it gives an overview of the condition of all roads. Filter the worst damage, set markers and plan measures for preservation and maintenance in one system.

Name: Tom Cummins
Email: t.cummins@vialytics.com
Outcome: Potential candidate for next industry showcase.

Company name: DERQ
Headquarters: Detroit, Michigan
Day: May 30, 2023
Description:

- Derq is a global MIT spinoff and Techstars alum based out of Dubai and Detroit.
- V2X applications for CAV: Real-time infrastructure perception providing full situational awareness to CAV, detecting and predicting dangerous conflicts with pedestrians, vehicles, or other vulnerable road users, to avoid collisions. V2X messages generated with ultra-low latency and high positional accuracy in compliance with automotive standards.
- Adaptive traffic management: Accurate detection and tracking of vehicles and vulnerable road users (VRU) as well as safety conditions enabling adaptive traffic signal actuation applications based on observed safety events such as red-light running prediction or jaywalking pedestrians. Deployable on top of existing or new video detection systems and integrates with industry-standard controllers.
- Study cases in Osceola County (Data collection and near misses V-V and V-VRU, 9 locations), projects in three FDOT districts (D1, D5 and D7)
- Patent on prediction of intent

Name: Pete Ganci
Email: pganci@cttraffic.com
Website: https://en.derq.com/
Outcome: Participated in industry showcase. Proposal submitted to FDOT about evaluating pedestrian detection systems such as Derq's.

Company name: Hanwha vision
Headquarters: Changwon-si, South Korea
Day: June 21, 2023
Description:

- Hanwha Vision offers a comprehensive line of security and video surveillance solutions which include IP cameras that support up to 8K resolution, a video management system, video and audio analytics, multi-sensor technologies and device integration with a host of 3rd party application providers.
- The ITS solutions include cameras with full remote setup and built-in AI, the solution addresses install and field-of-view concerns while offering analytics and data.
- The products include LPR, object detection, digital noise reduction, and a wide dynamic range technology.

Website: https://hanwhavisionamerica.com/markets/its/#its-ai-technology
Name: Zareh Megerdoonian
Email: zareh.m@hanwha.com
Outcome: Potential candidate for next industry showcase.

Company name: Iris
Headquarters: New York City, New York
Day: August 08, 2023
Description:

- The company Iris offers a machine learning detection with vision. It includes software and hardware. Patented computer vision.
- Two prominent brands: IrisGo and IrisCity, for dashboard camera, it includes the videos for the agencies that buy the product.

- It includes Automated Road patrol, roadway assets inventory and pavement condition survey.
- The University of Catania in Italy are working with the company on certain use cases.

Website: https://www.irisradgroup.com/
Name: Joe Quaresima
Email: joeq@irisradgroup.com
Outcome: Potential candidate for next industry showcase. Possible partner for federal grant applications.

Company name: SmartCTY
Headquarters: New York City, New York
Day: August 08, 2023
Description:

- The company provides information with existing DOT information.
- Includes a dashboard to show traffic information, weather, congestion, and statistics of fuel, time loss.

Website: www.smartcty.com
Name: Steven Salsberg
Email: steven@smartcty.com
Outcome: Potential candidate for next industry showcase. Possible partner for federal grant applications. Referred the company to SMART North Florida and CoG to explore collaborations.

Company name: Innovusion
Headquarters: Sunnyvale, California
Day: August 08, 2023
Description:
Company: Innovusion

- The company sell more than 3000 lidars per month.
- The model Falcon Long Range has a range of 250 m and can be used in a car.
- Their applications include Advanced Driver Assistance, Smart City, Smart Highway, Vehicle Overlimit Management, Industrial Automation
- Cost of each lidar can be as low as $4K.

Website: https://innovusion.com/
Name: David Samuel, James Byun
Email: david.samuel@innovusion.com; james.byun@innovusion.com.
Outcome: Referred the company to UF researchers working with lidars for potential purchase for academic usage.

Appendix D – A list of Public Agencies That Could Benefit from Working with I-STREET™ at the Federal, State, and Local Levels

This list was created to get an overall picture of the agencies I-STREET™ can engage in in Florida and at the federal level. The list contains more than 60 agencies. We have selected potential partners from this list to collaborate with, as indicated in section 4.

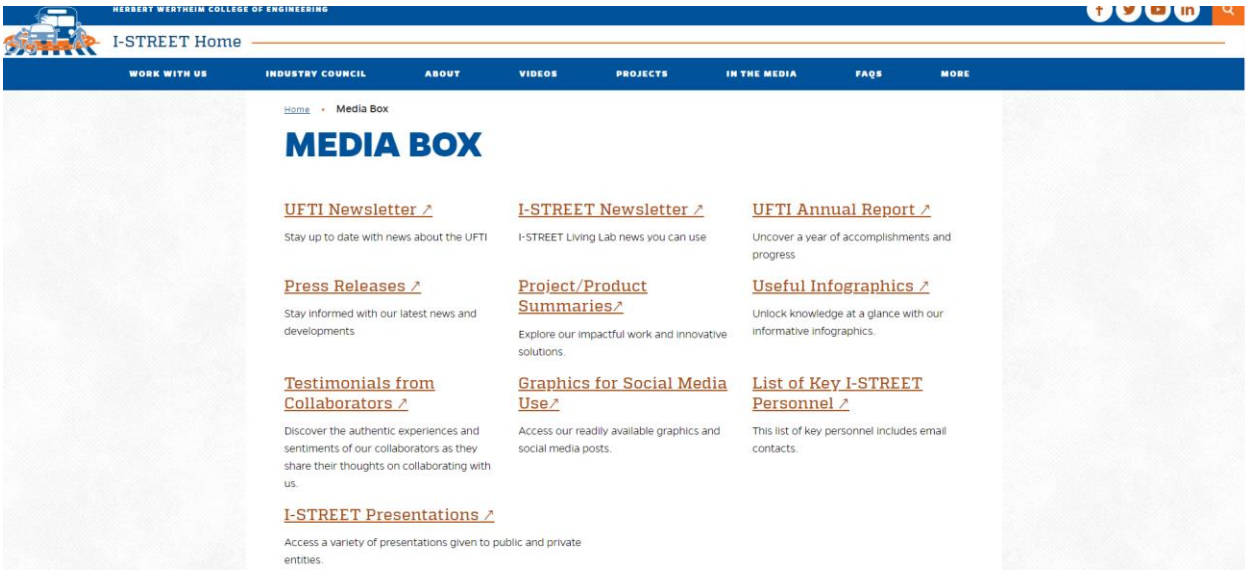
Agency name	Type of Agency	Contact name	Email
Federal Transit Administration	Federal	Nuria Fernandez	FTAPressOffice@dot.gov
Federal Highway Administration	Federal	Shailen Bhatt	
US DOT	Federal	Pete Buttigieg	secretarybuttigieg@dot.gov
Federal Railroad Administration	Federal	Amit Bose	frapa@dot.gov
Florida's Turnpike Enterprise	State	Nicola Liquori	turnpike.pio@dot.state.fl.us
Federal Aviation Administration	Federal	Press Office	pressoffice@faa.gov
FDOT Central Office	State	Trey Tillander	trey.tillander@dot.state.fl.us
FDOT District 1	District 1	L.K. Nandam	L.Nandam@dot.state.fl.us
FDOT District 2	District 2	Greg Evans	Greg.Evans@dot.state.fl.us.
FDOT District 3	District 3	Phillip Gainer	phillip.gainer@dot.state.fl.us
FDOT District 4	District 4	Gerry O'Reilly	Gerry.OReilly@dot.state.fl.us
FDOT District 5	District 5	John E. Tyler	john.tyler@dot.state.fl.us
FDOT District 6	District 6	Stacy Miller	stacy.miller@dot.state.fl.us
FDOT District 7	District 7	David Gwynn	david.gwynn@dot.state.fl.us
FDOT Office of Construction	State	Tim Lattner	tim.lattner@dot.state.fl.us
FDOT Office of Freight and Rail Office	State	Vacant position	freight@dot.state.fl.us
FDOT Office of Maintenance	State	Lance Grace, P.E.	Lance.Grace@dot.state.fl.us
FDOT Public Transit Office	State	Gabrielle Matthews	Gabrielle.matthews@dot.state.fl.us
FDOT Safety Office	State	Lora Hollingsworth	Shaynika.Clark-Debose@dot.state.fl.us
FDOT Aviation Office	State	David A. Roberts	david.roberts@dot.state.fl.us
Florida Metropolitan Planning Organization Advisory Council (MPOAC)	MPO	Mark Reichert	Mark.Reichert@dot.state.fl.us
Broward MPO	MPO	Greg Stuart	stuartg@browardmpo.org
Bay County TPO	TPO	Mary Beth Washnock	vneilson@palmbeachtpa.org

Agency name	Type of Agency	Contact name	Email
North Florida TPO	TPO	Jeff Sheffield	jsheffield@northfloridatpo.com
Gainesville MTPO	MTPO	Scott Koons	koons@ncfrpc.org
Ocala/Marion County TPO	TPO	Rob Balmes	rob.balmes@marionfl.org
River to Sea TPO	TPO	Colleen Nicoulin	cnicoulin@r2ctpo.org
Lake-Sumter MPO	MPO	Michael Woods	Woods@LakeSumterMPO.com
Hernando/Citrus MPO	MPO	Robert Esposito	resposito@co.hernando.fl.us
Space Coast TPO	TPO	Georganna Gillette	georganna.gillette@brevardfl.net
MetroPlan Orlando	MPO	Gary Huttmann	ghuttmann@metroplanorlando.com
Pasco County MPO	MPO	Carl Mikyska	cmikyska@pascocountyfl.net
Forward Pinellas	MPO	Whit Blanton	blanton@forwardpinellas.org
Hillsborough TPO	TPO	Beth Alden	aldenb@plancom.org
Polk TPO	MPO	Parag Agrawal	paragagrawal@polk-county.net
Indian River County MPO	MPO	Brian Freeman	freeman@ircgov.com
Heartland Regional TPO	TPO	Marybeth Soderstrom	msoderstrom@cfrpc.org
Sarasota/Manatee MPO	MPO	David Hutchinson	dave@mympo.org
St. Lucie TPO	TPO	Peter Buchwald	buchwaldp@stlucieco.org
Palm Beach TPA	TPO	Valerie Neilson	vneilson@palmbeachtpa.org
Miami-Dade TPO	TPO	Aileen Bouclé	aileen.boucle@mdtpo.org
Collier MPO	MPO	Anne McLaughlin	anne.mclaughlin@colliercountyfl.gov
Lee County MPO	MPO	Donald Scott, Chair	dscott@leempo.com
Charlotte County-Punta Gorda MPO	MPO	D'Juan Harris	harris@ccmpo.com
Martin MPO	MPO	Beth Beltran	bbeltran@martin.fl.us
South Florida Regional Transportation Authority (SFRTA)	Local	Loraine Kelly-Cargill	cargill@sfrta.fl.gov
Miami-Dade Expressway Authority (MDX) (Miami Dade Transp Planning Council)	Local	Darlene Fernandez	darlenefdz@gmail.com
City of Miami Beach (Miami Dade Transp Planning Council)	Local	Aileen Bouclé	aileen.boucle@mdtpo.org

Agency name	Type of Agency	Contact name	Email
City of North Miami (Miami Dade Transp Planning Council)	Local	Rasha Cameau	rcameau@northmiamifl.gov
City of Miami (Miami Dade Transp Planning Council)	Local	Juvenal Santana	
City of Homestead (Miami Dade Transp Planning Council)	Local	Julio A. Brea	jbrea@cityofhomestead.com
City of Hialeah (Miami Dade Transp Planning Council)	Local	Jose Sanchez Aileen Boucle, AICP	Elizabeth.Rockwell@mdtpo.org (media inquires)
City of Doral (Miami Dade Transp Planning Council)	Local	Carlo Arroyo Aileen Boucle, AICP	Carlos.Arroyo@cityofdoral.com Elizabeth.Rockwell@mdtpo.org
Transit Alliance Miami	Local	Marta Viciedo	help@transitalliance.miami
Florida Public Transportation Association	State	Clinton Forbes	cforbes@pbcgov.org
Transportation for America	Federal	John Robert Smith or Benito Perez	jrsmith@t4america.org
Autonomous Florida	State	Beth Kigel	
Enterprise Florida	State	Orlando (Headquarters)	
SunTrax	State	Pamela Foster, Dave Weiner	Pamela.Foster@dot.state.fl.us
Florida Chamber of Commerce	State	Mark Wilson	mwilson@flchamber.com
Florida International University	State	Dr. Hadi	hadim@fiu.edu
Florida State University	State	Yassir AbdelRazig	abdelraz@eng.famu.fsu.edu
University of Central Florida	State	Dr. Mohamed Abdel-Aty	M.Aty@ucf.edu
University of South Florida	State	Dr. Lin	lin@usf.edu
Florida Atlantic University	State	Evangelos I. Kaisar	ekaisar@fau.edu
UFTI Advisory Board	State	n/a	n/a

Appendix E – I-STREET™ Media Box

Media Box webpage - https://istreet.ce.ufl.edu/media-box/



Appendix F – Memorandum of Understanding with a City or County

MEMORANDUM OF UNDERSTANDING

____(Name of Entity)_____

AND

UNIVERSITY OF FLORIDA BOARD OF TRUSTEES ON BEHALF OF UNIVERSITY OF FLORIDA TRANSPORTATION INSTITUTE

This Memorandum of Understanding is effective on the ___(date)_____ by and between University of Florida Board of Trustees on behalf of University of Florida Transportation Institute ("UF-UFTI") and __(name of entity)__.

