

Connected and Automated Transportation

Christopher Poe, Ph.D., P.E.

Assistant Director, Connected and Automated Transportation Strategy

One of a Kind



**THE TEXAS A&M
UNIVERSITY SYSTEM**



STATE AGENCY


Solve transportation problems
through research



Transfer technology,
knowledge



TTI Mission

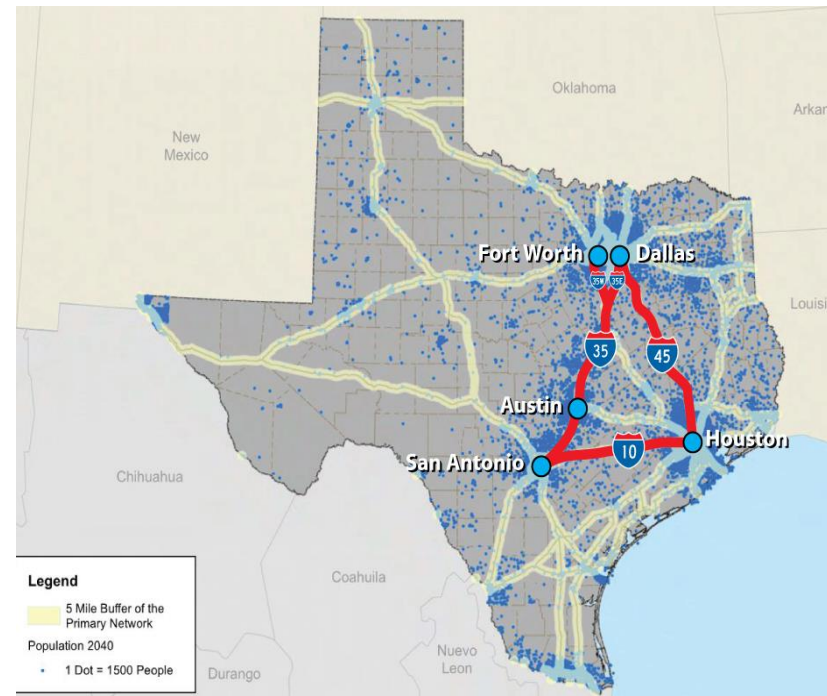
The image shows two young men sitting at a desk in a computer lab. They are looking at two computer monitors. The monitor on the right displays a 3D CAD model of a truck chassis with various components highlighted in green and red. The monitor on the left shows a green 3D model of a mechanical part. The student in the foreground is using a mouse. The text 'Develop human resources to meet tomorrow's transportation challenges' is overlaid in white on a semi-transparent dark background across the middle of the image.

Develop human resources to
meet tomorrow's
transportation challenges

TTI Mission

Texas Mobility/Safety Challenges

- Texas Triangle contains $\frac{3}{4}$ of Texas' 27 million people – 45 million people in 2040
- 11 of top 20 most congested roadway sections in Texas
- Congestion costing Texas \$9 billion per year
- 7 of top 25 national freight bottlenecks
- Overall crashes increasing over last 5 years in Texas





Transportation Technology

Investment in transportation technology is important to Texas!



