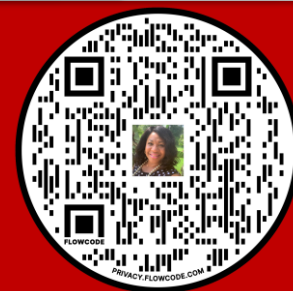


Jacksonville Transportation Authority

Ultimate Urban Circulator (U²C)

Bay Street Innovation Corridor (BSIC) Project Review

Test and Learn

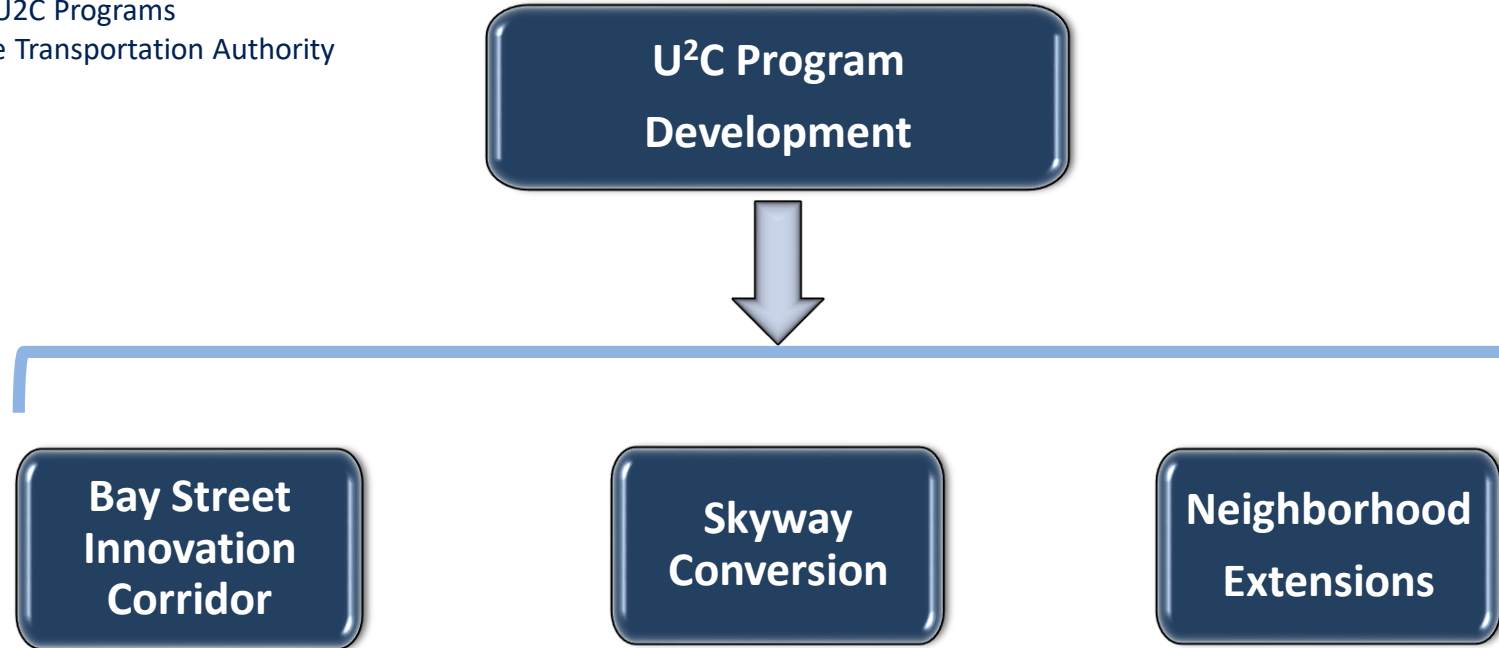




Jacksonville Transportation Authority



Angie D. Williams
Director – U2C Programs
Jacksonville Transportation Authority

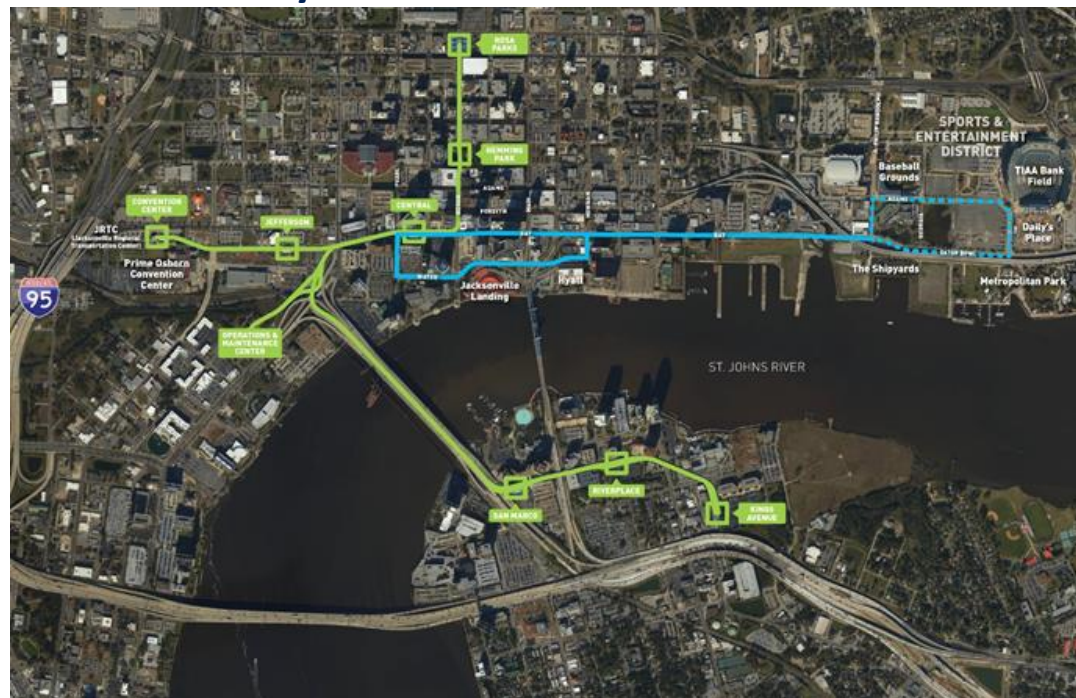




Jacksonville Transportation Authority



Bay Street Innovation Corridor



Skyway Conversion



Automation Division



BSIC Program Phases



- **Phase 1 – Bay Street Innovation Corridor Project**

- Phase 1A: 30% Plan Set Delivery
- Phase 1B: 60% Plan Set Delivery

- **Phase II: Construction**

- BSIC Route and Stations
- System Integration
- New Operations and Maintenance Building

