FMCSA’s SmartPark – Phase 2

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Outline

- Background
- Scope
- Summary of Phase 1
- Phase 2
- Contact Information
Background
Introduction to FMCSA

- FMCSA’s mission is *to reduce the number of crashes, injuries, and fatalities involving large trucks and buses*
- FMCSA is 1 of 10 Operating Administrations within the U.S. Department of Transportation (DOT)
- FMCSA is 1 of 3 DOT agencies focused on improving highway safety
- FMCSA and FHWA are the 2 DOT agencies involved with truck parking
Scope

- **FMCSA’s SmartPark Research Program**
  - Responds to National Transportation Safety Board’s (NTSB) Recommendation H-00-19 to provide a guide for truckers for parking availability
  - Is a research and technology demonstration effort in conjunction with the State of Tennessee
  - Is not intended to compete with
    - Other ITS truck parking projects funded under SAFETEA-LU § 1305
    - Private sector efforts

- **FMCSA’s CVISN Grants**
  - States may apply for an Expanded CVISN Grant to deploy any reasonable ITS technology for truck parking
    - States are not restricted to deploying the same technology as in FMCSA’s SmartPark Research Program
Program Goals

- To demonstrate an Intelligent Transportation Systems (ITS) technology for
  - Determining truck parking space availability in real time and
  - Disseminating information on truck parking availability to truckers on the road in real time
Program Objectives

- Identify a *commercially-available* or *near-term* technology to accurately and reliably determine truck parking space availability in real time.
- Demonstrate the concept of linking two truck parking areas so that if one is full, truckers can be diverted to an area that is unfilled.
- Demonstrate technology to disseminate truck parking space availability to truckers on the road in real time.
- Demonstrate a truck parking reservation system.
- Develop a business plan for deploying the technologies.
- Deploy SmartPark technologies.
Program Phases

- FMCSA’s SmartPark Program divided into two major phases
  - **Phase I** – Identify a technology for accurately and reliably counting truck parking space availability in real time
  - **Phase II** – Demonstrate real-time dissemination of truck parking space availability information based on the technology from Phase 1
Summary of Phase 1
Conclusion of Phase 1

- In 2013, FMCSA

  - Successfully concluded Phase 1 with Doppler radar combined with *side laser scanner* identified as the technology for determining truck parking space availability for Phase 2
  
  - Doppler radar combined with *light curtain* failed
  
  - Published final report on SmartPark Phase 1
    (see references slide)
  
  - Exercised the option in the Gannett-Fleming contract to continue into SmartPark Phase 2 using Doppler radar combined with *side laser scanner*
Doppler Radar Combined with Light Curtain or Laser

- **Principle of Operation**
Doppler Radar Combined with Laser

- **Principle of Operation**
  - Software analyzes the profile to distinguish between a combination vehicle or discrete vehicles following closely behind each other
  - Detecting a tow bar hitch, or other connection is critical

- **Tested for FMCSA 2012-2013**
  - Mile Marker 45 (public) on I-75 north near Athens, TN
## Comparison of Technology Performance

<table>
<thead>
<tr>
<th>Technology</th>
<th>Location</th>
<th>Sample Size (n)</th>
<th>Vehicle Detection Error Rate</th>
<th>Vehicle Classification Error Rate</th>
<th>Pass/Fail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Video Imaging</td>
<td>Charlton, MA</td>
<td>701</td>
<td>3.6%</td>
<td>6.1%</td>
<td>(&gt;5%) Fail</td>
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<tr>
<td>Magnetometry</td>
<td>Wrentham &amp; Attleboro, MA</td>
<td>3297</td>
<td>4.0%</td>
<td>13%</td>
<td>(&gt;5%) Fail</td>
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<tr>
<td>Doppler Radar &amp; Light Curtain (in) Overhead Scanner (out)</td>
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<td>8150</td>
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<td>12.96%</td>
<td>(&gt;5%) Fail</td>
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<tr>
<td>Doppler Radar &amp; Overhead Scanner (both in &amp; out)</td>
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<td>2.36%</td>
<td>&lt;5% Pass</td>
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<tr>
<td>Doppler Radar &amp; Side Scanner (both in &amp; out)</td>
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<td>37,703</td>
<td>0.18%</td>
<td>3.74%</td>
<td>&lt;5% Pass</td>
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</table>
Phase 2
Phase 2 – Major Tasks

- Link two truck parking areas in order to demonstrate the concept of whether truckers can be diverted from an area that is full to an area that is unfilled
- Demonstrate real-time dissemination of truck parking space availability information based on using
- Demonstrate a truck parking reservation system
- Forecast future truck parking availability from past use
- Develop a business plan for deploying SmartPark
Linking Two Truck Parking Areas

Test Site No. 1 at Mile Marker 45 on I-75 north near Athens, TN (site used for Phase I)

Test Site No. 2 at Mile Marker 23 on I-75 north near Cleveland, TN (site under re-construction by TDOT for Phase 2)
Demonstrate real-time dissemination of truck parking space availability information using

- Dynamic Message Signs
- Interactive Voice Recognition
- Smartphone app
- SmartPark Research Project Web site
Dynamic Message Signs (DMS)

- DMS with Type “A” insets are installed
  - 5200’ upstream of and
  - 400' before the entrance to each truck parking area
- Type “A” insets display “Available” (> 4 spaces), “Limited” (2-4). “Full” (≤1)

Mock-up of DMSs with Type “A” Insets
Dynamic Message Signs (actual)

DMS 5200 ft. upstream of Mile Marker 23 Truck Parking Area on I-75 NB

DMS 400 ft. upstream of Mile Marker 45 Truck Parking Area on I-75 NB
Truck Parking Reservations

- First-come, first-served for rest areas at
  - Mile Marker 23 (five reserved spaces) limited to ≤ 11 hrs.
  - Mile Marker 45 (five reserved spaces) limited to ≤ 2 hrs.

- Booked, changed, or cancelled using
  - Interactive Voice Recognition
  - Smartphone app
  - SmartPark Research Project Web site

Same methods as for obtaining information on truck parking availability
Reserved Truck Parking Spaces

Reserved Spaces in Truck Parking Area at Mile Marker 23

A Reserved Truck Parking Space Sign at Mile Marker 45
Forecasting Future Truck Parking Availability

- Predicated on historical usage of truck parking: the longer the record of usage, the higher the accuracy of forecast
- Forecast is made for week of year, day of the week, time of day, and rest area (either Mile Marker 23 or 45)
- Forecast may be obtained by same methods for obtaining information on truck parking availability:
  - Interactive voice recognition
  - Smartphone app
  - SmartPark Research Project Web site
Summary of SmartPark Technology
Contact Information

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202 366-2389

Technology Division

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Washington, DC  20590
References


- FMCSA, 2011. *SmartPark Truck Parking Availability System: Magnetometer Technology Field Operational Test Results*, FMCSA-RRT-10-041

- FMCSA, 2011. *SmartPark Truck Parking Availability System: Video Technology Field Operational Test Results*, FMCSA-RRT-10-002