**Ensures safety
is priority #1**




**Protects
infrastructure
investments**



**Enhances
mobility**



**Supports
Texas
economic
development**



Connected-Automation

- Automated vehicles
- Connected vehicles





Texas A&M Research focus areas



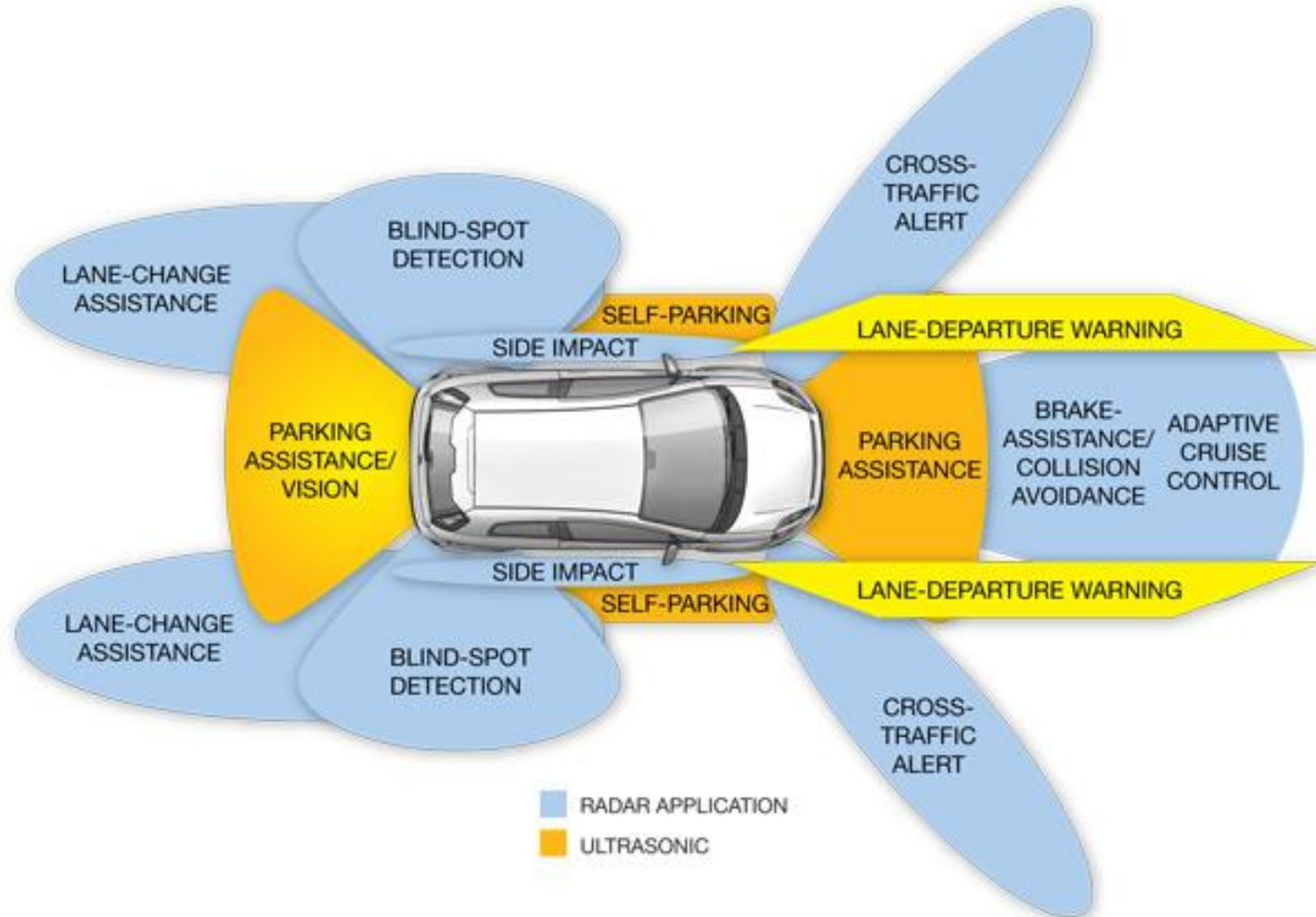
**Intelligent
Infrastructure**

**Human
Factors**

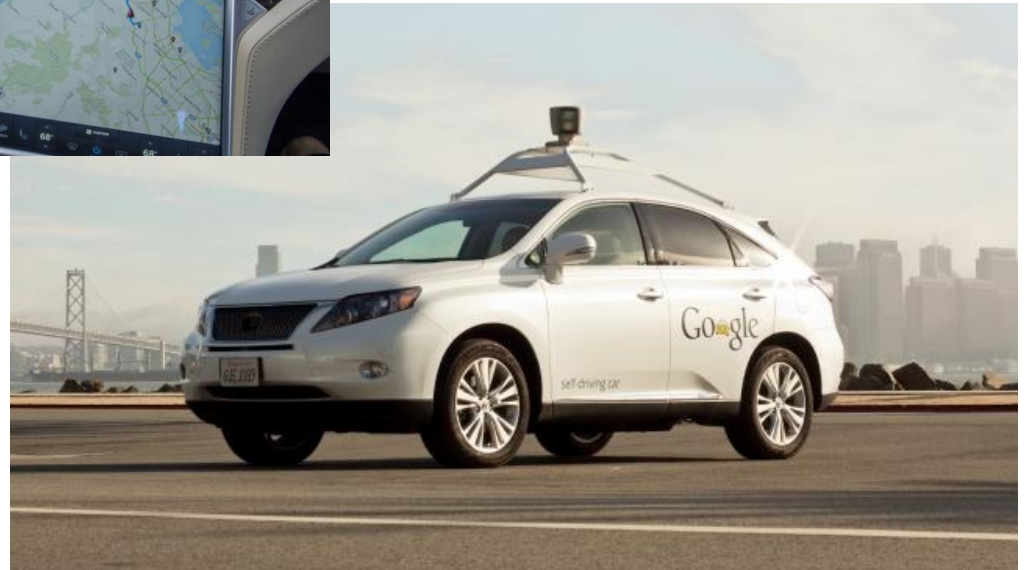
**Connected &
Automated
Vehicles**

Research Supported by RELLIS Campus

Advanced Driver Assistance Systems



Automated Vehicles



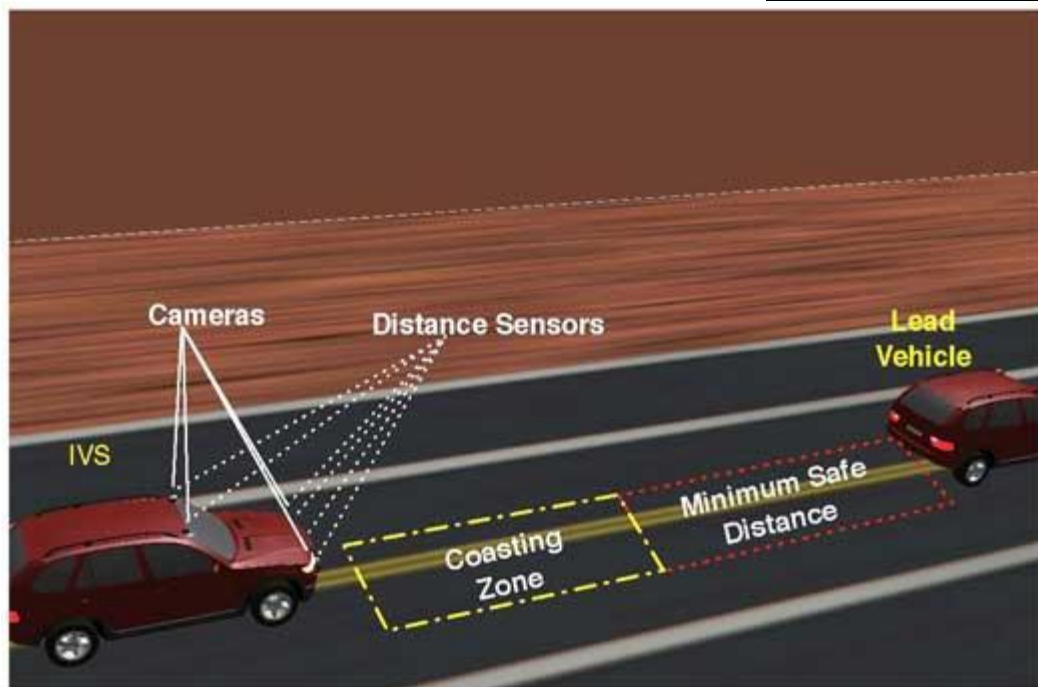


Level of Automation

Level	Example Systems	Driver Roles
1	Adaptive Cruise Control OR Lane Keeping Assistance	Must drive <u>other</u> functions and monitor driving environment
2	Adaptive Cruise Control AND Lane Keeping Assistance Traffic Jam Assist	Must monitor driving environment (system nags driver to try to ensure it)
3	Traffic Jam Pilot Automated parking Highway Autopilot	May read a book, text, or web surf, but be prepared to intervene when needed
4	Closed campus driverless shuttle Valet parking in garage 'Fully automated' in certain conditions	May sleep, and system can revert to minimum risk condition if needed
5	Automated taxi Car-share repositioning system	No driver needed