- **Phase III: Operations and Maintenance**



Automation Division



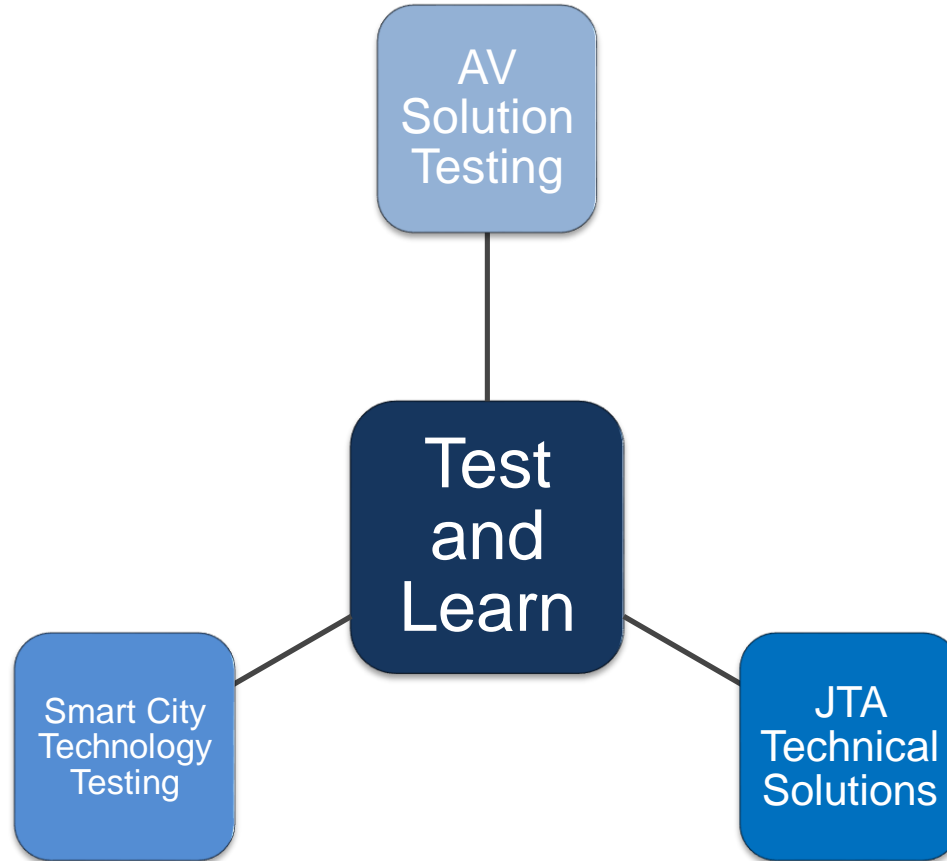


JTA Test and Learn Facility





Test and Learn Program





Memo

**Jacksonville Transportation Authority
Automation Division**

TO: AV Manufacturers & AV Tech Companies

From: Bernard Schmidt

Date: June 21, 2019

Subject: Release of JTA's top 20 High level Critical requirements for Autonomous Vehicles

After considerable research, the JTA Automation Division has identified the critical requirements for acceptable deployment of Autonomous Vehicles/Shuttles for its Ultimate Urban Circulator (U²C) program. These requirements are particular to the JTA but are analogous to what we believe are critical requirements for all public transit agencies looking to deploy such a service.

These requirements are not all inclusive and we may find circumstances which dictate the need to add and modify this list. This is meant to serve as initial guidance to autonomous vehicle (AV) manufacturers and technology stack providers. These requirements are to be considered proprietary to the JTA and are copyrighted and are not to be shared or distributed beyond this memo without written consent of the JTA.

Below is the list of the 20 critical needed items/capabilities identified by the Automation Division for Autonomous Shuttles also known as the "Golden 20".

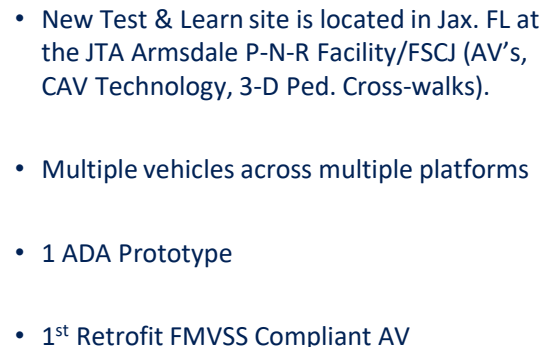
GOLDEN 20

JTA's (and Public Transportation's) Critical Needs of Autonomous Shuttles/Vehicles

- 1) Full ADA Compliance
- 2) Buy America/Buy American Compliance
- 3) Cybersecurity
- 4) Remote Route Programming with Low Latency
- 5) NHTSA Approval to operate on Public Road
- 6) Vehicle to Infrastructure and V2X Capabilities (DSRC & 5G)
- 7) Traverse Slope of ± 12 Degrees w/ Full Passenger load (Sustained Acceleration/Deceleration)
- 8) Operate bidirectionally up to 35 MPH
- 9) ≥ 12 hours of battery life
- 10) Operate at speeds of 15 MPH within ± 1 foot of Stationary Object
- 11) Operate at speeds of 15 MPH within ± 3 feet of Moving Object
- 12) May Operate during Inclement Weather (Rain, Fog, Wind, and Extreme Heat)
- 13) Internal Cab – Environment control with Rapid Cool capability & Sustained temperature with Full Passenger Load
- 14) Ability to be towed. Push/Pull and Steer AV Manually or towed via another AV
- 15) Crash Worthy up to 35 MPH
- 16) Ability For Fast Charge Opportunity Charging
- 17) Ability to regulate passenger capacity
- 18) System for recording/storing rides at least 30 days (Black Box)
- 19) Emergency button to contact Authority/Agency control center
- 20) Remote command & control operations of vehicles with low latency
- 21) Complete Vehicle Monitoring system, including health monitoring

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The JTA will provide further details, guidance and explanation for each of the define requirements upon request. Our AV test protocol and program will also provide further guidance and establish more define pass/fail criteria for the U²C program. For autonomous shuttles which do not meet any or some of these critical requirements, the AV manufacturers will need to provide detailed explanation on how they plan to meet them in the future or provide an alternate solution deemed acceptable by the JTA.