WHEREAS, the ___(name of entity) ____ that collects real time traffic signal data and other related data incident to its municipal transportation operations;

WHEREAS, UF-UFTI has created a testbed, known as the UF Smart Testbed, or I-STREET™, which is a project implemented on public roads in the City of Gainesville and on the University of Florida campus. The goals of the I-STREET™ Testbed are to improve transportation safety and mobility locally and nationally; to facilitate through research, education, and outreach, the development and implementation of advanced and emerging technologies that can improve transportation safety and mobility; to foster collaboration with industry wishing to develop, test, and implement technologies to improve transportation safety and mobility; and to become a recognized national and global leader in the development and implementation of advanced technologies to improve transportation safety and mobility;

WHEREAS, ___(name of entity) ___ desires to partner with UF-UFTI to participate in I-STREET™, a collaboration that leverages the Parties' combined strengths in advanced transportation technologies, transportation data collection and analysis, and education and outreach.

WHEREAS, ___(name of entity) ___ is willing to provide UF-UFTI with data and may assign an employee to assist UF-UFTI with the I-STREET™ project by providing information related to the data.

NOW, THEREFORE, the Parties enter into this MOU to memorialize their mutual understanding associated with their participation in the I-STREET™ Testbed. This MOU is not intended to be all-inclusive, but rather

only to establish the parameters for a successful collaboration between the parties by identifying key areas of responsibility and coordination pertaining to the I-STREET™ Testbed.

1. The effective date of this MOU shall be the last signature date affixed hereto. The term of this MOU shall be for a period of five (5) years, unless terminated by the Parties as provided below.
2. ___ (name of entity) ___ will provide certain data to UF-UFTI. The terms of this data sharing will be specified in a Data Use Agreement, which is attached to this MOU.
3. ___ (name of entity) ____ may assign an employee to assist UF-UFTI with the I-STREET™ project by providing information related to the data.
4. This MOU may be terminated by a written agreement signed by both Parties, or unilaterally by either Party, for any or no reason at any time, if the terminating Party provides the other Party with at least ninety (90) days' prior written notice of termination.
5. For the purpose of this MOU, contacts for the Parties are as follows:

For University of Florida Transportation Institute:

Technical Contact: **Administrative Contact:**

_____ _____

Gainesville, Florida 32611

For ____(name of entity) _____:

6. This MOU may be amended only by written agreement signed by both Parties, except for the contact information for the respective Parties, which may be amended by e-mail or other correspondence between the Parties.

IN WITNESS WHEREOF, the parties have executed this Agreement on the effective date stated above.

University of Florida Board of Trustees on behalf of

University of Florida Transportation Institute

By_____

Name:_____

Title:_____

Date_____

_____ (name of entity) _____

By_____

Name_____

Title_____

Date_____

DATA USE AGREEMENT FOR TRAFFIC DATA SET

This Data Use Agreement for a Traffic Data Set is effective on ____(date)_____by and between University of Florida Board of Trustees on behalf of University of Florida Transportation Institute ("UF-UFTI") and ____ (name of entity) _____

WHEREAS, ____(name of entity) ___ that collects real time traffic signal data and other related data incident to its municipal transportation operations;

WHEREAS, UF-UFTI has created a testbed, known as the UF Smart Testbed, or I-STREET™, which is a project implemented on public roads in _____(name of entity) ___ and on the University of Florida campus. The goals of the I-STREET™ Testbed are to improve transportation safety and mobility locally and nationally; to facilitate through research, education, and outreach, the development and implementation of advanced and emerging technologies that can improve transportation safety and mobility; to foster collaboration with industry wishing to develop, test, and implement technologies to improve transportation safety and mobility; and to become a recognized national and global leader in the development and implementation of advanced technologies to improve transportation safety and mobility;

WHEREAS, UF-UFTI has requested that ___(name of entity) _____ provide UF-UFTI with a Traffic Data Set ("TDS") in order to enable UF-UFTI to conduct research and development activities related to emerging transportation and smart city technology solutions;

WHEREAS, as part of its research and development project, UF-UFTI will share the TDS with private entities;

WHEREAS, it is the intent of both parties to fully comply with state and federal laws related to confidentiality and information security;

NOW THEREFORE, the parties agree as follows:

I. <u>Definitions</u>

A. “Traffic Data Set” (“TDS”) means real-time traffic-related information and signal timing information.

II. Responsibilities of the Parties

A. ____(name of entity) ____ agrees to provide TDS and access to field data collection equipment to UF-UFTI at no cost. The City may choose to contribute other data elements that the City deems of value to the I-STREET™ Testbed free of charge.

B. ____(name of entity) _____ will provide on-line access to its TDS, or establish and use a secure transfer site to transfer the TDS to UF-UFTI.

C. ____(name of entity) _____ will notify UF-UFTI if any data that _____(name of entity) ____ is providing to UF-UFTI is confidential or exempt under the Florida Public Records law.

D. UF-UFTI shall be responsible for responding to public records requests made directly to UF for records relating to the I-STREET™ Testbed, including the TDS supplied by _ (name of entity) ___to UF-UFTI. The City shall be responsible for responding to public records requests made directly to _____(name of entity) __ for TDS.

E. UF-UFTI agrees to limit the use and disclosure of the TDS to support research, education, and outreach activities for enhancing transportation, unless disclosure is legally required to respond to a public records request.

F. UF-UFTI will protect the TDS against unauthorized disclosure. UF-UFTI agrees to ensure that any agent, including a subcontractor, to whom it provides TDS, agrees to the same restrictions and conditions that apply through this Agreement to UF-UFTI with respect to such information.

G. UF-UFTI agrees to report to ____(name of entity) ____ any use or disclosure of the TDS not provided for by this Agreement of which it becomes aware, within ten (10) days of its discovery.

H. _____(name of entity) ___ reserves the right to make the same data available to other parties that request access to the City’s data.

I. _____(name of entity) ___ makes no warranties concerning the quality, timeliness, or accuracy of the TDS. City does not warrant it will be able to continuously provide the TDS without interruption and expressly reserves the right to discontinue the transfer of TDS at any time without consequence to _____

J. ____(name of entity) _____ retains all rights to the TDS raw data provided to UF-UFTI. UF-UFTI shall own all rights to products and any formatted, predictive, or derivative data generated from the TDS raw data.

K. UF-UFTI will provide ____(name of entity) ____ with access to the I-STREET™ Portal.

L. UF-UFTI is responsible for deciding what information shall be part of the I-STREET™ Testbed and for maintaining the I-STREET™ Testbed.

J. ____(name of entity) ____ may assign an employee to assist UF-UFTI with the I-STREET™ project by providing information related to the TDS.

III. Term and Termination

A. The term of this Agreement shall be effective as of the effective date indicated above.

B. In the event that UF-UFTI breaches this Agreement, _____(name of entity) __, in its sole discretion, may: i) terminate this Agreement upon written notice to UF-UFTI; or ii) request that UF-UFTI, to the satisfaction of ____(name of entity) ___, take appropriate steps to cure such breach. If UF-UFTI fails to cure such breach to ____ satisfaction in the time prescribed by ____(name of entity) ___, ___ (name of entity) ___ may terminate this Agreement upon written notice to UF-UFTI.

IV. Miscellaneous

A. This Agreement will cover any TDS disclosed by _____(name of entity) __ to UF-UFTI prior to, on, or after the date this Agreement is signed by all parties.

B. Neither Party shall assign, transfer, subcontract, or delegate all or any part of this Agreement, or any interest therein, without the other Party's prior written consent, which shall not be unreasonably withheld.

C. This Agreement shall be binding upon the successors and assigns of the Parties hereto.

D. Force Majeure. Neither Party is responsible for delays resulting from causes reasonably beyond its control, including, fire, explosion, flood, tropical storm, hurricane, war, strike, or riot, provided that the nonperforming Party uses commercially reasonable efforts to avoid or remove causes of nonperformance and continues performance under this Agreement with reasonable dispatch after the causes are removed.

E. The City shall be solely responsible for the negligent or wrongful acts of its officers and employees while acting in the course and scope of their employment with ___(name of entity) _____.

F. UF-UFTI shall be solely responsible for the negligent or wrongful acts of its officers and employees while acting in the course and scope of their employment with UF-UFTI.

G. Nothing in this Agreement waives either party's sovereign immunity granted under section 768.28, Florida Statutes.

H. Neither Party shall be liable to the other Party by reason of its performance under this Agreement for any loss of profits or consequential damages, even when that Party is advised of the possibility of such loss, claims, or damages.

I. Any waiver of any breach of any condition or covenant herein contained to be kept and performed by either Party shall not be deemed or considered as a continuing waiver, and shall not operate to bar or prevent the non-breaching Party from declaring a default for any succeeding breach, either of the same condition or covenant or otherwise.

J. The Parties acknowledge that each of the Parties have participated in the drafting of this agreement. No Party shall be considered to be the drafter of this agreement for the purposes of interpretation.

K. There are no third-party beneficiaries of this Agreement. The Parties agree and intend that this Agreement shall be enforceable only by the Parties and their duly authorized representatives. It is specifically agreed between the Parties executing this Agreement that nothing herein creates in the public or any member thereof a third party beneficiary status hereunder.

L. Nothing in this Agreement shall be construed to create any relationship between the parties, other than that of independent entities contracting with each other for the sole purpose of transferring TDS. This Agreement does not confer upon either party status as the agent, legal representative, or employee of the other party for any purpose. The Agreement shall not be interpreted or construed as creating or evidencing an association, joint venture, partnership or franchise relationship between the parties or the public.

M. This Agreement constitutes the entire agreement between the Parties. This agreement supersedes all proposals and oral and written agreements between the Parties on this subject. No modifications, alterations, changes, or waiver to this Agreement or any of its terms shall be valid or binding unless accomplished by a written amendment signed by both Parties.

N. Any notice permitted or required by this Agreement shall be in writing and sent by U.S. mail or e-mail to the contact address as noted below or as may be provided by either party to the other in writing from time to time.

O. This Agreement shall be construed and enforced in accordance with the laws of the State of Florida.

P. For any dispute related to this Agreement that the Parties cannot resolve by mutual agreement, the Parties shall seek agreement through formal mediation in Gainesville, Florida, failing which either Party may pursue any remedies legally available.

IN WITNESS WHEREOF, the parties have executed this Agreement on the effective date stated above.

University of Florida Board of Trustees on behalf of

University of Florida Transportation Institute

By_____

Name_____

Title_____

Date_____

_____(name of entity) _____

By_____

Name_____

Title_____

Date_____

Approved as to Form and Legality

_____

_____

Appendix G – Data Agreement with a City or County

Traffic Operations Division

Data User Agreement

This agreement for use of data ("Data User Agreement") is entered into as of the data of the last signature on this Data User Agreement (hereinafter "Effective Date") by ____(name of entity) ____ and the University of Florida Board of Trustees (hereinafter "USER") as a condition of use by the USER of_____ (hereinafter "DATA"), particular to the project STRIDE (hereinafter "SCOPE"). As a condition of use of the DATA, USER, understands and agrees to the following terms and conditions.

USER understands and agrees that access to, and utilization of DATA is provided as-is with no warrantees or guarantees of any kind, either express or implied for any particular use.

USER understands and agrees that there is no reasonable expectation of privacy when accessing and utilizing DATA using ____(name of entity) ____owned and maintained computers, systems and related technology infrastructure.

USER understands and agrees that ____(name of entity) ____ reserves the unilateral rights to terminate USER, access to and utilization of DATA in the event of inappropriate or unauthorized use.

In the event that USER becomes aware of any inappropriate use or data breach USER agrees to provide prompt verbal notice and subsequent written notice within 24 hours to____(name of entity) ____.

The agreement is valid for one year from ____ (date) _____of the following calendar year.

The Data User Agreement represents the entire agreement and understanding between the parties with respect to its subject matter and supersedes any prior and/or contemporaneous discussions, representations or agreements, whether written or oral, of the parties regarding this subject matter.

ACCEPTANCE OF TERMS. By signing below, the USER certifies that they agree to the terms and conditions, and are duly authorized to bind their respective entities or agencies with this Data User Agreement.

_____

Authorized signature (USER) Date

Director- UF Office of Clinical Research University of Florida Board of Trustees

Name (Print)/Title

Attest:_____
Printed Name:_____
Company/Entity Name

Appendix H – Data Use Agreement with a Transit Operator

DATA USE AGREEMENT FOR TRAFFIC DATA SET

_____(name of entity) __ AND

UNIVERSITY OF FLORIDA BOARD OF TRUSTEES ON BEHALF OF UNIVERSITY OF FLORIDA TRANSPORTATION INSTITUTE

This Data Use Agreement (the "Agreement") is effective on the date of last signature ("Effective Date") by and between University of Florida Board of Trustees on behalf of University of Florida Transportation Institute ("UF-UFTI") and _____(name of entity) ___ ("the Company").

