TTI’s Capabilities in Connected Transportation

The Texas A&M Transportation Institute (TTI) shares an industry vision where no vehicles collide and people can use connected and automated transportation to transform how they live, work and interact with their environment. To achieve this vision, research, development and testing are needed on how vehicles, users and transportation infrastructure all work together.

While automated vehicles are emerging and connected vehicle research is progressing, TTI believes the most significant gains in safety and mobility will occur at the nexus of these areas. TTI is creating a world-class research environment on the Texas A&M University campus where researchers can collaborate, new transportation paradigms can be created, and future mobility and safety can be showcased.
**CV/AV Test Beds**

**TTI Test Bed**
TTI is developing a connected and automated transportation test bed at the Texas A&M University Riverside campus in Bryan, Texas. The test bed will be used to develop and test connected and automated vehicle (CV/AV) applications and human-machine interfaces using vehicle-to-infrastructure (V2I) and infrastructure-to-vehicle communication in a controlled environment. The test bed will leverage other automated vehicle expertise across the University in ground, aerial and subterranean applications.

**Connected Work Zone**
TTI is deploying connected vehicle technology along the I-35 corridor to improve safety and mobility through work zones by providing in-vehicle devices to freight companies to receive work zone infrastructure data on lane closure location, capacity reduction, queue lengths and delay to assist in pre-trip and en-route planning for logistics.

**Transit, Bicycle and Pedestrian Safety**
TTI is defining requirements to operate a test bed facility to demonstrate and evaluate CV/AV technology hardware and applications in transit or paratransit vehicles to improve transit passenger, bicyclist and pedestrian safety.

**Sponsor:** Texas Department of Transportation

**Infrastructure**

- **AASHTO CV Infrastructure Footprint Analysis**
  Conduct analyses leading to a preliminary concept of a national connected vehicle field infrastructure.

  **Sponsor:** American Association of State Highway and Transportation Officials (AASHTO)

- **Sensing Highway Infrastructure**
  Develop innovative maintenance solutions using emerging technologies in safety, operations, bridges and pavements.

  **Sponsor:** Texas Department of Transportation

- **Pavement Markings and Signs**
  Determine what agencies can do to enhance road readiness for camera-based vision, linking machine vision detection to 1) contrast (daytime) and 2) retroreflectivity (nighttime).

  **Sponsor:** Texas A&M Transportation Institute
• **Signal Phase and Timing (SPaT)**
  Develop an interface between traffic signal controllers and roadside equipment to enable communication of real-time traffic signal status and timing to connected vehicles.  
  **Sponsor:** U.S. Department of Transportation Turner-Fairbanks Research Center

• **Integrated V2I Prototype Development**
  Develop a prototype hardware/software system to provide a full complement of infrastructure capability supporting V2I communications-based, connected vehicle applications.  
  **Sponsor:** U.S. Department of Transportation Turner-Fairbanks Research Center

• **Traffic Signal Controller Logic Enhancements**
  Provide a standardized method to describe and transmit SPaT information, along with integrating available vehicle information, to improve safety, mobility and the environment, as well as support transit/freight applications.  
  **Sponsor:** Federal Highway Administration

• **INFLO Prototype Development and Demonstration**
  Develop and demonstrate, through a small-scale deployment, a prototype system for providing speed harmonization and queue warning in a connected vehicle environment.  
  **Sponsor:** U.S. Department of Transportation Turner-Fairbanks Research Center

• **Speed Harmonization Fundamental Research**
  Conduct fundamental research on providing automated speed harmonization to improve operations and safety.  
  **Sponsor:** U.S. Department of Transportation Turner-Fairbanks Research Center

• **New Approaches for Testing Connected Highway and Vehicle Systems**
  Develop a platform that the Federal Highway Administration can use to test, validate and verify connected vehicle concepts, applications and technologies in a laboratory testing environment.  
  **Sponsor:** Federal Highway Administration

• **Wrong-Way Driving Detection and Mitigation Research**
  Develop the concept of operations and requirements for a CV test bed for wrong-way driver detection and mitigation applications.  
  **Sponsor:** Texas Department of Transportation

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**Accelerate Texas**

Accelerate Texas is a public-private partnership founded by TTI and the Texas Department of Transportation to focus on commercializing CV/AV technology and operations in Texas. The founders are joined by private sector companies and other public sector agencies to help provide test beds and the thought leadership necessary to enable the commercialization, deployment and public acceptance of these technologies.  