Test Procedure: ADS – 2 : Perform a lane change/low speed merge

Operational De	Test Procedure: ADS – 3 : Move Out of Travel Lane to Pull Over/Park
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Test Procedure: ADS-5: Detect and Respond to Static Signs

• Clear la • Multi- Operation Test Procedure: ADS-7: Perform Vehicle Following

Object and Event	<ul style="list-style-type: none"> • Clear l • Clear s 	<ul style="list-style-type: none"> • Mu • Ac 	Operation	Test Procedure: ADS – 9: Detect and respond to bicycles
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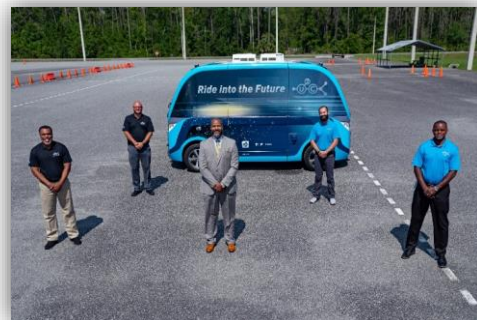
Test Procedure: ADS – 12: Detect and respond to emergency vehicle

<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • Option 	<ul style="list-style-type: none"> • Clear 	<ul style="list-style-type: none"> • C • C 	<ul style="list-style-type: none"> • Operat 	Test Procedure: ADS – 13: Detect and respond to object in the
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Vehicle Platform	• None	Object and	Object and	•	•	Operational Domain
Subject Vehicle	Test Protocols	•	•	•	•	Test Procedure: ADS – 14: Sensor performance in low

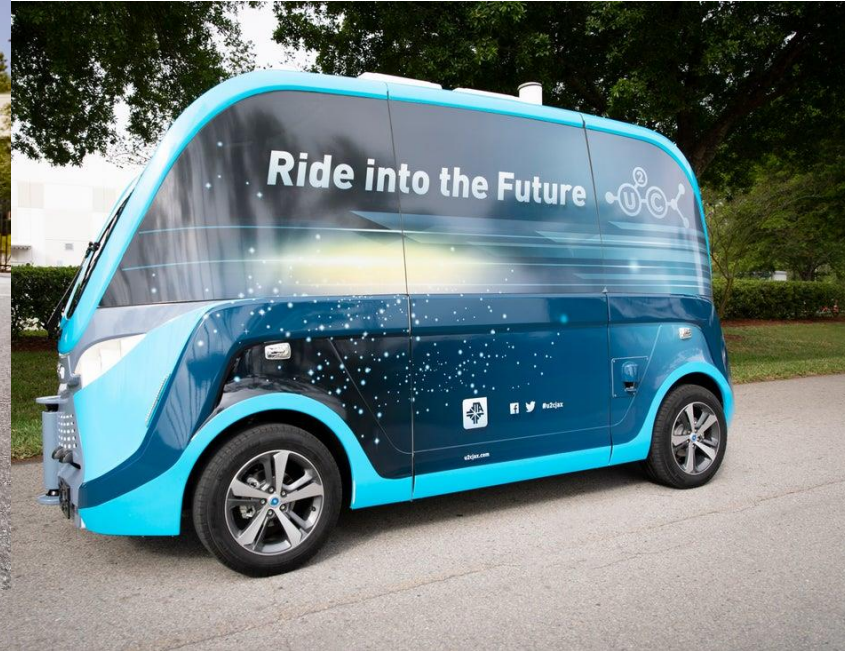
Principal Other SV are being tested	Vehicle Platform Subject Vehicle	Failure Be	Failure Be	Object	<ul style="list-style-type: none"> • Multi • Aspha 	condition/weather induced low visibility Test Procedure: ADS – 15: Detect and respond to h
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	Principal	Other	Alc.	N	Obliv.	Strong	