WHEREAS, the Company is a private entity that manages autonomous shuttles at various locations around the US;

WHEREAS, UF-UFTI has created a testbed, known as the UF Smart Testbed, or I-STREET™, which is a project implemented on public roads in the City of Gainesville and on the University of Florida campus. The goals of the I-STREET™ Testbed are to improve transportation safety and mobility locally and nationally; to facilitate through research, education, and outreach, the development and implementation of advanced and emerging technologies that can improve transportation safety and mobility; to foster collaboration with industry wishing to develop, test, and implement technologies to improve transportation safety and mobility; and to become a recognized national and global leader in the development and implementation of advanced technologies to improve transportation safety and mobility;

WHEREAS, UF-UFTI has requested that the Company provide UF-UFTI with a Traffic Data Set ("TDS") in order to enable UF-UFTI to conduct research and development activities related to emerging transportation and smart city technology solutions;

WHEREAS, it is the intent of both parties to fully comply with state and federal laws related to confidentiality and information security;

NOW THEREFORE, the parties agree as follows:

III. <u>Definitions</u>

A. "Traffic Data Set" ("TDS") means real-time vehicle trajectories of autonomous vehicles operated by ___ (name of entity) ___, including speeds, accelerations, decelerations, GPS data, and any information pertinent to car-following, lane-changing, and conflicts with other vehicles, pedestrians, and bicyclists.
B. "Research Purpose" means to facilitate academic research, including but not limited to the publication of research, related to traffic operational evaluations for highway networks with autonomous shuttles. The intended use of the data is to develop new models that replicate the movement of autonomous shuttles and conventional vehicles around them. These models can be incorporated into traffic simulators in order to evaluate alternative scenarios with autonomous shuttles.

IV. Responsibilities of the Parties

A. The Company agrees to provide TDS and access to field data to UF-UFTI at no cost. The Company may choose to contribute other data elements that may be of interest to the research free of charge.

B. The Company will provide access to its TDS using existing APIs and systems. The Company will not develop new or custom data access systems for the purposes of this Agreement.

C. The TDS, in raw data form, shall be considered confidential information. However, consistent with the Research Purpose, the models developed from TDS and the results from those models shall not be considered confidential. UF-UFTI will maintain the TDS in strict confidence and shall protect the TDS against unauthorized disclosure. The Company will notify UF-UFTI if any other data that the Company is providing to UF-UFTI is confidential.

D. UF-UFTI agrees to limit the use and disclosure of the TDS to the Research Purpose.

E. The TDS shall be used solely by UF-UFTI for the Research Purpose, including publication of model results as provided herein. UF-UFTI shall be responsible for any breach of this Agreement by its employees or any of its representatives that it is authorized to provide the TDS. UF-UFTI shall not copy, alter, modify, disassemble, reverse engineer or decompile the TDS without the Company's prior written consent.

F. UF-UFTI agrees to report to the Company any use or disclosure of the TDS not provided for by this Agreement of which it becomes aware, within ten (10) days of its discovery.

G. The TDS is provided "AS IS" and the Company makes no representation or warranty regarding the TDS.

III. Term and Termination

A. The term of this Agreement shall be effective as of the Effective Date and shall remain in effect for a period of six (6) months or terminated by either party upon ten (10) days written notice to the other party. The term may be extended by mutual agreement of the parties via an amendment and signed by a duly authorized representative of each party.

B. In the event that UF-UFTI breaches this Agreement, the Company, in its sole discretion, may: i) terminate this Agreement upon written notice to UF-UFTI; or ii) request that UF-UFTI, to the satisfaction of the Company, take appropriate steps to cure such breach. If UF-UFTI fails to cure such breach to the Company's satisfaction in the time prescribed by the Company, the Company may terminate this Agreement upon written notice to UF-UFTI.

C. Upon termination of this Agreement, UF-UFTI shall, and cause its representatives to, promptly return or destroy at the Company's option the TDS. UF-UTI's obligations to maintain the confidentiality of TDS shall continue for three (3) years from the termination this Agreement.

IV. Miscellaneous

Q. UF-UTI shall not assign, transfer, subcontract, or delegate all or any part of this Agreement, or any interest therein, without the Company's prior written consent, which shall not be unreasonably withheld.

R. This Agreement shall be binding upon the successors and assigns of the Parties hereto.

S. Force Majeure. Neither Party is responsible for delays resulting from causes reasonably beyond its control, including, fire, explosion, flood, tropical storm, hurricane, war, strike, pandemic, or riot, provided that the nonperforming Party uses commercially reasonable efforts to avoid or remove causes of nonperformance and continues performance under this Agreement with reasonable dispatch after the causes are removed.

T. This Agreement shall be construed and enforced in accordance with the laws of the State of Florida.

U. Nothing in this Agreement waives either party's sovereign immunity granted under section 768.28, Florida Statutes.

V. THE COMPANY SHALL NOT BE LIABLE UNDER THIS AGREEMENT FOR ANY DIRECT, INDIRECT, INCIDENTAL, PUNITIVE, SPECIAL, EXAMPLARY, LOSS OF PROFITS OR CONSEQUENTIAL DAMAGES, EVEN WHEN THAT PARTY IS ADVISED OF THE POSSIBILITY OF SUCH LOSS, CLAIMS, OR DAMAGES.

W. Any waiver of any breach of any condition or covenant herein contained to be kept and performed by either Party shall not be deemed or considered as a continuing waiver, and shall not operate to bar or prevent the non-breaching Party from declaring a default for any succeeding breach, either of the same condition or covenant or otherwise.

X. The Parties acknowledge that each of the Parties have participated in the drafting of this agreement. No Party shall be considered to be the drafter of this agreement for the purposes of interpretation.

Y. There are no third-party beneficiaries of this Agreement. The Parties agree and intend that this Agreement shall be enforceable only by the Parties and their duly authorized representatives. It is specifically agreed between the Parties executing this Agreement that nothing herein creates in the public or any member thereof a third party beneficiary status hereunder.

Z. Nothing in this Agreement shall be construed to create any relationship between the parties, other than that of independent entities contracting with each other for the sole purpose of transferring TDS. This Agreement does not confer upon either party status as the agent, legal representative, or employee of the other party for any purpose. The Agreement shall not be interpreted or construed as creating or evidencing an association, joint venture, partnership or franchise relationship between the parties or the public.

AA. This Agreement constitutes the entire agreement between the Parties with respect to the TDS. This agreement supersedes all proposals and oral and written agreements between the Parties on this subject. No modifications, alterations, changes, or waiver to this Agreement or any of its terms shall be valid or binding unless accomplished by a written amendment signed by both Parties.

BB. Any notice permitted or required by this Agreement shall be in writing and sent by U.S. mail or e-mail to the contact address as noted below or as may be provided by either party to the other in writing from time to time.

University of Florida Board of Trustees on behalf of

University of Florida Transportation Institute

Name_____

Title_____

Address:

E-Mail Address:

_____

Name_____

Title_____

Address:

Appendix I – Data Transfer Agreement with a Transit Operator

DATA TRANSFER AGREEMENT (DTA) FOR
EVALUATION OF TRAFFIC OPERATIONAL AND DESIGN INTERACTION OF AV SHUTTLE

This Data Transfer for Evaluation of Traffic Operational and Design Interaction of AV Shuttle (the "Agreement") is made and entered into as of this _(date)____ and between _____(name of entity) ___, with offices located at _(location of entity)____and University of Florida board of Trustees ("UF") with offices located at 207 Grinter Hall, Gainesville, FL 32611-5500.

WHEREAS ____(name of entity) ____ operates an autonomous vehicle shuttle (the "AV Shuttle") at _(location)____ UF desires to perform an evaluation of the traffic operational and design interactions of the AV Shuttle at___(location) __described in Attachment 1 (the "Research Purpose") ; and

WHEREAS UF desires to access video inside the AV shuttle as described in Attachment 1, and other confidential information of _____(name of entity) ___ will permit UF to access the video, subject to terms of this Agreement.

NOW, THEREFORE, in consideration of the promises set forth herein, the parties hereby agree as follows.

1. RESEARCH PURPOSE

____(name of entity) ____shall make available to UF the video described in Attachment 1 solely for the Research Purpose. Prior to commencement of video inside the AV Shuttle, _____(name of entity) __ and UF shall reasonably cooperate to ensure all the riders on the AV Shuttle are aware of the video and consent to being included, as applicable, on the video and in the study. At least thirty (30) days prior to any publication or disclosure of the results of the Research Purpose to any third parties, UF shall provide a copy of such a disclosure or publication to and provide an opportunity to remove from the disclosure or publication any of Confidential Information. The publication shall be provided to_____(name of entity) __ If _____(name of entity) ___ does not respond within forty-five (45) days, the researcher(s) may proceed with the disclosure or publication. Until after publication or disclosure by UF, _____(name of entity) __ shall retain confidentiality of such disclosure or publication and will not use such disclosure or publication for any purpose other than internal review.

2. CONFIDENTIAL INFORMATION

During the term of this Agreement, UF may receive certain confidential and proprietary information and trade information marked clearly confidential or confirmed in writing to be confidential from ____(name of entity) ____ (collectively, "Confidential Information"). Confidential Information may include (i) computer software, including updates, enhancements, new releases, modifications and improvements thereto, and user and technical documentation; (ii) technical, business, financial, marketing, sales, research and development information and plans; (iii) customer and prospect lists, agreements with third parties, vendor lists, pricing proposals, customer buying patterns; (vi) formulas, methods, know-how, processes, designs, prototypes, new products, developmental work, performance tests, product testing or evaluations, bug fixes, product enhancements; (vii) information concerning the members, employees, consultants and service providers of either party; and (viii) any other information identified by_____(name of entity) ___ in writing as confidential.

3. USE OF CONFIDENTIAL INFORMATION

Confidential Information shall be used solely by UF for the Research Purpose. UF shall take reasonable precautions, at least the same level of cares it takes to protect its own confidential information, to maintain Confidential Information in strict confidence. Confidential Information shall only be disclosed to UF officers, directors, employees, consultants or other authorized individuals (collectively, "Representatives") on a need-to-know basis. UF shall require its Representatives to maintain any Confidential Information disclosed to it in accordance with the terms of this Agreement and UF shall be responsible for such Representatives' compliance with the terms of this Agreement. UF shall not copy, alter, modify, disassemble, reverse engineer or decompile any Confidential Information without Disclosing Party's prior written consent.

4. EXCEPTIONS

Confidential Information shall not include any information that UF can establish: (i) is or subsequently becomes publicly available through no act or omission of UF; (ii) was in UF's lawful possession prior to disclosure of such information; (iii) is subsequently disclosed to UF by a third party who is not in breach of an obligation of confidentiality; or (iv) is independently developed by UF without the use of the Confidential Information. Confidential Information may be disclosed under a court order, or a valid subpoena to the extent counsel for UF determines in its reasonable discretion that the disclosure of such Confidential Information is reasonable required and the Receiving Party shall promptly notifies ____(name of entity) ____ in writing of such determination and provides ____(name of entity) ____an opportunity to seek an appropriate protective order prior to disclosing such Confidential Information.

5. ENFORCEMENT

____(name of entity) ____may be irreparably damaged if the obligations under this Agreement are not specifically enforced and_____(name of entity) ___ may not have an adequate remedy in the event of a breach by UF of its obligations hereunder. The parties agree, therefore, that ____(name of entity) ____may be entitled, in addition to other available remedies, to an injunction restraining any actual, threatened or further breaches of UF's obligations under this Agreement (or any other appropriate equitable order or decree).

6. TERMINATION

This Agreement shall terminate upon completion of the Research Purpose or upon ten (10) days written notice by either party to the other. Upon termination of this Agreement, UF shall, and cause its Representatives to, promptly return or destroy at _____ option all such Confidential Information of _____ UF’s obligations set forth in this agreement shall survive for sixty (60) months following termination of this Agreement.

7. WARRANTY

All Confidential Information and information provided or disclosed by_____(name of entity) __ hereunder shall be provided "AS IS" and ____(name of entity) ____.makes no representation or warranty regarding any such information. ____(name of entity) ____SHALL NOT BE LIABLE UNDER THIS AGREEMENT FOR DIRECT, INDIRECT, INCIDENTAL, PUNITIVE, SPECIAL, EXEMPLARY OR CONSEQUENTIAL DAMAGES WHETHER OR NOT THE POSSIBILITY OF SUCH DAMAGES WAS DISCLOSED OR COULD HAVE BEEN REASONABLY FORESEEN.

8. LIABILITY

Each Party assumes all risks of personal injury and property damage attributable to the acts or omissions of that party and its officers, employees, and agents.

9. MISCELLANEOUS

A. Governing Law

This Agreement shall be governed by the laws of the State of Florida, without giving effect to any conflicts of laws principles. Any disputes under this Agreement may be brought in the state courts and the federal courts located in Gainesville, Florida and the parties hereby consent to the personal jurisdiction and exclusive venue of these courts.

B. Independent Contractors

UF and _____(name of entity) __ shall at all times be independent contractors for the purposes of this Agreement and not agents, employees or partners. Each party shall so represent itself to all other parties. Except as provided herein, neither party has granted to the other the right to bind it in any manner whatsoever.

C. Assignment

UF shall not assign, delegate or subcontract any of its rights or obligations under this Agreement without the prior written consent of

D. Waiver

No course of dealing or failure to enforce any provision of this Agreement shall constitute a waiver of any rights under this Agreement. To be effective, any waiver to this Agreement must be in writing and signed by both parties.

E. Severability

If any provision of this Agreement, or portion thereof, is held to be invalid, illegal or unenforceable by a court of competent jurisdiction, such provision shall be reduced or modified by such court of competent jurisdiction to the extent necessary to make such provision legal and enforceable. If any provision herein is held to be illegal, invalid or unenforceable by a court of competent jurisdiction and no provision is substituted by such court of competent jurisdiction, the provision found illegal, invalid or unenforceable shall be severed and the remaining provisions of the Agreement shall remain in full force and effect.