Level 1 – Cooperative Adaptive Cruise Control

C-ACC
Cooperative Adaptive Cruise Control



Level 2 - Tesla Autopilot

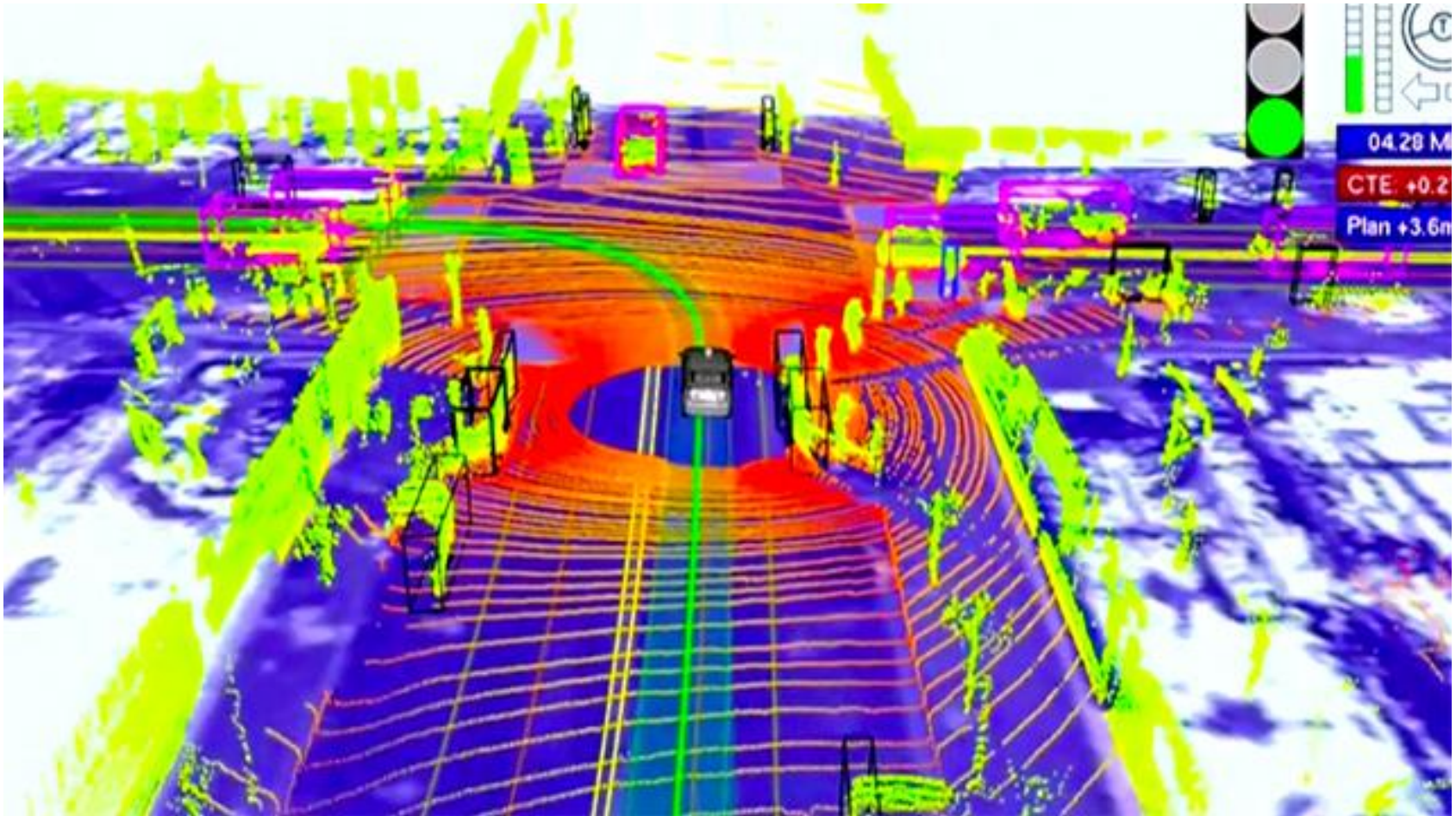


- <https://www.youtube.com/watch?v=MrwxEX8qOxA>

Level 4 Automation



What does the Google Car see?