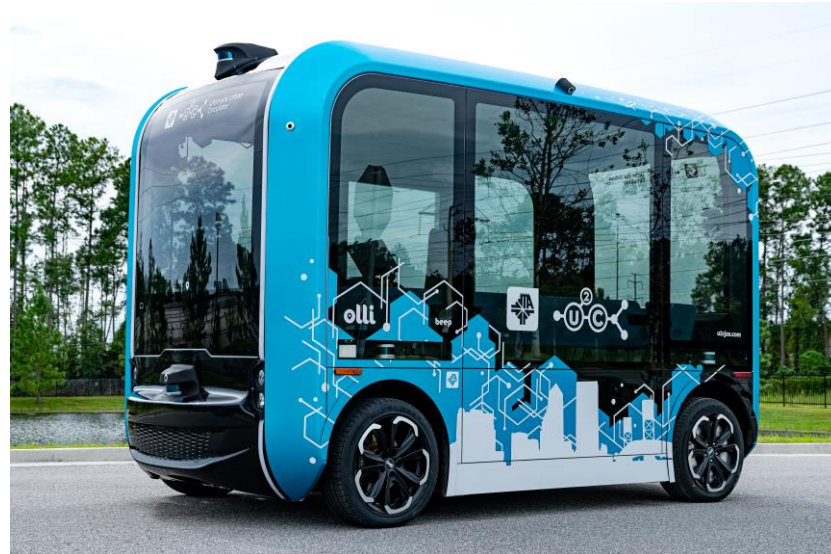


JTA – Test and Learn Program – Vehicle Platforms



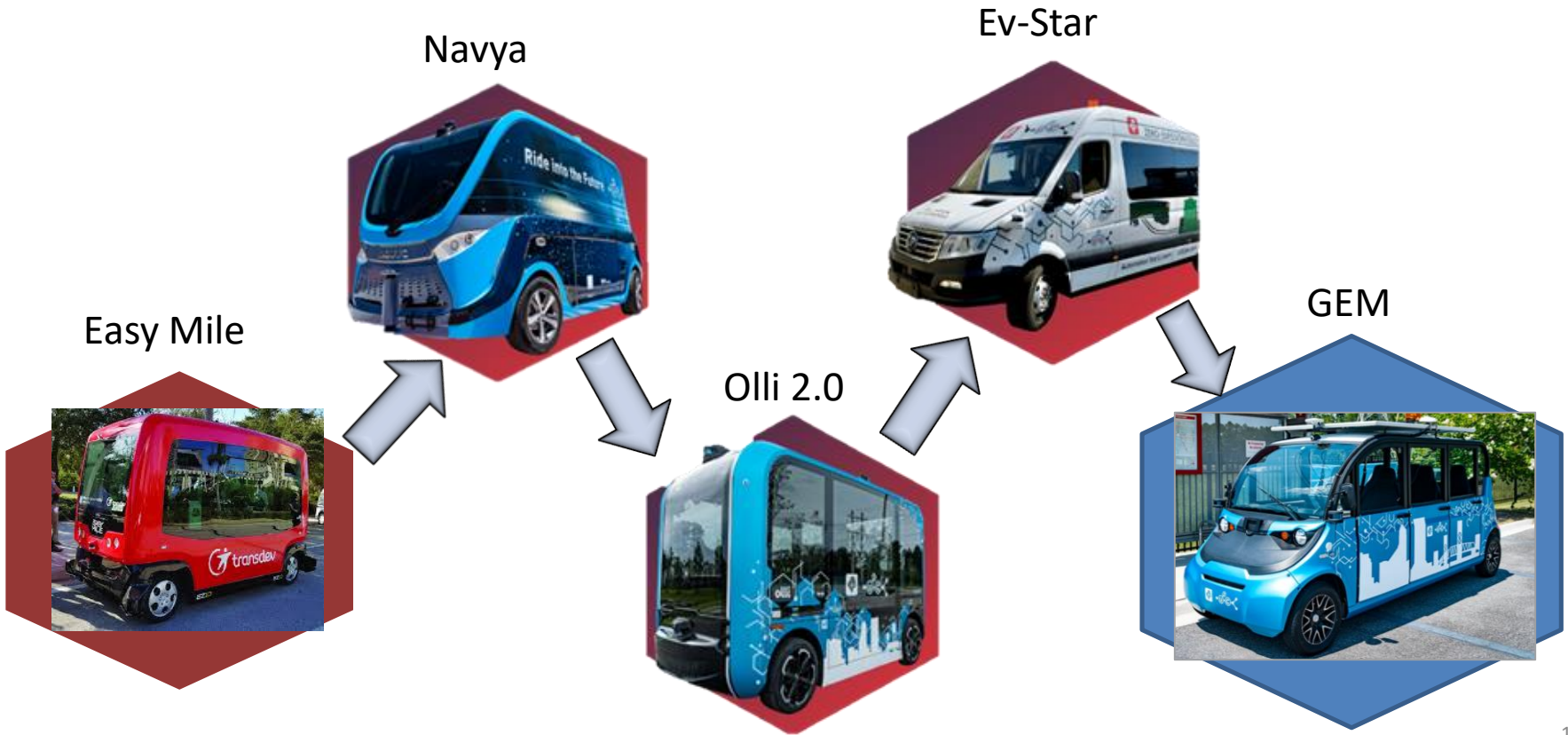


JTA – Test and Learn Program – Vehicle Platforms



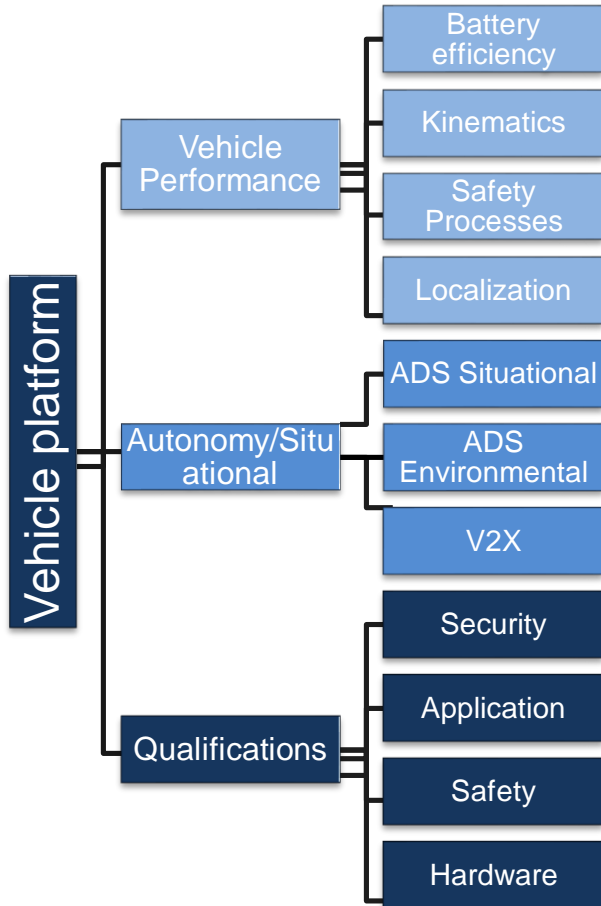


JTA – Test and Learn Program – Vehicle Platforms



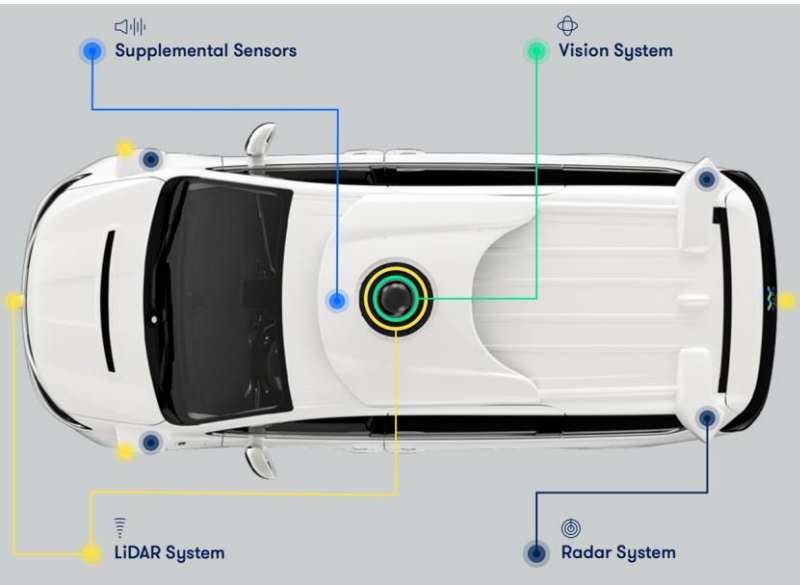


AV Testing System Framework