F. Force Majeure

Neither party shall be liable for any failure to perform or for delay in performance due to causes beyond its reasonable control.

G. Notices

All notices hereunder shall be in writing and shall be sent by overnight courier or regular mail to the party's address set for the above.

H. Compliance with Laws

The use of and disclosure of the Confidential Information obtained under this Agreement shall at all times be consistent with this Agreement or applicable laws or regulations.

I. Entire Agreement

This Agreement contains the entire understanding of the parties with respect to its subject matter and supersedes all prior agreements, understandings, representations, correspondence or communications relating to its subject matter. This Agreement shall not be amended unless such amendment, is in writing and signed by authorized signatories of both parties. This Agreement shall inure to the benefit of and shall be binding upon the parties hereto, and their successors and permitted assigns.

Appendix J – Data Use Agreement with a Data Platform Company

DATA USE AGREEMENT

Sublicensee Traffic Data Services by _____(name of entity) ___

Through the Florida Department of Transportation

_____(name of entity) _____ (hereinafter **"Sublicensee"**) certifies that it is either (1) an authorized subcontractor of the Florida Department of Transportation (**"Agency"**), or (2) a government agency, and requires access/use of the data and services as procured under an agreement between Agency and ____(name of entity) ____. As a condition of use of the___(name of entity) ___ Products, Sublicensee, its agents and employees, understands and agrees to the following terms and conditions:

Sublicensee understands and agrees that access to, and utilization of, _____(name of entity) ___is governed by the data licensing terms and conditions specifically set forth in the License Agreement, as set forth in Attachment A. Sublicensee agrees that Sublicensee, its officers, employees and agents shall fully adhere to and comply with all such data licensing terms and conditions, and that _____(name of entity) __shall be a third party beneficiary of this License Agreement, and be permitted to directly enforce the terms of the License Agreement in the event of Sublicensee's failure to comply with any applicable terms or conditions.

Sublicensee understands and agrees that ____(name of entity) ____ reserves the unilateral right to terminate the Sublicensee's access to and utilization of _____(name of entity) ___services and data in the future in the event of inappropriate use or unauthorized disclosure.

In the event Sublicensee becomes aware of an inappropriate use or unauthorized disclosure, Sublicensee agrees to provide immediate verbal notice and subsequent written notice within 24 hours to the following:

_____

Signatures

I, the undersigned, am duly authorized to bind the _____to this Agreement and do so by affixing my Signature hereto.

Entered into _____

Signature: _____

Name: _____ Title: _____

Technical Contact Name: _____ Technical Contact Email:_____

Description of Why Access to _____is Required by Sublicensee:

Appendix K – Data Evaluation Agreement with an Automobile Data Services Provider

DATA EVALUATION AGREEMENT

This Data evaluation Agreement ("Agreement") is effective as of the _____("Effective Date") by and between:

1. _____(name of entity) _____
2. University of Florida Board of Trustees whose office address is 207 Grinter Hall, PO Box 115500, Gainesville, Florida, 32611-5500, USA ("Licensee").

Introduction

____(name of entity) ____permits Licensee to evaluate data ("Evaluation"),_____(name of entity) __and Licensee have agreed that the terms of this Agreement shall apply to all Evaluations and which are set out in Evaluation Schedules referring to this Agreement.

It is agreed that:

Definitions:

"Data" means the data made available by or on behalf of _____(name of entity) __ as detailed in an Evaluation Schedule;

"Evaluation Period Duration" means the length of time during which the Licensee shall complete the evaluation

"Evaluation Schedule" means an evaluation schedule duly executed by the parties and referring to this Agreement detailing amongst other things the Data to which it relates and the Evaluation Period, the form of which shall be materially the same as the sample evaluation schedule in Appendix 1; and

"Findings Duration" means period of time which the Licensee will share its Evaluation findings with ……

1. Licence Grant._____ shall deliver the Data to Licensee as set out in the Evaluation Schedule. ____(name of entity) ____ hereby grants to Licensee a non-exclusive, royalty-free, non-transferable, non-sublicensable, license to modify, process, reproduce, enhance, compile and/or organize all or any portion of the Data, provided such use shall be solely as a component of an aggregated dataset in connection with the Evaluation.

2. Restrictions. In no event shall Licensee sell, sub-license, provide access to or otherwise monetise the Data. Licensee shall not copy, translate, disassemble or decompile the Data.

Licensee shall not reverse engineer the Data, or attempt to do so, in a manner that allows identification of any vehicle or natural person.

3. Protection of Data.

    - Licensee will not disclose or share the Data with any third-parties.
    - Licensee will only permit access to the Data to those officers, directors and employees who require such access in order to evaluate the Data and will ensure that all officers, directors and employees that access the Data are trained to adhere to the access and use restrictions in this Agreement.
    - Licensee will cease all use of the Data, delete and destroy all written or other tangible copies of the Data in Licensee's possession or control, including all extracts and copies thereof, at the end of the Evaluation Period. Upon termination of this Agreement at _____(name of entity) ___ request or within three months from receipt of the Data Licensee shall provide written confirmation acceptable to ____(name of entity) ____that the Data and copies thereof have been deleted and/or destroyed.
    - Licensee will comply with all applicable laws and regulations in its storage, use, and disposal of the Data. comply with any legal or regulatory requirements that are imposed on _____(name of entity) ___ With respect to the Data
    - Licensee will maintain commercially reasonable administrative, technical and physical safeguards necessary to protect the Data against loss, destruction, alteration, or unauthorised access and disclosure. Further, Licensee shall comply with Third Party Information Security Requirements, which is attached hereto as Appendix B and incorporated by reference within this Agreement.

4. Evaluation Purpose. The purpose of the Evaluation is for Licensee to gain an understanding of the value and use of the Data either in conjunction with Licensee's existing products and or services or separately to create to new products and or services. It is intended that the Evaluation will result in the Licensee forming a decision as to whether or not it shall purchase data similar to that of the Data on an ongoing basis under the terms of a commercial agreement.

5. Evaluation Period and Findings. The Evaluation Period shall begin when the Data is provided to Licensee and shall continue for the Evaluation Period Duration. The Evaluation findings will be shared with _____(name of entity) ___ during the Findings Duration. The Licensee warrants that it shall not share the findings of the Evaluation with any third party including its affiliates.

6. Termination. Unless agreed otherwise between the parties, this Agreement and/or Evaluation Schedule will terminate:
   i) immediately upon written notice to the other Party; or

ii) immediately upon being notified in writing in the event of a material breach by Licensee. Each Evaluation Schedule shall automatically terminate upon expiry of the Findings Duration.

7. No Fees or Obligation of to Purchase. Each party shall be responsible for its own costs and expenses in connection with this Agreement. Licensee does not incur any obligation to purchase any products or services from_____(name of entity) ___a result of entering into this Agreement.

8. Intellectual Property Rights. Except as expressly granted pursuant to Section 1 all intellectual property rights subsisting in or relating to the Data and all property subsisting in copies of the Data supplied to the Licensee under this Agreement shall remain owned by ____(name of entity) ____or its licensors. Nothing herein shall be deemed to grant, transfer, assign or set over unto Licensee any other right, title, interest or ownership of the Data, all of which is hereby expressly reserved by_____(name of entity) ___its licensors.

9. Indemnity. Licensee will defend and indemnify ____(name of entity) ____and its successors and assigns, and its officers, directors, employees, subcontractors, consultants, representatives, and agents) from and against any and all losses incurred, including reasonable legal fees and expenses, of any kind or nature arising out of or resulting from, any claim or allegation of a third party arising from or relating to Licensee's access, use, or disclosure of the Data or performance in connection with this Agreement, including (a) the unauthorized use of, disclosure of, or access to the Data while the Data was under the control of Licensee or its subcontractors or agents, (b) that Licensee or its services infringe or misappropriate the intellectual property rights of any third party, and (c) a violation of any law by Licensee or any subcontractor, agent, or affiliate of Licensee in connection with Licensee's performance under this Agreement, and (d) breach of section 11. Customer's indemnification obligations hereunder shall be limited to the extent Customer is entitled to protections under Section 768.28, Florida Statutes and/or prohibited/limited/immunized by applicable law.
10. Confidentiality. The parties acknowledge that in the course of performance of its obligations pursuant to this Agreement, a party ("Receiving Party") may obtain confidential and/or proprietary information ("Confidential Information") from the other party or its affiliates ("Disclosing Party"). The Receiving Party hereby agrees that all Confidential Information it receives shall be received in strict confidence and shall only be used for the purposes of this Agreement, and shall not be disclosed to any third party, except in the case of Licensee as set out in Section 3, without the prior written consent of the Disclosing Party. Further, the provisions of this Agreement shall be deemed Confidential Information of both parties, and the Data shall be deemed _____(name of entity) ___ confidential information. For purposes of clarity, neither party will disclose any information relating to an identified or identifiable natural person ("Personal Information"), such as name, home address, email address or other contact information, acquired by it from the other party under this Agreement. Should either party inadvertently obtain Personal Information from the other party, it will be deemed Confidential Information. In such a case, in addition to the obligations set forth in this Section

11 and Agreement as it relates to Confidential Information and Personal Information, the party who inadvertently obtains the Personal Information will notify the other party within two (2) business days and make arrangements for such data to be promptly destroyed. The provisions of this Section 11 shall survive the term or termination of this Agreement for any reason.

11. Injunctive Relief. Because unauthorized use or disclosure of the Data will result in immediate and irreparable injury to _____(name of entity) ___or its licensors or affiliates for which monetary damages may not be adequate, in the event of any use of the Data that violates (or, in wejo or its licensor's reasonable opinion, is likely to violate) this Agreement, ____(name of entity) ____ may, in addition to its other rights and remedies, be entitled to equitable relief, including temporary and permanent injunctive relief and specific performance.

12. Disclaimer. NOTWITHSTANDING ANY CONTRARY PROVISION OF THIS AGREEMENT, THE DATA IS PROVIDED ON AN "AS IS" AND "AS AVAILABLE" BASIS, WITH ALL WARRANTIES DISCLAIMED, BOTH EXPRESS AND IMPLIED, INCLUDING WARRANTIES AS TO THE AVAILABILITY, QUALITY, SUITABILITY FOR LICENSEE'S PURPOSES, AND ACCURACY OF THE DATA, AND WARRANTIES OF NONINFRINGEMENT, MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

13. Notices. Any notices under this Agreement, shall be given to the addresses set out above unless agreed otherwise.

14. Amendments. No amendment to this Agreement shall be binding upon either party unless it is in writing and is signed by both parties.

15. Governing Law. This Agreement shall be governed by the law of Florida and shall be subject to the exclusive jurisdiction of the courts in Florida.

16. Entire Agreement. This Agreement constitutes the entire agreement between the parties with respect to the subject matter hereof, and supersedes all prior oral or written representations or agreements.

AGREED by the parties through their authorized signatures.

_____ _____-

EVALUATION SCHEDULE No. 1

The terms and conditions of the Data Evaluation Agreement entered into between ___(name of entity) _and The University of Florida ("Licensee") on _____ ("Agreement") shall apply to and be incorporated into this Evaluation Schedule as if they were set out herein and this Evaluation Schedule shall be subject to the terms and conditions of the Agreement unless specifically set out to the contrary herein.

Appendix L – Data Agreement with a Traffic Safety Smartphone Application Company

MUTUAL NON-DISCLOSURE AGREEMENT

THIS AGREEMENT is dated as of _____ (the "Effective Date") and entered into by and between ____(name of entity) ____whose principal office is located _____and the University of Florida Board of Trustees, a public body corporate of the State of Florida, having offices at UF Research, Sponsored Programs, 207 Grinter Hall, Gainesville, FL 32611. It is understood and agreed to that the parties to this Agreement would each like to provide the other with certain information that may be considered confidential. To ensure the protection of such information and in consideration of the agreement to exchange said information, the parties agree as follows:

1. The confidential information to be disclosed under this Agreement (“Confidential Information") can be described as and includes:

Any and all non-public technical and business information relating to proprietary ideas, patentable ideas, existing and/or contemplated products and services, research and development, production, costs, profit and margin information, finances and financial projections, customers, clients, marketing, and current or future business plans and models, owned and controlled by one party ("Disclosing Party") and disclosed to the other ("Receiving Party), that is marked as confidential (or with other similar designation) at the time of disclosure; and/or (b) disclosed by in any other manner and identified as confidential at the time of disclosure and is also summarized and designated as confidential in a written memorandum delivered within thirty (30) days of the disclosure.

2. The parties shall use the Confidential Information only for the purpose of evaluating potential business, employment and/or investment relationships and discussions related to ……..…….The period in which Confidential Information may be disclosed ("Disclosure Period”) is two (2) years from the Effective Date unless terminated by either Party. Either Party may terminate the Disclosure Period with thirty (30) days written notice. The confidentiality and use obligation is three (3) years from expiration or termination of the Disclosure Period.

3. The parties shall limit disclosure of Confidential Information within its own organization to its directors, officers, partners, members and/or employees having a need to know and shall not disclose Confidential Information to any third party (whether an individual, corporation, or other entity) without prior written consent. The parties shall satisfy its obligations under this paragraph if it takes affirmative measures to ensure compliance with these confidentiality obligations by its employees, agents, consultants and others who are permitted access to or use of the Confidential Information.

4. This Agreement imposes no obligation upon the parties with respect to any Confidential Information (a) that was possessed before receipt; (b) is or becomes a matter of public knowledge through no fault of receiving party; (c) is rightfully received from a third party not owing a

duty of confidentiality; (d) is disclosed without a duty of confidentiality to a third party by, or with the authorization of the disclosing party; or (e) is independently developed.