[accelerate-texas.org](http://accelerate-texas.org)
To identify and solve transportation problems through research, to transfer technology and knowledge, and to develop diverse human resources to meet the transportation challenges of tomorrow.

**Transportation Policy Research Center (PRC)**
The emergence of automated and connected vehicle technology presents significant implications for policy makers. The TTI PRC is working to better understand those implications and inform the decision making that will influence how automated travel can come about in a way that best serves the public interest. The Revolutionizing our Roadways series outlines the PRC’s work in the following specific areas.

**Completed Research Reports** ([tti.tamu.edu/policy/technology](http://tti.tamu.edu/policy/technology))
- The Challenges and Benefits of Making Automated Vehicles a Reality
- Policy Considerations for Automated Vehicle Testing in Texas
- Cybersecurity Considerations for Connected and Automated Vehicle Policy
- Data Privacy Considerations
- Liability Issues

**In Progress Research**
- Vehicle Telematics as a Platform for Road User Fees
- Mobility Effects of Connected and Automated Vehicles
- Travel Behavior Impacts of Automated Vehicles
- Implications of Automated Vehicle Crash Scenarios
- Impacts of CV/AV on State and Local Transportation Agencies
  Conduct research from the National Cooperative Highway Research Program (NCHRP) Project 20-24(98) roadmap, including institutional and policy issues, infrastructure design and operations, and planning and multimodal issues.
  **Sponsor:** National Cooperative Highway Research Program
- Transportation Planning Implications of Automated Vehicles on Texas Highways
  Assess how to effectively incorporate transformative CV/AV technologies in transportation planning to assist in the decision making process.
  **Sponsor:** Texas Department of Transportation
- Deploying CV/AV: Scenarios and Roadmap
  Develop CV/AV deployment scenarios, use the scenarios to determine future roadway infrastructure requirements, and develop a strategic roadmap for addressing the implications of CV/AV futures.
  **Sponsor:** Texas A&M Transportation Institute
- Policy and Planning Actions to Internalize Societal Impacts of CV/AV Systems into Market Decisions
  Generate information for state and local governments about policy/planning actions that can be taken to stimulate the development of markets for CV/AV systems for all modes, providing the ability to internalize societal costs and benefits in industry market decisions.
  **Sponsor:** National Cooperative Highway Research Program

**Human Factors**
- **Best Practices for Distraction Metrics**
  Establish test protocols to assess driver distraction of CV messages.
  **Sponsor:** U.S. Department of Transportation and National Highway Traffic Safety Administration
- **Evaluation of Multimodal Interactions System to Address Driver Cognitive Load**
  Conduct a closed-course driving study to test and evaluate an infotainment system prototype, including both usability and human factors testing in a realistic driving context, to examine potential cognitive load and safety impacts to the user.
  **Sponsor:** Honda Research Institute
- **Monitoring, Assessing and Acting on Driver and Vehicle States to Enhance Safety**
  Explore two different approaches to detecting abnormal vehicle operation events, such as unintended acceleration, and evaluate ways to reduce the likelihood of these events and assist the driver in recovering from them.
  **Sponsor:** Toyota Economic Loss Settlement

**TTI’s Mission**

**Contact**

Christopher Poe, Ph.D., P.E.
Assistant Agency Director
Research and Implementation Division
Texas A&M Transportation Institute
(972) 994-2206
cpoe@tamu.edu
tti.tamu.edu