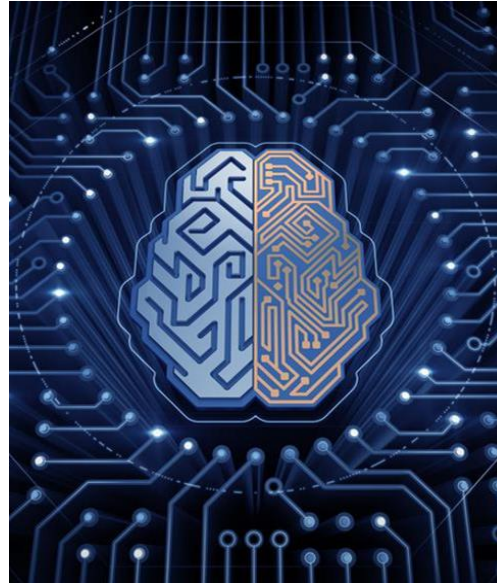




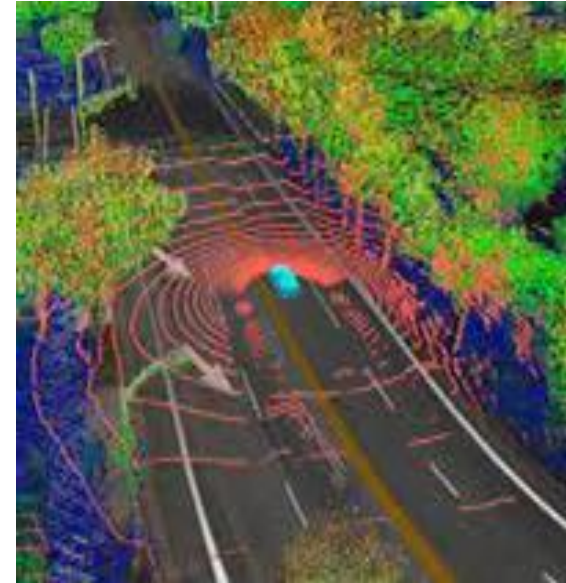
AV Tech Stack



Hardware



Software



High Definition Maps



Smart City Technology Testing



Smart City
Technology
Testing

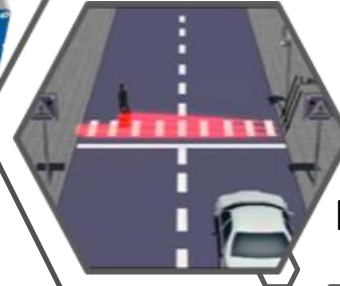
Edge Computing



Video Analytics



Pedestrian Detection



Connected Vehicle
Technology