5. The parties represent that they have the right to make the disclosures under this Agreement.

6. This Agreement shall not be construed as creating, conveying, transferring, granting or conferring upon either party any rights, license or authority in or to the information exchanged, except the limited right to use Confidential Information specified in paragraph 2. Furthermore and specifically, no license or conveyance of any intellectual property rights is granted or implied by this Agreement.

7. Neither party has an obligation under this Agreement to purchase any service, goods, or intangibles from the other party. Furthermore, both parties acknowledge and agree that the exchange of information under this Agreement shall not commit or bind either party to any present or future contractual relationship (except as specifically stated herein), nor shall the exchange of information be construed as an inducement to act or not to act in any given manner.

8. Neither party shall be liable to the other in any manner whatsoever for any decisions, obligations, costs or expenses incurred, changes in business practices, plans, organization, products, services, or otherwise, based on either party's decision to use or rely on any information exchanged under this Agreement.

9. If there is a breach or threatened breach of any provision of this Agreement, it is agreed and understood that the non-breaching party may have no adequate remedy in money or other damages and accordingly may be entitled to injunctive relief; provided however, no specification in this Agreement of any particular remedy shall be construed as a waiver or prohibition of any other remedies in the event of a breach or threatened breach of this Agreement.

10. This Agreement states the entire agreement between the parties concerning the disclosure of Confidential Information and supersedes any prior agreements, understandings, or representations with respect thereto. Any addition or modification to this Agreement must be made in writing and signed by authorized representatives of both parties. This Agreement is made under and shall be construed according to the laws of the State of Florida, U.S.A.

11. If any of the provisions of this Agreement are found to be unenforceable, the remainder shall be enforced as fully as possible and the unenforceable provision(s) shall be deemed modified to the limited extent required to permit enforcement of the Agreement as a whole.

WHEREFORE, the parties acknowledge that they have read and understand this Agreement and voluntarily accept the duties and obligations set forth herein.

IN WITNESS WHEREOF, the parties hereto have set their hand and seals on this _____.

Appendix M – Research Services Agreement with a Sensor Company

Research Services Agreement

Between

_____(name of entity) ____

and the

University of Florida Board of Trustees

THIS AGREEMENT ("Agreement") is made by and between the University of Florida Board of Trustees, a public body public corporate of the state of Florida, (hereafter referred to as "UF"), whose address is UF Division of Sponsored Programs, 207 Grinter Hall, Box 115500, Gainesville, FL 32611-5500 and _____(name of entity) ___

(hereafter referred to as "SPONSOR"), whose address is _____

each one a "Party" and collectively "Parties."

WHEREAS, SPONSOR desires to retain the services of UF, upon the terms and conditions hereinafter set forth;

NOW THEREFORE, in consideration of the mutual covenants and agreements contained herein, SPONSOR and UF agree as follows:

1. **Scope of Service to be Performed**: UF agrees to undertake and conduct the work entitled; **"Testing and Evaluation of Traffic Detection Devices,"** for SPONSOR as outlined in Exhibit A ("Services").

2. Period of Service: The services called for by Article 1, may begin on _____with activities ending on _____unless extended by written amendment or terminated sooner following the termination provisions set forth below.

Services involving vertebrate animals and/or human subjects may not be conducted until IACUC and/or IRB approvals have been obtained.

3. Funding and Payment: SPONSOR shall fund UF a maximum amount of _____for the Project. This Agreement is payable on a fixed price basis. SPONSOR shall pay UF in accordance with the following schedule after receipt of UF invoice:

Lump sum payments _____ U.S. dollars upon signing

Invoices shall be sent to : _____

Payment shall be made to “University of Florida” and remitted to the following address:

University of Florida

Accounts Receivable Manager

_____ Office of Contracts and Grants – Accounting Services

33 Tigert Hall

Sponsor shall pay interest at the lesser of 1.5% above the prime interest rate and the maximum amount allowed by law for failure to make payments when due. The prime interest rate is calculated as published in Wall Street Journal on the first business day of default. Sponsor shall pay University for collection fees and legal fees that it incurs to collect outstanding balances.

4. Points of Contact: The following are designated as Investigators and Administrative contacts for the purposes of this Agreement. The Investigators will be responsible for the technical matters of the services outlined in Exhibit A. The UF Investigator is essential to the work being performed and no change will be made to the UF Investigator without SPONSOR written approval.

Investigators:

For UF:

_____

512 Weil Hall

Gainesville, FL 32611

_____

Administrative:

UF Division of Sponsored Programs

207 Grinter Hall

PO Box 115500

Gainesville, FL 32611-5500

(352) 392-1582

ufawards@ufl.edu

5. Reporting Requirements: In addition to performing the Services as described by Article 1, UF Investigator shall deliver the following reports to the SPONSOR's Investigator:

Report Type

Final Narrative Report

Due No Later than

No later than 30 days from Contract End date

These narrative reports should provide an assessment of what has been accomplished during the reporting period with the final report covering the entire contract period. Before publication the SPONSOR

could review the report and could request deletion or anonymization of product name or company name and require deletion of proprietary or Confidential Information as defined in Paragraph 6 below.

6. Confidential Information: Any confidential or proprietary information provided by one Party to the other in connection with this Agreement ("Confidential Information", as further defined below) is confidential and/or proprietary to the Disclosing Party, and the Receiving Party shall not publish or disclose Confidential Information to a third-party or use Confidential Information for any purpose unrelated to this Agreement, without the prior written consent of the Disclosing Party. The Party receiving Confidential Information from the other party is referred to as the "Receiving Party," and the Party disclosing Confidential Information to the other party is referred to as the "Disclosing Party". Confidential Information shall mean: (a) if the Confidential Information is in written form when disclosed, the Disclosing Party must indicate the proprietary nature of such information by an appropriate legend, marking, stamp or other positive identification on the writing delivered to the Receiving Party, and (b) if the Confidential Information is disclosed orally or visually, the Disclosing Party must, within 30 days after disclosure to the Receiving Party, deliver to the Receiving Party a writing containing an adequate description of the oral or visual information which shall indicate the proprietary nature of such information by an appropriate legend, marking, stamp or other positive identification.

The obligations of non-use and non-disclosure shall not apply to:

(a) Information that the Receiving Party can show by written record that it possessed prior to its receipt from the Disclosing Party;

(b) Information that was available to the public prior to its receipt by the Receiving Party or later became so through no fault of the Receiving Party;

(c) Information that is subsequently disclosed to the Receiving Party by a third party free of any obligations of confidentiality;

(d) Information that is independently known, developed, or discovered without use of the Disclosing Party's Confidential Information; or

(e) Information that is required to be disclosed by law.

In the event of 6(e) above, the Receiving Party is required to give the Disclosing Party prompt notice thereof. The Disclosing Party may seek an appropriate protective order, and the Receiving Party will reasonably cooperate with the Disclosing Party in its efforts to seek such a protective order.

The obligations of this Article pertaining to confidentiality shall apply for three (3) years after disclosure.

8. Inventions and Patents:

(a) "Background Intellectual Property" means any intellectual property owned or controlled by a Party as of the Effective Date or conceived outside of the Services.

(b) Neither Party shall have any claims to or rights in Background Intellectual Property of the other Party.

(c) No license to the other Party under any patents is granted or implied by conveying proprietary or other Confidential Information to that Party.

(d) If an invention is conceived exclusively by the employees of one Party in the performance of the Services ("Sole Invention"), title to said Sole Invention and to any patent issuing thereon shall be in the inventing Party's name.

(e) In the case of a joint invention, that is an invention made jointly by one or more employees of both Parties hereto in the performance of the Services ("Joint Invention"), each Party shall have an equal, undivided interest in and to such Joint Invention(s).

9. Use of Name for Publicity: Neither Party shall use the name of the other Party or of any Investigator in any advertising or promotional material without the prior written approval of the other. Notwithstanding any other provision of this Agreement, both parties acknowledge that under Section 1004.22, Florida Statutes, UF shall be free to release the title and short description of the Services, the name of the UF Investigator, and the amount and source of funding provided for the Services, without prior approval of SPONSOR.

10. Compliance with Law: The Parties shall comply with all applicable federal, state, local laws and regulations and nothing in this Agreement shall be construed to require either Party to violate such provisions of law or subject either Party to liability for adhering to such provisions of law.

11. Independent Contractor: UF shall be deemed to be and shall be an independent contractor and, as such, UF shall not be entitled to any benefits applicable to employees of SPONSOR; Neither Party is authorized or empowered to act as agent for the other for any purpose and shall not on behalf of the other enter into any contract, warranty, or representation as to any matter. Neither shall be bound by the acts or conduct of the other.

12. Insurance: In the performance of all services hereunder:

(a) UF warrants and represents that UF has adequate liability insurance, such protection being applicable to officers, employees, and agents while acting within the scope of their employment by UF, and UF has no liability insurance policy as such that can extend protection to any other person.

(b) Each Party hereby assumes any and all risks of personal injury and property damage attributable to the negligent acts or omissions of that Party and the officers, employees, and agents thereof to the extent permitted. by Section 768.28, Florida Statutes.

13. Termination: Either Party may terminate this agreement without cause upon thirty (30) days' prior written notice to the other.

Termination for Breach. If either Party commits a material breach of this Agreement and fails to remedy that breach within thirty (30) days after receipt of written notice from the other Party, the Party giving notice may terminate this Agreement by written notice to the other Party, effective upon receipt.

Upon any termination of this Agreement by either Party, UF will cease further obligation of funds for Services and will take all reasonable steps to cancel or otherwise reduce outstanding obligations. SPONSOR will pay UF for either (a) percent of completion or (b) deliverable completed to the date of termination and (c) any non-cancellable obligations on or before the date of termination pursuant to

Article 3. UF will refund any portion of SPONSOR advance payments not obligated pursuant to (a) or (b) and (c).

14. Dispute Resolution: B. The parties shall attempt to cooperatively resolve any and all disputes and/or claims that arise under this Agreement by first engaging the highest appropriate administrative officials of each Party who shall negotiate in good faith to seek a cooperative resolution. In event that any disputes or claims arising from this Agreement cannot be resolved as provided for above, the parties hereby agree to first participate in good faith in non-binding mediation in an attempt to resolve and settle all disputes.

15. Force Majeure: Neither Party is responsible for delays resulting from causes reasonably beyond its control, including fire, explosion, flood, tropical storm, hurricane, war, strike, or riot, provided that the nonperforming Party uses commercially reasonable efforts to avoid or remove causes of nonperformance and continues performance under this Agreement with reasonable dispatch after the causes are removed.

16. Miscellaneous: This Agreement (a) may not be assigned or transferred by either Party without the other Party's prior written consent, (b) constitutes the entire understanding of the Parties with respect to the subject matter hereof, and (c) may be modified or amended only in a writing signed by duly authorized representatives of both Parties.

17. Export Control: SPONSOR shall notify UF in writing before providing UF any export controlled information or materials. SPONSOR shall include, if known, the Export Control Classification Number, United States Munitions List Category or EAR99 designation as appropriate.

18. Execution: Delivery of a signed Agreement by reliable electronic means, including facsimile or email, shall be an effective method of delivering the executed Agreement. This Agreement may be stored by electronic means and either an original or an electronically stored copy of this Agreement can be used for all purposes, including in any proceeding to enforce the rights and/or obligations of the parties to this Agreement.

19. Agreement Modification: The Parties may only modify this Agreement by a written instrument signed by both Parties. A purchase order may be used for billing purposes only and may not modify the terms and conditions of this Agreement.

IN WITNESS WHEREOF, the Parties have caused this Agreement to be executed by their duly authorized representatives.

UNIVERSITY OF FLORIDA BOARD OF TRUSTEES

Signature: ……

Title: …..

Date:…….

_____

University of Florida

I have read and approve this Agreement, and I hereby assign to University all my right, title, and interest in any Intellectual Property. Principal Investigator

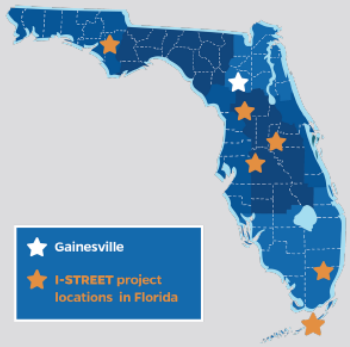
Appendix N – I-STREET™ Brochure

Implementing Solutions from Transportation Research and Evaluation of Emerging Technologies

I-STREET is a "living lab" on the University of Florida's (UF) campus, surrounding roadway networks, and across the state of Florida. Advanced technologies such as autonomous vehicles, smart devices, and sensors are tested and deployed to enhance mobility and safety. **I-STREET** is a collaboration between the Florida Department of Transportation (FDOT), the City of Gainesville (CoG), and University of Florida's Transportation Institute (UFTI) to further advance transportation technology development and deployment. The Gainesville **I-STREET** network is connected to the CoG's Smart Traffic Center and offers an ideal testing location for technologies related to all modes of transportation.