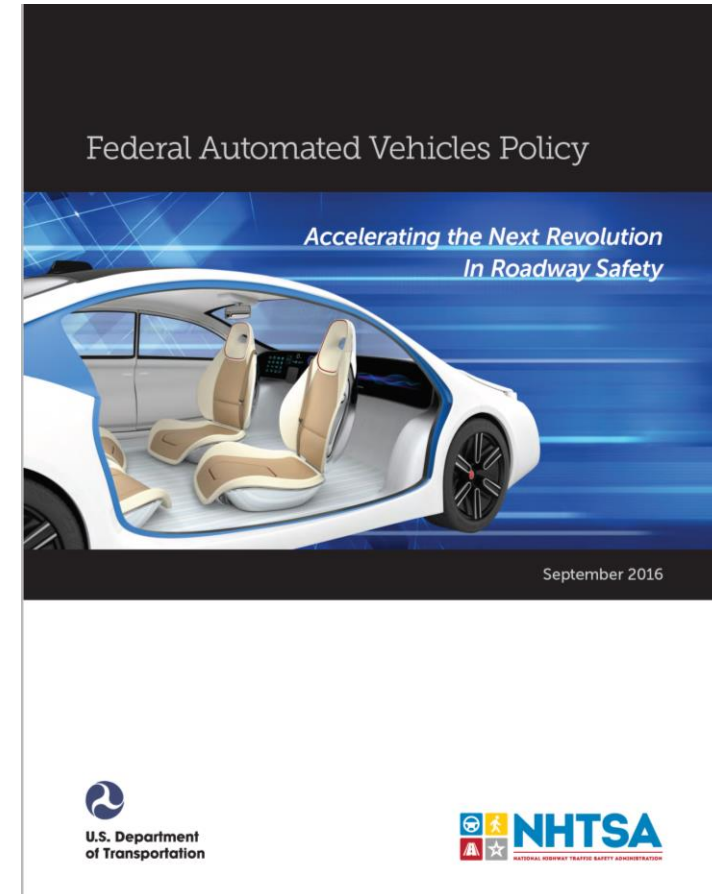
What are the challenges?



Automated Vehicle Guidance

■ USDOT

- http://www.its.dot.gov/research_archives/safety/cv_safetypilot.htm
- <https://www.transportation.gov/AV>
- <http://www.its.dot.gov/pilots/wave1.htm>
- <https://www.transportation.gov/smartcity>