Blind Spot Detection



Weather Sensor

V2X





Internal Technical Solution



JTA
Technical
Solutions



System/Construction
Development



Fleet Operation

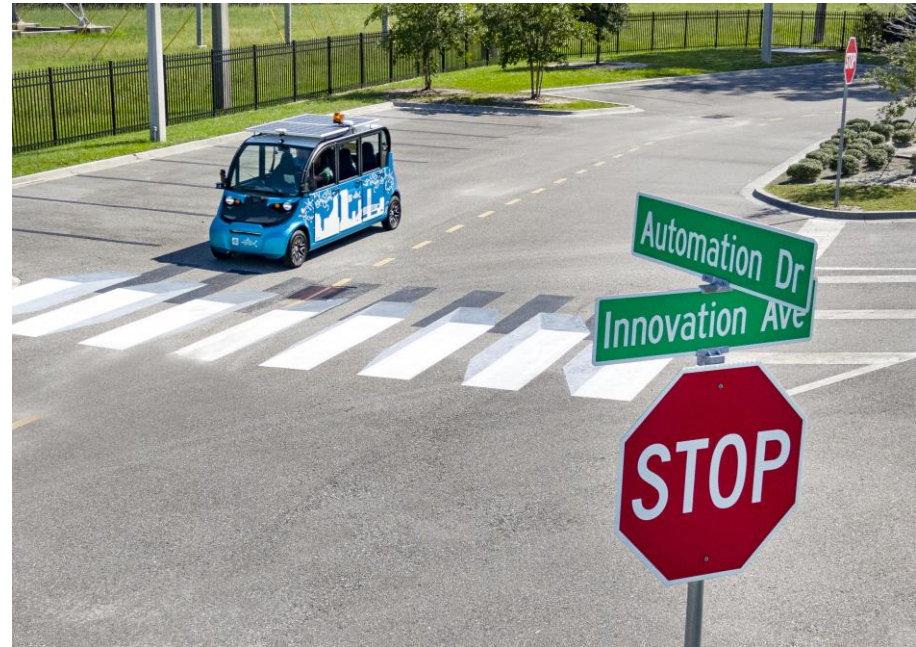


JTA – Test and Learn Program – Testing Of Good Year Non-pneumatic tires





JTA – Test and Learn Program – Testing Of 3-D Crosswalk



Thank You