*"**I-STREET** engages both public and private sectors to think of solutions to real world challenges."*

Jesus Gomez
Transit Director, CoG



I-STREET *FAST FACTS*

- $10M+ Invested in I-STREET since inception (2017)
- 10+ Industry testing partners and 80+ industry connections
- 180+ Faculty and students part of UFTI
- 20+ Pedestrian and bicyclist safety devices deployed
- 80+ On-Board Units (OBUs)
- 150+ Road side Units (RSUs)
- 200+ Miles of roadway networks

Become a Program Partner

Organizations that are interested in supporting the work UFTI does throughout Florida are invited to join the UFTI Industry Partnership Program. Funding from partner contributions supports student scholarships and fellowships, independent research, technology development and innovation in transportation.

Learn more about this opportunity, including contribution tiers and member benefits at ***istreet.ce.ufl.edu/partner-with-us.***

ACCESS CAV & SENSOR DATA

I-STREET gathers data from roadside units, onboard units, traffic monitoring devices, and various sensors. Industry partners can access these data to help develop and test their emerging technologies.

EVALUATE YOUR TECHNOLOGY ON OUR OPEN-ROAD "LIVING LAB"

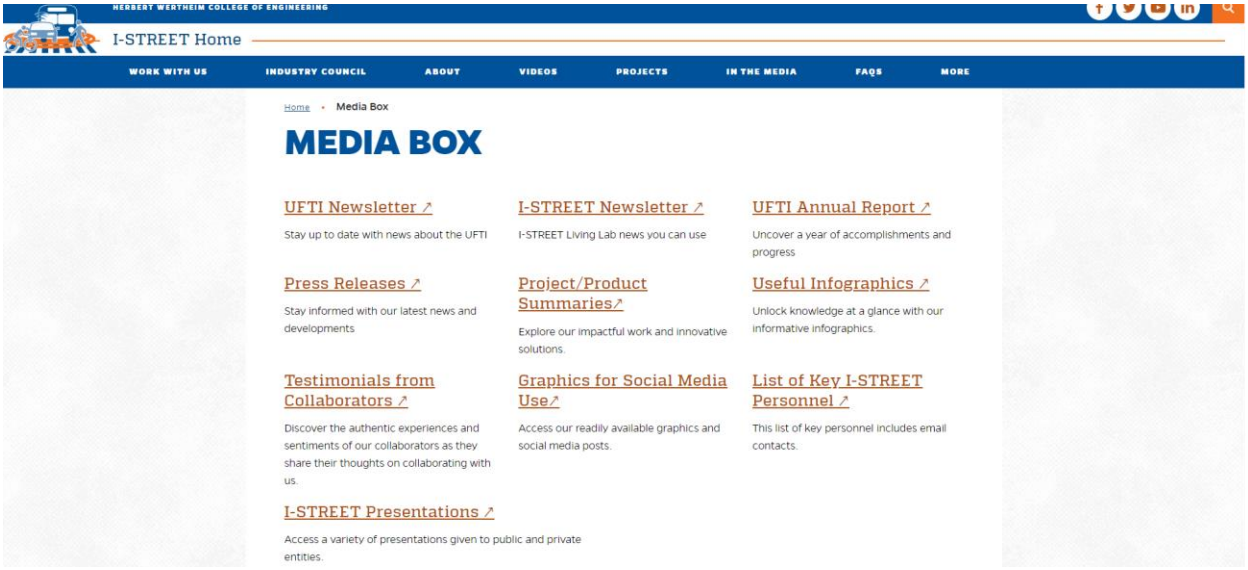
I-STREET is a real-world open-road network with sensors, connected vehicle infrastructure, data collection equipment, and video feeds. Industry partners can work with **I-STREET** to test the functionality and effectiveness of transportation safety and mobility solutions.

INNOVATE WITH US

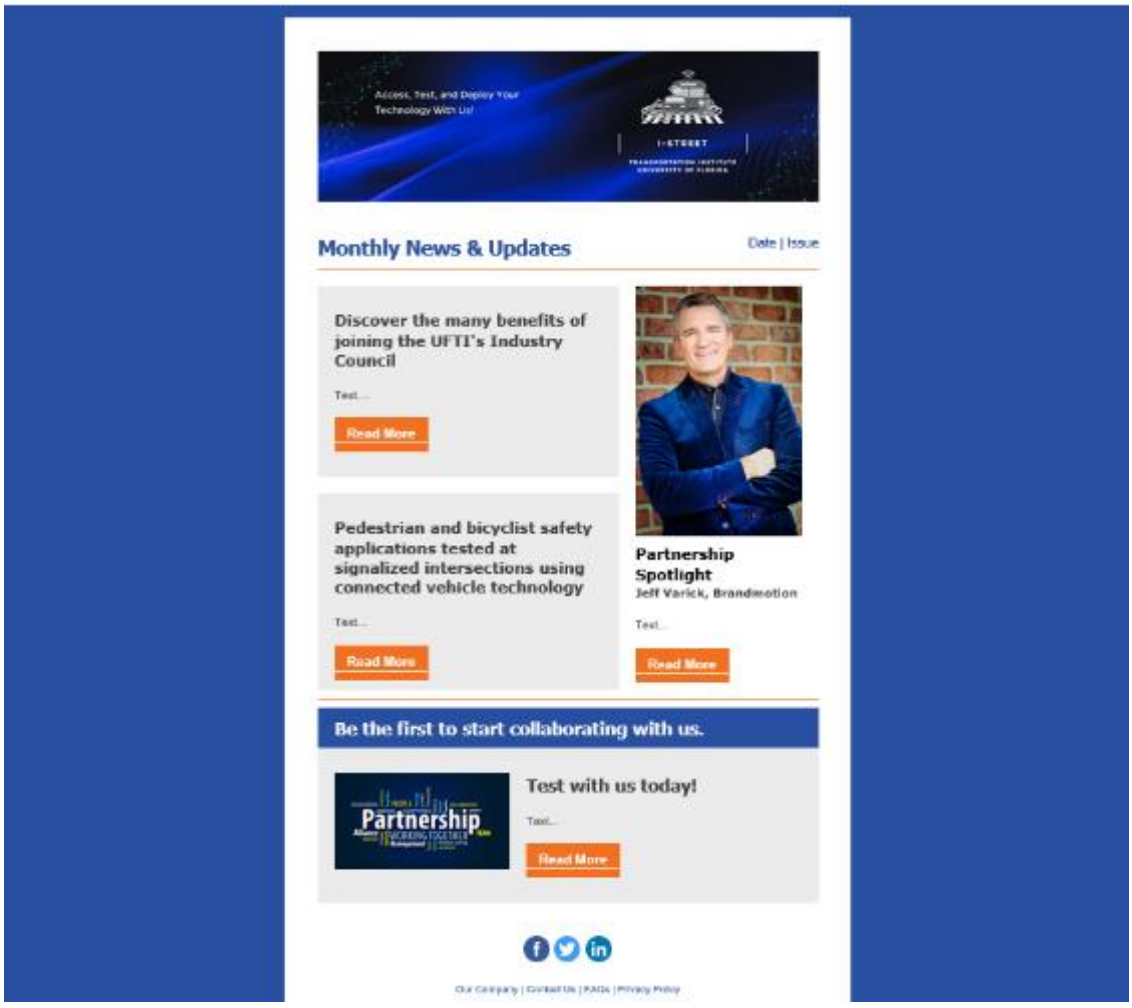
UF Innovate is the umbrella organization that helps build business from the innovation developed to coordinated research. **I-STREET** research products that are ready for widescale implementation are eligible for further development and support through UF Innovate. Industry partners work with **I-STREET** to test the functionality and effectiveness of transportation safety and mobility solutions.

Appendix O – Media Box Contents

1. **Media Box webpage -** https://istreet.ce.ufl.edu/media-box/



2. **UFTI Newsletter (most recent) -** https://www.transportation.institute.ufl.edu/publications/newsletters/newsletter-archives/uf-transportation-institue-newsletter-archives/
3. **I-STREET™ Newsletter (mock-up) –** The newsletter will contain information relevant to both public and private sector audiences.



4. **UFTI Annual Reports –** This will link to a page where UFTI annual reports, including information about I-STREET™, will be posted.(https://www.transportation.institute.ufl.edu/publications/annual-reports/)
5. **List of Key** I-STREET™ **Personnel –** (https://istreet.ce.ufl.edu/contact-us/)
   Press Releases – This page will link to a page where we will post press releases as those become available. (https://istreet.ce.ufl.edu/press-releases/)
6. **Sample Project/Product Summary**

I-STREET RESEARCH

Project Summary

Evaluation of CARMA for I-STREET Testbed Implementation
FDOT Project BDV31-977-145

I-STREET
TRANSPORTATION INSTITUTE
UNIVERSITY OF FLORIDA

1 OVERVIEW

The I-STREET research team conducted a thorough assessment of the Federal Highway Administration's (FHWA) Cooperative Automation Research Mobility Applications (CARMA) program and on cooperative driving automation (CDA) capabilities for transit applications. Subsequently, they crafted a detailed guidance document aimed at aiding the Florida Department of Transportation (FDOT) in the seamless implementation of this technology on the I-STREET Living Lab.

2 METHODOLOGY

- CARMA use cases, including the hardware used were reviewed and status of development and testing assessed
- Public and private sectors consulted to understand required components for CDA-ready vehicle-infrastructure system
- Test tracks and lab facilities visited which have used CARMA hardware

3 OBJECTIVE

The mission of the I-STREET research team was to deliver a comprehensive report offering guidance to the FDOT on how best to harness the potential of the CARMA program within the I-STREET Living Lab in Gainesville, FL.

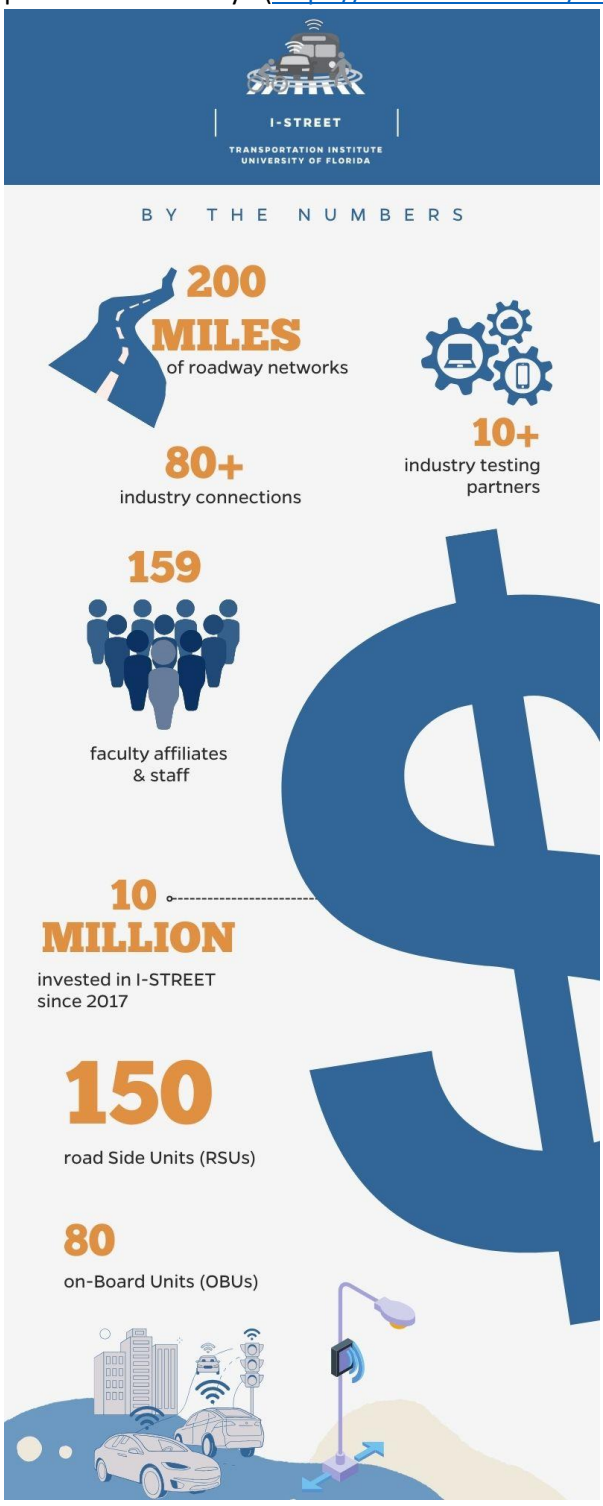
4 KEY FINDINGS

Based on an extensive review of a variety of hardware used by various testing facilities and labs, six use cases were developed specifically for field implementation on the I-STREET Living Lab. The use cases were identified as cooperative perception (CP) applications which is expected to improve perception performance of automated vehicles.

5 REAL WORLD APPLICATIONS

The tailored use cases designed for implementation in the I-STREET Living Lab show significant promise in addressing the prevalent challenges concerning pedestrian and bicyclist safety in Gainesville, FL. This guidance document furnishes FDOT with crucial details regarding technology readiness, a prioritized approach to problem-solving, and a clear financial roadmap for the successful integration of the recommended six use cases within the I-STREET Living Lab.

