TTI Commercial Truck Platooning
TxDOT Project 0-6836

2nd Annual TAMU Transportation Technology Conference

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What is Truck Platooning?

• Extension of cooperative adaptive cruise control
• *Automated lateral and longitudinal vehicle control.*
• Tight formation with short following distances
• Lead truck: manually driven
• Following truck(s): driver disengaged
Levels of Automation: Simplified

- Level 0: hands, feet, eyes and eyes/brain ON
- Level 1: hands or feet OFF and eyes/brain ON
- Level 2: hands and feet OFF, eyes/brain ON
- Level 3: hands, feet, eyes OFF, brain ON
- Level 4: hands, feet, eyes, brain OFF
  - constrained environments
- Level 5: hands, feet, eyes, brain OFF
  - unconstrained
Why Truck Platooning?

• Fuels savings
• Emission reductions
• Vehicle safety benefit
• Increased highway throughput
• Other benefits
The Project Goal

Position TxDOT as a leader in this research area and the overall TSM&O and CV/AV initiatives.

– Comprehensive truck platooning demonstration in Texas.

– Proactive effort in assessing innovative operational strategies.
Project Focus

• Assess the feasibility of deploying 2-vehicle truck platoons on specific corridors in Texas in 5 to 10 years

• Bring together major public and private sector partners who have committed in-kind resources
  – Equipment
  – Engineering services, and
  – Intellectual property.
# Project Structure

## Phase-1: Concept Feasibility
- Feasibility Studies
- Proof-of-Concept Build

Decision Gate – Aug 2016

## Phase-2: Preparation for Implementation
- Systems Engineering
- Implementation Guidance

Decision Gate – April 2019

## Phase-3: Implementation
- Field deployment in Texas
- Evaluation
## Phase I

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### Additional Information
- **System Development**:
  - Operational requirements
  - Safety analyses
  - Specifications

- **Demonstration**:
  - Design and Implementation
  - Integration
  - Demonstration
Vehicle Build
# Project Partners

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<th>Project Partners</th>
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<tr>
<td>Ricardo</td>
<td>Software Engineering + Integration</td>
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<tr>
<td>Navistar</td>
<td>2x Sleeper cab trucks + Maintenance + Engineering + Graphic Design</td>
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<tr>
<td>TRW</td>
<td>2x ColumnDrive + Engineering</td>
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<td>Denso</td>
<td>2x DSRC Radios/Antennas + Engineering</td>
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<td>Bendix</td>
<td>2x Wingman Fusion + Engineering</td>
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<td>GreatDane Trailer</td>
<td>2x 48ft Trailers + Maintenance + Engineering</td>
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<tr>
<td>Lytx</td>
<td>2x DriveCam Solutions + Engineering</td>
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<td>Argonne National Lab</td>
<td>2x Fuel &amp; Engine Temp Data Acquisition, Testing Support and Analysis</td>
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<td>US Army TARDEC</td>
<td>Engineering consulting to the project</td>
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Project Summary Video

Commercial Truck Platooning

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Phase 1 Demonstration
Simulation: Fuel Consumption Results

- **Average fuel savings** in the range **to 12%**
  - High volume and high MPR produce more savings, but only in non-congested traffic condition.
  - In congested traffic condition, platoons are governed by stop-and-go condition leading to reduced effectiveness in fuel consumption performance.
With platooning, there is a noticeable increase in throughput observed in high volume condition at MPR > 30%. The maximum increase in throughput is in the range of 6-8% at 50% MPR, tight following gap, and quick formation time.
Final Questions
## Contact Information

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Alternative Platooning Concepts

- Phase 1: Defined five alternative truck platooning concepts that could be deployed in TX in 5 -10 yrs.
  1. Ad Hoc “On-the-Fly” Platooning
  2. Guided Hoc “On-the-Fly” Platooning
  3. Scheduled Platooning
  4. Trip Platooning
  5. Platoon Service Provider
Deployment Site Characteristics

Phase 3 Requirements

• > 4-lane, rural interstate highways
• Low AADT
• High truck percentage $\rightarrow$ least 15% of AADT.
• Relatively long stretches of highway between urban centers
• Posted speed limit $\geq$ 65 mph
Potential Corridors