Acknowledgments

• **Key Stakeholders**
  – Federal Motor Carrier Safety Administration
  – Tennessee Department of Transportation
Project Background

- **FMCSA Charge** – Ensure Safe CVO Operations
- **Truck Driver Fatigue** – Ongoing Problem
  - 800 deaths/year
  - 30%-40% of all truck crashes
- **Regulations in Place to Limit Hours**
- **Truck Parking Areas Plentiful (pub + priv)**
- **Existing Parking Inefficiently Utilized**
- **2002 NTSB: Use ITS to Improve Awareness and Utilization of Truck Parking**
Project Background

- **FMCSA & FHWA – Smart Parking Initiatives**
  - FHWA: 2006 Grant Program
  - FMCSA: 2005 SmartPark Technology Demonstration

- **FMCSA Program**
  - Two Prior Unsuccessful SmartPark Systems: Video detection and Magnetometers
  - Current SmartPark – Overhead & Side Laser Scanners, and Light Curtain Technologies
SmartPark Overview

- Detector Components for Demonstration
  - Overhead Scanner
  - Side Scanner
  - Laser Curtain
SmartPark Overview

• **Location of Test**
  – I-75 MM 45 in Athens, TN
System Overview

• **Components:**
  – Gantry Structures
  – Detectors
  – On-site Processor
  – Off-Site Server
  – 7 CCTV Cameras
  – Website and Data Archive
System Overview

- CCTV Camera Placement and Cones of Vision
System Overview

- Data Flow
System Overview

• Website for Real-Time Monitoring
  – www.fmcsasmarpark.com

• Site Features:
  – Live CCTV Camera Views
  – Data Retrieval
  – Reports
  – Corrections
System Overview

- **Website Interface**

  ![Diagram of SmartPark Management System]

  - Parking Lot
  - Data Retrieval
  - Reports
  - Lot Occupancy
  - Data Archive and Display
  - CCTV Cameras
  - Corrections

---

Excellence Delivered As Promised
System Overview

- **System Outputs:**
  - Timestamp
  - Ingress vs. Egress
  - Unique Vehicle ID
  - Detector Type
  - Detector Mounting Location
  - Class
  - Lot Occupancy

- JPEG Images from the 7 CCTV cameras displaying:
  - All spaces within the lot
  - Ingress detection area
  - Egress detection area

- JPEG profile image of the vehicle generated by the detector
# System Overview

## SmartPark Management System

### Parking Lot Data Retrieval Reports

<table>
<thead>
<tr>
<th>Timestamp</th>
<th>Event Type</th>
<th>Vehicle ID</th>
<th>Sensor Type</th>
<th>Sensor Mount</th>
<th>Class</th>
<th>In Use</th>
<th>Images</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nov 14 2012 12:01AM</td>
<td>Ingress</td>
<td>021516</td>
<td>SCANNER</td>
<td>CENTER</td>
<td>6</td>
<td>52</td>
<td><img src="image1.png" alt="Image" /></td>
</tr>
<tr>
<td>Nov 14 2012 12:01AM</td>
<td>Egress</td>
<td>021394</td>
<td>SCANNER</td>
<td>CENTER</td>
<td>6</td>
<td>51</td>
<td><img src="image2.png" alt="Image" /></td>
</tr>
<tr>
<td>Nov 14 2012 12:02AM</td>
<td>Egress</td>
<td>021395</td>
<td>SCANNER</td>
<td>CENTER</td>
<td>6</td>
<td>50</td>
<td><img src="image3.png" alt="Image" /></td>
</tr>
<tr>
<td>Nov 14 2012 12:02AM</td>
<td>Egress</td>
<td>021396</td>
<td>SCANNER</td>
<td>CENTER</td>
<td>6</td>
<td>49</td>
<td><img src="image4.png" alt="Image" /></td>
</tr>
<tr>
<td>Nov 14 2012 12:02AM</td>
<td>Egress</td>
<td>021397</td>
<td>SCANNER</td>
<td>CENTER</td>
<td>6</td>
<td>48</td>
<td><img src="image5.png" alt="Image" /></td>
</tr>
</tbody>
</table>
System Overview
Testing Period

• Goals
  – Identify and highlight the system’s strengths
  – Identify and attempt to mitigate the system’s weaknesses
  – Identify prominent anomalies at the site (trailer drops, abnormal vehicle behavior etc.)
  – RFP: *Evaluate and validate the detector technologies as accurate, economically feasible systems to provide a truck parking information system that is autonomous as possible.*
Testing Period

- **Performance Requirements**

<table>
<thead>
<tr>
<th>Requirement Identification</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PR1</td>
<td>The system shall maintain the parking area occupancy count to better than 95% accuracy.</td>
</tr>
<tr>
<td>PR2</td>
<td>Classification consistency; the ingress and egress detectors must be consistent in classification with each other to a level of 95 percent.</td>
</tr>
<tr>
<td>PR3</td>
<td>The system shall provide parking availability information at a minimum of 99.5 percent of the time.</td>
</tr>
</tbody>
</table>
Preliminary Results

• Evaluation of PR1 – Vehicle Detection (in and outs):

<table>
<thead>
<tr>
<th></th>
<th>Ingress</th>
<th>Egress</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Detection:</td>
<td>99%+</td>
<td>99%+</td>
</tr>
<tr>
<td>Total:</td>
<td>99.5%+</td>
<td></td>
</tr>
</tbody>
</table>

• Evaluation of PR 2 – Classification Consistency

Overall Classification Consistency: 97%+
Looking Ahead: Phase 2 & Beyond

• “Smart Parking Corridor” Concept
  – I-75 MM 23
  – New Detector System
  – Integrated Parking Info
  – Advanced DMS
Looking Ahead: Phase 2

- **Traveler Information Tools**
  - Parking Reservation System
  - Historical Usage Tools and Analytics
  - Apps
- **Business Plan and Market Viability Study**
- **Potential Use in FHWA Grants**
Questions

• Thanks!

• Questions?

• Contact Info
  – Project Manager: Jason Ellerbee, jellerbee@gfnet.com, 813.363.8431
  – Task Lead: Von López-Jacobs, vlopezjacobs@gfnet.com, 215.287.2415