7. **Useful Infographic(s) –** This links to a page where this can be downloaded. Other infographics will be posted as necessary. (https://istreet.ce.ufl.edu/useful-infographics-for-I-STREET™/)



8. **Testimonials –** Graphics (https://istreet.ce.ufl.edu/I-STREET-collaborator-testimonials/)
9. **Logos –** (https://istreet.ce.ufl.edu/logos/)
10. **Social Media – (**https://istreet.ce.ufl.edu/social-media/)
    - ***A. Social Media Handles & Usernames***
        - Facebook - https://www.facebook.com/UFTransportation/
        - X - @_UFTI
        - YouTube - @uftransportation2948
        - LinkedIn - https://www.linkedin.com/company/uf-transportation-institute
    - ***B. Hashtags***
        - #IstreetPartners
        - #IstreetFieldDay
        - #IstreetCares
        - #IStreetTakeOver
        - #AskIstreet
        - #IstreetInnovates
        - #IStreetDoesSafety
    - ***C. Social Media Sample Posts and or videos*** *(*these can be used as templates for content creators)
11. **I-STREET™ Presentations** – (https://istreet.ce.ufl.edu/I-STREET-presentations/)
12. **Multimedia Assets** – (https://istreet.ce.ufl.edu/multimedia-assets/)

Appendix P – Educational Opportunities for Transportation Professionals

P-1 University of Florida

Topic	Description	More Info
Transportation Operations and Planning (TOP) Certificate Program	9-credit Professional Certificate Select three courses: • TTE 6267 Traffic Flow Theory (3 credits) • TTE 5256 Traffic Engineering (3 credits) • TTE 6205 Freeway Operations and Simulation (3 credits) • TTE 6315: Highway Safety Analysis (3 credits) • TTE 5305 Advanced Transportation Systems Analysis (3 credits) • TTE 5006 Advanced Urban Transportation Planning (3 credits) • URP 6716 Transportation Policy and Planning (3 credits) • CGN 6905 Special Problems in Civil Engineering (3 credits)	Website
TTE6008 (Previously CGN6905) Fundamentals of the Transportation Profession	This 3-credit course provides an overview of all aspects pertaining to professional practice of transportation including history, organizational structures, legal aspects, finances, human resources, asset management, leadership, marketing and communications, innovation, and technical overview of select topics. Content delivered by guest lecturers who are experts in the field.	Website
Older Adults' Perceptions of Automated Vehicle Technology (Department of Occupational Therapy)	This course provides an overview of older adults' transportation needs, the potential benefit of Autonomous Vehicle Technology (AVT) to their health and safety, and results from a study conducted to determine older adults' perception before and after being exposed to AVT (i.e. a driving simulator driving in autonomous mode and an automated shuttle). The presentation highlights implications for practice, policy and research.	Website
Autonomous & Connected Vehicles (ACV): Introduction to the Health Care Professional (Department of Occupational Therapy)	This course provides an overview of the current crash statistics in the USA, an introduction to AV, including the levels of AV, how driving as an occupation may be affected/changed by AV, the pros and the cons of AV, a timeline for AV, as well as a discussion on the vulnerable road users and how they may benefit from AV. The presentation highlights that we are facing the greatest transportation revolution of the century and invite health care professionals to consider the opportunities of AV technology for mobility-disadvantaged people.	Website

P-2 Mcity at University of Michigan

Topic	Description	More Info
Learn at the Global Epicenter of Connected Vehicle Research and Development	4-day course, 3.5 CEUs, $2630 • Introduction, Research Overview, and Connected Vehicle Technology • Connected Vehicle Infrastructure • Cybersecurity and Privacy of CAV • Automated Vehicle Technology and Simulation Tools	Website
Certificate in Current and Emerging Technologies (CCET)	$250 per module; $950 Certificate (4 online modules) **CAV Modules:** • Adversarial Machine Learning • Dynamics & Control of Connected Vehicles • Social & Behavioral Implications of AVs and Services **Hybrid & Electric Vehicle Modules:** • Electrical Energy Storage • Battery Management & Safety • Electric Machines **Advanced Manufacturing Modules:** • Advanced Materials & Processes for Manufacturing Lightweight Structures • Design & Manufacture of Multi-Material Lightweight Structures • Innovation in Manufacturing Systems & Sustainability • Smart Production Systems	Website
Professional Education Certificates	**Certificate** (15 weeks, $995) • Foundations of Mobility: Mobility Behavior & Technology • Foundations of Mobility: Mobility Systems Design, Finance, and Regulation **Modules** (6-7 hours online, $250): • Social & Behavioral Issues • Mobility & the Environment • Mobility & Technology • Mobility Data • Planning, Urban Design, and Systems Integration • Mode Choice • Financing the Transportation and Mobility Ecosystem • Law, Policy, and Regulation	Website

P-3 Center for Advanced Automotive Technology

Topic	Description	More Info
Connected Vehicle Professional™	CVP is a vendor-neutral credentialing program launched between the Connected Vehicle Trade Association (CVTA) and The Next Education. Three courses: • Connected Vehicle Professional I - Function, Protocols, and Architecture • Connected Vehicle Professional II - Standards, Organizations, Programs • Connected Vehicle Professional III - Data, Markets, Policy and Regulations	Website
IT 311 - Sensors used in connected and automated vehicles	Developed by Jackson State University, the course introduces students to principles of sensors (GPS, MEMS, lidar, Radar, Ultrasonic, Infrared) used in connected and automated vehicles, locomotion, autonomous mobile robots.	Website
IT 312 - Navigation techniques used in connected and automated vehicles	Developed by Jackson State University, the course introduces students to principles of navigation techniques used in connected and automated vehicles.	Website
Automated, Connected, and Intelligent Vehicles	Developed by Springfield Technical Community College, the course introduces students to the various technologies and systems used to implement ADAS.	Website

P-4 Additional Professional Development

Topic	Description	More Info
Advanced Automotive Service Technology – Tesla Technician at Miami Dade College	16-week course, $2,428.19 During the course of the program, students will develop technical expertise and earn certifications through a blended approach of in-class theory, hands-on labs and self-paced learning. Upon successful completion of the program, graduates have the certification necessary for job placement as Service Technicians at one of Tesla's Service Centers.	Website
Advanced Driver Assistance Systems Technicians at Florida State College at Jacksonville	Florida State College at Jacksonville is developing an NSF funded training program to develop workforce ready ADAS technicians for the automotive industry by adding instruction on ADAS systems and diagnosis to the College's automotive technology associate degree program and developing an ADAS technician certificate.	Website
Coursera: Self-Driving Cars Specialization offered by the University of Toronto	Online certificate program; price not provided 4 courses (estimated 4-6 months to complete): • Introduction to Self-Driving Cars • State Estimation and Localization for Self-Driving Cars • Visual Perception for Self-Driving Cars • Motion Planning for Self-Driving Cars	Website

Udacity: Self-Driving Car Engineer	Online course program including courses in Computer vision, Sensor Fusion, Localization, Planning, and Control	Website
SAE International: Autonomous Vehicles for Transportation Professionals	4-hour online course (0.4 CEUs), $199 Three modules: • Transportation System Overview • AV Technology Overview • AV Supplier Ecosystem	Website
SAE International: Robotics for Autonomous Vehicle Systems Bootcamp	40-hour online course (6.0 CEUs), $3,995 Twelve weeks (estimated 10-15 hours/week) Designed for working engineers who are interested in learning more about the field of AVs.	Website
SAE: Automotive Cybersecurity Certification: Level One	2-day classroom course in China, (1.3 CEUs), $1,559 Provides basic knowledge to be able to consider the new cybersecurity requirements according to the ISO/SAE 21434 security standard. Designed for people who work in the automotive cybersecurity, management, engineering, or audit environment.	Website
IEEE Guide to Autonomous Vehicle Technology	Time commitment and price not provided Seven courses: • Cooperation in AVs • Developing and Validating Control Systems for Connected and Automated Vehicles • Human Factors in Vehicle Automation • Intelligent Control of Connected and Automated Vehicles • Object Visual Detection for Intelligent Vehicles • Object Visual Recognition for Intelligent Vehicles • Sensors for AVs	Website
USDOT: Connected and Automated Vehicle Education (CAVe)-in-a-box	Provides community colleges, trade schools, universities, and other academic stakeholders with unique tools and resources for the development of an intelligent transportation workforce.	Website
Wayne State University Short Courses	6-week online short courses through the College of Engineering, $199 Examples of courses: • Vehicle connectivity and Internet of Things (IoT) • Autonomous vehicle technologies • Future mobility models: Business and technology • The world of artificial intelligence	Website
University of California San Diego: ECE/MAE 148 - Introduction to Autonomous Vehicles	4-credit course provided by the School of Engineering, 11 weeks, $980 Utilizing a combination of lectures and practical applications, participants will gain hands-on experience in a state-of-the-art lab with the development of scale autonomous cars that must perform on a simulated city track.	Website
National Highway Institute	A number of courses in the Intelligent Transportation Systems (ITS) Program Area, online, no cost	Website

	• ITS: What, Why, and How (7.7 hours) • Systems Engineering Fundamentals for ITS (8 hours) • Transportation Cyber Security (4 hours) • Introduction to Connected Vehicles and Automated Vehicles (2 hours) • Improving Highway Safety with ITS (8 hours) • ITS Procurement (3.5 hours)	
USDOT: ITS Professional Capacity Building Program	An online ePrimer, a standalone reference document, no cost, 16 modules	Website
ESME Learning Solutions (developed by MIT)	Smart Mobility: Reimagining the Future of Transportation Tech & Sustainable Cities 6-week online course (7-10 hours/wk), $1,850, 6 modules	Website
MIT: Transportation Networks and Smart Mobility: Methods and Solutions	5-day course, 3.0 CEUs, virtual, $3,600 Topics include traffic performance, smart mobility, demand and user behavior, public transportation models, freight models, real-time systems, calibration and validation	Website
Carnegie Mellon University: Managing AI in Transportation	5-day virtual bootcamp developed by Heinz College's Traffic21 Institute $3,975 ($3,250 discount for alumni, veterans, US govt employees, and non-profits)	Website

Appendix Q – Educational Opportunities for Undergraduate and Graduate Students

The courses with a possibility of benefiting from I-STREET™ research are marked with asterisk (*).

Q-1 Degree Programs at UF

- 4-1 combined BS/Masters program in Civil Engineering, Transportation track
- 3-year Concurrent Degree program in Transportation Engineering (ME) and Urban Planning (MAURP)
- Masters (MS or ME) in Transportation Engineering (Civil Engineering)
- Ph.D. in Transportation Engineering (Civil Engineering)

Q-2 Undergraduate Courses at UF

Course	Name
TTE 4004C	Transportation Engineering*
TTE 4106	Urban Transportation Planning*
TTE 4300	Transportation Systems Analysis
TTE 4824	Transportation Facility Design*
TTE 4201	Traffic Engineering*
CGN 4905	Transportation Data Analytics*
CGN 4905	Applied Data Science IN Civil and Environmental Engineering*
GIS 4113	Introduction to Spatial Networks
SUR 4201	Route Geometrics and Design
EIN 4245	Human Factors Applications*
EEL 3701C	Digital Logic and Computer Systems
EEL 3872	Artificial Intelligence Fundamentals*
URP 4283	Automation for Geospatial Modeling and Analysis
GIS 4123C	GeoAI – Geographic Artificial Intelligence
DCP 4300	AI in the Built Environment*
HFT 4746	Smart Cities, Attractions, and Theme Parks

Q-3 Featured Undergraduate Course at UF: Careers in Transportation Seminar

In fall 2022, UFTI developed a 1-credit undergraduate course called Careers in Transportation Seminar. The course was designed to encourage students from a wide range of majors (engineering, planning, sustainability, etc.) to consider transportation as a career. While the course was designed for freshmen and sophomore students, it was open to all undergraduate and graduate students. Each week professionals from around the country presented to students about their own experiences in the transportation industry and provided an overview of their career. In addition, students completed assignments related to a wide range of transportation topics and developed their own professional skills through as set of activities. More information about the course including the syllabus can be found at https://stride.ce.ufl.edu/education/stride-careers/.

Q-4 Graduate Courses at UF

Course	Name
	Operations and Simulation

TTE 6267	Traffic Flow Theory*
TTE 6259	Urban Streets Simulation and Control*
TTE 5256	Traffic Engineering*
TTE 6205	Freeway Operations and Simulation*
CGN 6905	Advanced Traffic Simulation*
	Planning and Analytics
TTE 5106	Advanced Urban Transportation Planning*
TTE 6505	Discrete Choice Analysis
EGN 5215	Machine Learning Applications in Civil Engineering*
CGN 6905	Transportation Data Analytics*
CGN 6905	Applied Data Science in Civil and Environmental Engineering*
	Network, Safety, and Design
TTE 5305	Advanced Transportation Systems Analysis
TTE 6606	Urban Transportation Models
TTE 6315	Highway Safety Analysis*
TTE 5805	Geometric Design of Transportation Facilities
	Graduate Electives
TTE 6306	Computational Methods in Transportation Engineering*
EEL5632	Safety and Security of Vehicular Electronic Systems*
CCE 5035	Construction Planning and Scheduling
CGN 5605	Public Works Planning
CGN 5606	Public Works Management
TTE 5835	Pavement Design
TTE 5837	Pavement Management Systems
CES 5325	Design of Highway Bridges
URP6821	Transportation and Land Use Modeling
URP6716	Transportation Policy and Planning
URP6711	Transportation and Land Use Coordination
URP 6270	Introduction to Planning Information Systems
URP 6274	GPS for Planners
URP 6100	Planning Theory and History
URP6042	Urban Economy
URP6280	3D Geospatial Modeling and Visualization
URP6542	Urban Land Economics
URP6272	Urban Spatial Analysis
STA6166	Statistical Methods for Research I
STA6167	Statistical Methods for Research II
STA 6326	Introduction to Theoretical Statistics I
STA 5106	Computer Programs in Statistical Analysis
STA 5325	Mathematical Methods of Statistics
ESI6314	Deterministic Methods for Operational Research
ESI 6325	Applied Probability Methods in Engineering
ESI 5236	Reliability Engineering
ESI 6337	Markov Processes, Queuing Theory and Applications
ESI 6546	Stochastic Modeling and Analysis

ESI 6529	Digital Simulation Techniques*
ENC5319	Scholarly Writing for Publication
CAP5108	Research Methods for Human-Centered Computer*
CAP6610	Machine Learning*
BCN 5470	Construction Methods Improvement
GIS6104	Spatial Networks
GEO6938	Special Topics: Transportation Geography
SUR 6395	Topics in GIS

Q-5 Featured UF Graduate Course

The Department of Electrical & Computer Engineering at the University of Florida provides the course EEL 5632: Safety and Security of Vehicular Electronic Systems (website). The course explores the role of automotive systems in connectivity and analyzes some key challenges in making these systems robust, i.e., safe, secure, and reliable. The course describes the architectures of current and emergent automotive systems. It brings together concepts from diverse areas of Computer Science and Computer Engineering, including Computer Architecture, Hardware and System Security, Real-time Systems, Machine Learning, Formal methods, Embedded system design, and Computer Networks. The course focus on:

- Electronics and software responsible for various autonomous functionality of the vehicle
- Notions such as functional safety, security, and reliability in current and future cars
- Trade-offs and conflicts involved in automotive electronic design.
- Variety of automotive standards, certifications, and regulations
- Current practices in automotive safety and security design
- Automotive software challenge

Q-6 Recently Approved Courses at UF

The following three courses have been approved to be taught at planned UF campus in the near future:

1. **TTE6275 Connected and Automated Vehicles***

   Course Description

   Prepares students to understand CAVs and address the myriad of issues related to the safe and efficient deployment of CAVs in the transportation system. Technology, policy/legal aspects, human factors, traffic operations/safety, and ethics/equity will be addressed in the context of passenger vehicles, public transit vehicles, and freight vehicles.