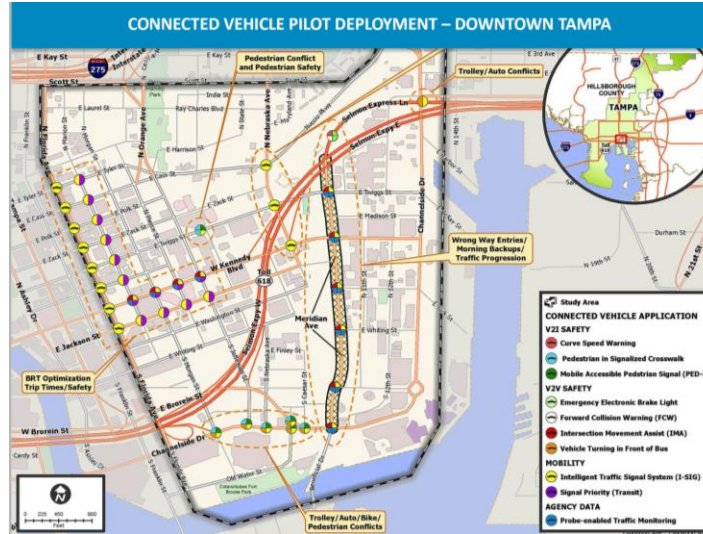
Connected Vehicles



5.9 GHz Wireless Communication



CV Pilot Deployments

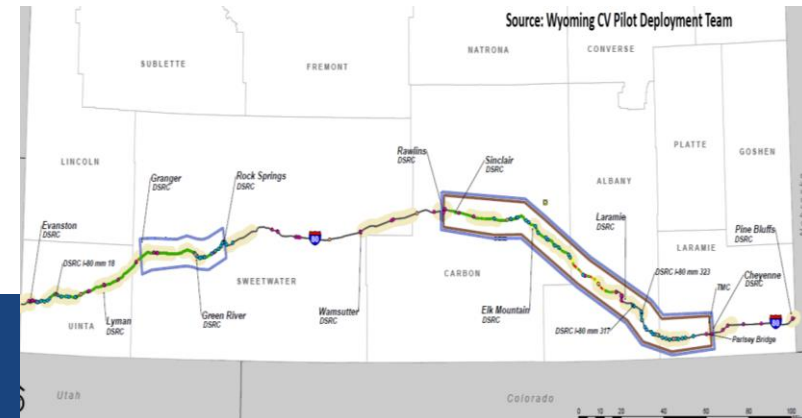


Tampa, FL

New York City



Wyoming, I-80





TAMU CONNECTED AND AUTOMATED VEHICLE RESEARCH

TTI is leading CV/AV Research



**Automation
Commercial
Truck
Platooning**

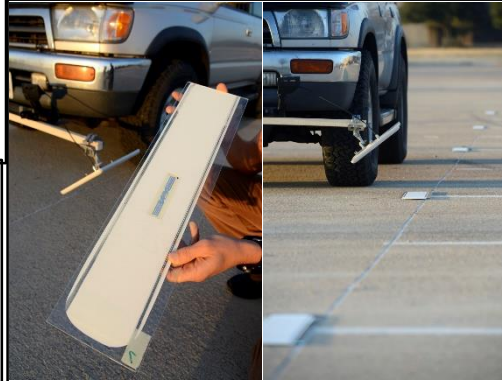


**Transit,
Pedestrian,
and Bicycle
Test Bed**

**Traffic Signal,
Phase & Timing
CV Applications
and Evaluation**



**Highway
Infrastructure
Sensing for
Safety and Asset
Management**



**Wrong-Way
Driving
Detection and
Mitigation**



**Connected and
Automated
Vehicle Policy
Research**



**Connected
Work Zone
Applications**



Connected Work Zone

- Scope: USDOT grant to expand work zone lane closure, delay, and queue information to freight logistics and trucks using CV architecture.
- Sponsor: TxDOT
- Deliverable: Working demonstration in central Texas on I-35
- Schedule: FY2015-2018





WHAT ARE THE POSSIBILITIES FOR THE FUTURE?

New Paradigms



New Vehicles



Future Car Interiors

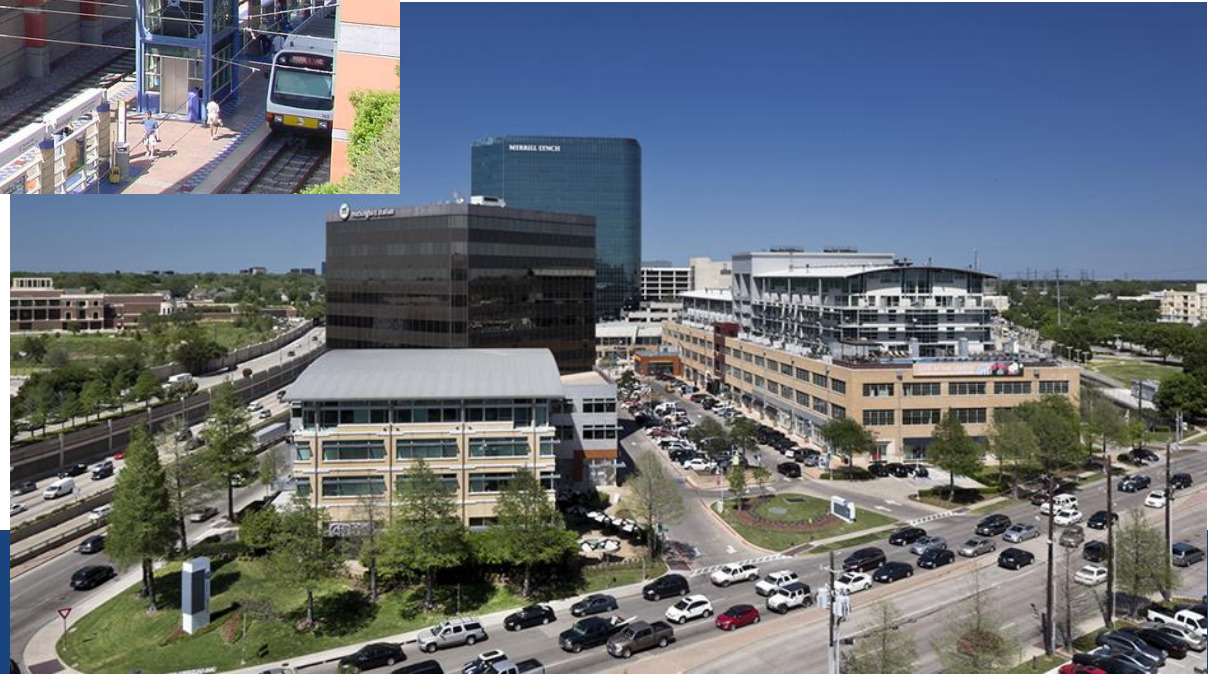


Vehicle Trends

- Smaller Form Factor
- More Electric Vehicles
 - No emissions
 - Quiet
- Greater Safety
 - Does not crash
- Greater Range



Transit Oriented Design (TOD)



Freight Shuttle





Questions?

- Christopher Poe, Ph.D., P.E.

(972) 994-0433

cpoe@tamu.edu

<http://tti.tamu.edu>