   Course Objectives

   1. Understand fundamental technologies and theory driving CAVs
   2. Analyze policy framework and legal aspects
   3. Analyze human factors / human-machine interaction issues
   4. Evaluate ethics and equity in CAV deployment
   5. Create a framework for safe operations of a transportation system with CAVs

2. **TTE6605 Smart Multimodal Transportation Systems***

   Course Description

Prepares students to operate multimodal transportation systems (intersections, urban streets, freeways, and transit systems) efficiently and safely in the light of all the transformation happening in the field of transportation engineering such as intelligent infrastructure and data for real-time decision making. Real world data will be used for quantitative analyses using emerging visualization techniques and optimization/ modeling methods.

Course Objectives

For each of intersections, urban streets, freeways, and transit systems, students will be able to

1. Analyze emerging technologies and issues
2. Apply emerging data streams and analytics techniques.
3. Evaluate Traffic operations
4. Evaluate Traffic safety

3. **TTE6615 Electric, Shared, and Micro Mobility***

Course Description

Prepares students to understand three critical trends in transportation namely electrification, shared mobility (Uber/Lyft etc.), and micro mobility (e-scooters, micro transit, etc.). Technology, policy/legal aspects, human factors, traffic operations/safety, and equity are addressed. Analyses will be undertaken using emerging visualization techniques and optimization/ modeling methods.

Course Objectives

For each of electric, shared, and micro mobility:

1. Understand fundamental technologies and theory
2. Apply Emerging data streams and analytics techniques.
3. Analyze policy framework and legal aspects
4. Analyze operations and safety
5. Evaluate human factors and equity issues

Q-7 Certificates at UF

Topic	Details	Website
Artificial Intelligence Fundamentals and Applications *	9-credit Undergraduate certificate in College of Engineering	Website
Geographic Artificial Intelligence and Big Data*	12-13-credit undergraduate certificate in College of Liberal Arts and Sciences	Website
Geospatial Information Analysis	11-12-credit undergraduate/graduate certificate in College of Liberal Arts and Sciences	Website
Mapping with Small Unmanned Aerial Systems *	9-credit undergraduate/graduate certificate in the College of Agricultural and Life Sciences	Website
Graduate Certificate in Urban Analytics*	15-credit graduate certificate Department of Urban & Regional Planning	Website
Machine Learning Certificate*	9-credit graduate certificate in College of Engineering (Electrical & Computer Engineering)	Website

Graduate tracks in Electrical & Computer Engineering *	Complete 4 courses to complete a graduate track (digital certificate of completion): Computer Architecture | Computer Systems | Hardware/Systems Security | IoT/Networking | Communications | Controls | Signal Processing | Machine Learning & AI | RF & Power Electronics | Electronic Integrated Circuits | Nano & Quantum Devices | Microsystems Technology | E&M, Power and optics	Website

Q-8 Graduate Degrees and Certificates at Other Universities

University	Degree name	Website
University of Michigan	MSc in Automotive Systems Engineering	Website
Illinois Institute of Technology	MSc in Autonomous Systems and Robotics	Website
Stanford University	Robotics and Autonomous Systems Graduate Certificate 4 courses (2 required, 2 electives), online, $19,600-22,400	Website
College of the Desert	Associate of Science (AS) in Advanced Transportation Technologies 12 courses (10 required, 2 electives)	Website
New Jersey Institute of Technology	Gradate Certificate in Intelligent Transportation Systems 4 courses (3 required, 1 elective)	Website
Indiana University	Graduate Certificate in Hybrid Electric Vehicle Technology (12 credits, College of Engineering)	Website
Harvard University	Online, 4-credit Graduate Course through Harvard Summer School (Continuing Education): CRN 34560 - Robotics, Autonomous Vehicles, Drones, and Artificial Intelligence $3,600	Website
Cranfield University (UK)	MSc in Connected and Autonomous Vehicle Engineering	Website
The University of Warwick (UK)	MSc in Smart, Connected, and Autonomous Vehicles	Website
Coventry University	MSc in Connected and Autonomous Vehicle Systems	Website

Q-9 Courses at Other Universities

University	Course	Website
Clemson University	Course: CE 8930: Autonomous Vehicle Systems (taught Fall 2019)	Website
University of California San Diego	Course: ECE/MAE 148 - Introduction to Autonomous Vehicles; 4-credit course provided by the School of Engineering, 11 weeks, $980 Utilizing a combination of lectures and practical applications, participants will gain hands-on experience in a state-of-the-art lab with the development of scale autonomous cars that must perform on a simulated city track.	Website
Purdue University	Course: CE597, Machine Learning and Artificial Intelligence for Autonomous Vehicle Operations II (taught Fall 2020)	Website

Purdue University	Graduate Technical Focus Area: AI for Autonomous Systems (30 credits)	Website
Purdue University	Graduate Hybrid Vehicle Systems Certificate (9 credits, College of Engineering)	Website
Johns Hopkins University	Graduate Course: Intelligent Vehicles: Cybersecurity for Connected and Autonomous Vehicles	Website
Virginia Tech University	Graduate Course: ECE 5914 – Autonomous Systems Seminar	Website
University of Illinois	Graduate Course: CS 588 – Autonomous Vehicle System Engineering	Website
University of Minnesota	Graduate Course: PA 5290 – Emerging Trends in Transportation	Website
University of Southern California	Graduate Course: CE 584 – Intelligent Transportation Systems	Website
Stanford University	Graduate Course: GSBGEN 569: The Open Road: Innovation in Cars, Driving, and Mobility (last offered Winter 2000) Course: ME 302B: The Future of the Automobile- Driver Assistance and Automated Driving	Website Website
Northwestern University	Course: COMP_ENG 395, 495: Connected and Autonomous Vehicles: Challenges and Design	Website
Carnegie Mellon University	Masters Concentration: Smart Transportation/Mobility	Website
Carnegie Mellon University	Course: 94-845/12-645 Smart Cities: Growth and Intelligent Transportation Systems	Website

Appendix R – Educational Opportunities for K-12 Students

R-1 STRIDE Curriculum Materials

The UFTI STRIDE Center has developed transportation curricula and conducted educational outreach to K-12 audiences in order to raise awareness and interest in transportation careers. Information on UF-sponsored K-12 outreach can be found on the STRIDE website (https://stride.ce.ufl.edu/k-12-workforce-development/active-k-12-projects/uf/).

R-2 Additional K-12 Curriculum Materials

UFTI has compiled a list of K-12 curriculum resources that focus on engineering and transportation. The resource list developed for educators is provided on the STRIDE Center website at https://stride.ce.ufl.edu/k-12-workforce-development/resources-for-educators/

AT-HOME STEM ACTIVITIES

- TeachEngineering:
  "Sprinkle" activities are designed for under 60 minutes at home with videos and descriptions.
- DiscoverE (formerly the National Engineers Week Foundation):
  At-Home Engineering activities with videos and descriptions

VIDEOS ABOUT TRANSPORTATION AND ENGINEERING CAREERS

- Your Future in Transportation:
  A 5-minute video showcasing future careers and opportunities in transportation produced by the Transportation Research Board (TRB).
- Discovering You: Engineering Your World (NBC News Learn):
  Scroll down to the "Discovering You" section with 3-minute videos highlighting different engineers in their jobs
- Interviews with Engineers:
  3-15 min video interviews with female engineers produced by EngineerGirl
- CareerOneStop:
  2 min videos describing a wide range of careers including STEM, transportation, and logistics produced by the U.S. Department of Labor

TRANSPORTATION ACTIVITIES AND LESSONS

- Institute for Transportation Engineers (ITE):
  STEM activities for elementary, middle, and high school
- Insurance Institute for Highway Safety (IIHS):
  STEM videos, demonstrations and classroom activities related to crash safety
- Data Science in Action: Machine Learning for Self-Driving Cars
  A two-week day camp to introduce high school students to programming and machine learning. Held in Boston, MA and San Jose, CA. Taught by researchers from Harvard and the University of Toronto and data scientists from PayPal.
- NASCAR:
  "The Science of Speed" lessons on aerodynamics and energy for grades 5-7
- University of Minnesota K-12 Traffic Engineering Curriculum:
  5 lessons and an online traffic control game called Gridlock Buster

- American Society of Civil Engineers (ASCE):
  Civil Engineering Transportation Resources module with 5 activities
- NanoSonic:
  10 STEM lesson plans for middle and high school students including lessons on Intelligent Transportation Systems (ITS), Connected Vehicles (CV), and Automated Vehicles (AV)
- Engineering First:
  Elementary school curriculum introducing engineering and bridge design and construction developed by the Accelerated Bridge Construction University Transportation Center (ABD-UTC) and the West Marshall School District
- Boy Scouts of America Online Merit Badges created by SAFER-SIM:
  - Traffic Safety Merit Badge
  - Engineering Badge

ENGINEERING LESSONS AND ACTIVITIES

- Kid's Guide to Engineering:
  Overview of engineering written for kids with links to activities and additional information
- TeachEngineering:
  A digital library of engineering curricula for K-12 including over 100 videos compiled by the University of Colorado, Boulder Engineering
- DiscoverE (formerly the National Engineers Week Foundation):
  Wide range of engineering activities for K-12
- PBS Kids Design Squad:
  Activities and videos related to space and transportation for ages 9-12
- American Society for Engineering Education (ASEE):
  STEM activities and lessons for K-12
- Try Engineering:
  Lesson plans and classroom activities for teachers; games and resources for students
- Ultimate STEM Guide for Kids: Links to over 200 STEM related sites for elementary, middle and high school students
- LEGO® Education Store:
  Lesson plans using LEGO® products

CONTESTS RELATED TO TRANSPORTATION

- ARTBA Video Contest
  Annual Contest for elementary, middle, high school students and post-secondary students sponsored by the American Road & Transportation Builders Association (ARTBA).
- Road Safety Art Contest
  Children ages 5-12 create artwork to raise awareness of how to stay safe on the roads sponsored by the Federal Motor Carrier Safety Administration (FMCSA)
- National School Bus Safety Week Poster Contest
  Elementary and middle school students create a poster featuring the theme "Be Safe – Know the Danger Zone"
- U.S. Toyota Dream Car Art Contest
  Children ages 5-15 create artwork that imagines the future of mobility sponsored by the Toyota Motor Corporation

- International Aviation Art Contest
  Children ages 6-17 submit artwork related to an aviation theme conducted by the National Association of State Aviation Officials (NASAO)

ADDITIONAL RESOURCES

- Women's Transportation Seminar (WTS):
  WTS is an international organization dedicated to the professional advancement of women in transportation.
- University of Florida WTS Chapter:
  As the first official WTS Student Chapter, WTS at UF has the goal of establishing a college-based student community focusing on advancing women in transportation through professional workshops, networking, and community service.
- Transportation YOU:
  Transportation YOU is a hands-on, interactive mentoring program that offers young girls ages 13-18 an introduction to a wide variety of transportation careers.
- University of Florida Center for Precollegiate Education and Training:
  The Center for Precollegiate Education and Training (UF-CPET) promotes and supports the use of the facilities and faculty of the research university in the preparation and enhancement of science and technology teaching at the secondary education level.
- U.S. Department of Transportation
- Go! Explore the World of Transportation:
  Go! is a free, online magazine (e-zine) about transportation that is primarily for and by young people.
- Fast Forward:
  Fast Forward provides information for middle school, high school, and community college students and faculty about careers and issues in transportation industry.
- Engineering Go For It (eGFI):
  eGFI is the American Society for Engineering Education's interactive website for K-12 students and teachers with information on engineering careers as well as lessons and activities for teachers.
- Young Professionals in Transportation:
  Connecting young transportation professionals from around the world.
- Ford Driving Skills