DETECTING WRONG WAY DRIVERS

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BACKGROUND
WIDESPREAD ISSUE ACROSS MULTIPLE STATES
WHAT ARE THE CAUSES?

- Impaired driving ability
  - DUI/DWI (Majority of cases)
  - Elderly/confused
  - Distracted
- Problematic intersections
  - Access from frontage roads!
  - Turns onto ramps
- Unclear signage and road markings
CURRENT DETECTION METHODS

- Doppler or microwave radar detectors
  - False positives occur too frequently to rely on detections

- Video imaging
  - Can also provide snapshots (low light means the car cannot be easily identified)
  - Can be used in conjunction with Doppler or radar detectors for confirmation
  - May not be best in low light situations, which is when most events occur

- Thermal sensors
  - Detections do not always occur

- In-pavement sensors (inductive or magnetic)
  - Expensive to install and maintain
  - Detections often require vehicle to remain in lane
COST-EFFECTIVE PREVENTATIVE MEASURES

- Improvements to wrong way signs
  - Adding more signs, especially on both sides of ramps
  - Lowering the heights of signs to improve visibility
  - Enhanced, larger signs with reflective tape and LED lighting
- Enhanced pavement markings for entrance and exit ramps
- Modifying traffic signals (straight arrow discouraging turns on exit ramps)
- Changes to intersections such as removal of obstructions, channels in roadway, etc.
WRONG WAY SIGNS
ENHANCED SIGNS AND PAVEMENT MARKINGS
VEHICLE MANUFACTURERS

- Nissan, Toyota
  - Using internal data, alerts the wrong way driver
  - Limitations: GPS, relies on mapping data which may change
- Mercedes-Benz
  - Adds camera sensor recognition of wrong way signs to the internal data
  - Limitations: Obscured signs, other visibility issues in addition to GPS/map data issues
- Both types only warn the wrong way driver
EXAMPLE IN-VEHICLE WARNING

On-screen

Voice

“You may be traveling against the flow of traffic. Please check your direction of travel.”

Warning! Wrong Way!
ENTERPRISE POOLED FUND STUDY

- Share information between the states
  - What has been deployed
  - What works
  - What still needs more work
- No “one” solution
- Improved signage helps the driver self correct
- Still need better detection and notification to the traffic management center
TXDOT WWD ACTIVITIES
SOLUTIONS TO ALERT AND NOTIFY

- TxDOT wants wrong way detection to the traffic management center
- Many solutions want to provide their own notifications
  - Must first go to the vendor’s website
  - Subject to network problems
  - TxDOT does NOT want this type of solution
  - May use during initial trial period, but not a long term option
- TxDOT’s Lonestar software supports multiple wrong way detection devices
  - Provides alerts and alarms to operators
  - Sends email and text notifications
LONESTAR ALERTS, ALARMS, REPORTS

Wrong-Way Alert Detected - Ex355-154.140

A Wrong-Way Alert has been detected for detector "Ex355-154.140" on 1/22/2014 at 1:15:34 PM. The vehicle was detected going 60 mph on IH35 South (IH35S at Nogalitos Exit).

Wrong-Way Alarms Report

<table>
<thead>
<tr>
<th>Alarm Name</th>
<th>Alarm Type</th>
<th>Equipment Name</th>
<th>Equipment Type</th>
<th>Operational Status</th>
<th>Alarm Timestamp</th>
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<tbody>
<tr>
<td>LNK-14016-021125-0</td>
<td>Reported</td>
<td>281NB @ Josephine</td>
<td>detector</td>
<td>Active</td>
<td>1/10/2014 2:11:25PM</td>
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<tr>
<td>LNK-14016-021125-1</td>
<td>Reported</td>
<td>281NB @ Josephine</td>
<td>detector</td>
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<td>1/10/2014 2:11:25PM</td>
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<tr>
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<td>281NB @ Josephine</td>
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</tr>
</tbody>
</table>

Wrong-Way Alert Detected - Ex355-154.140

SwRI@swri.org

Sent: Wed 1/22/2014 1:16 PM
To: Pierre, Sidney J.

A Wrong-Way Alert has been detected for detector "Ex355-154.140" on 1/22/2014 at 1:15:34 PM. The vehicle was detected going 60 mph on IH35 South (IH35S at Nogalitos Exit).

Sent from Lonestar user DPA Alert
RADAR DETECTION

- Added support to Lonestar for detection, alerting, reporting
- Wavetronix HD
  - Used on main lanes to detect wrong way
  - Reported too many false positives, even after Wavetronix provided a firmware update
- TAPCO (single detection)
  - Used on ramps to detect wrong way
  - Reported too many false positives
TAPCO DUAL RADAR AND CAMERA

- TAPCO revised their device to add another radar detector and a camera
  - Radar: one inbound and one outbound directed
  - Camera: detects wrong way driver and confirms both radars
- When triggered, the camera can provide snapshots both before and after the trigger time
TAPCO EXAMPLE SNAPSHOTs

Without Illuminator  

With Illuminator
TAPCO: WHAT’S NEW

- TAPCO Wrong Way Logic Module
- TAPCO Control By Web
- Illuminator for low light pictures
TAPCO PROS AND CONS

- **Advantages**
  - Triple detection and TAPCO logic unit result in lower false positives
  - Receive snapshots when alert is triggered
  - Cost includes TAPCO configuring the unit for each location’s specific needs

- **Disadvantages**
  - Camera detection cannot be included over 40 MPH
  - False positive rate unproven in the field, will be testing in the Fort Worth district
TRAFFICVISION

- Not just WWD, includes incident detection
- Installing in Fort Worth for a pilot test
  - Setup early Jan 2017
  - Trial starts Jan 15\(^{th}\) and will last through Mar 15\(^{th}\)
  - Hoping to get incident detections from ice during this time
- During trial, cameras will be on a web page and flash when incident is detected
- Houston district did a pilot test earlier in the year
TRAFFICALM

- Uses multiple radar units with optional camera
- San Antonio planning to install and test
- Arizona DOT has installed and is pleased with the results

Advantages
- Cheaper
- Mounts on existing poles
- Will initially test with Trafficalm alerts without integrating with Lonestar
CONNECTED VEHICLE

- Connected Vehicle WWD Detection and Management System under development
- First phase completed
  - Concept of operations
  - Functional requirements
  - High level system design
- Second phase under way
  - Test corridor identified
  - Will use connected vehicle pods for testing
  - Will also be testing with the TAPCO devices
FDOT WWD ACTIVITIES
SUNGUIDE WWD ALARMS

- Quickly alerts operator of WWD event
- Cameras move to presets automatically
- Text and email notifications
- Operator can create an event to manage
SUNGUIDE® WWD EVENT OPTIONS

- Automatically created
- Automatically created and DMS messages activated
- Alarm which can be turned into an event
DEVICE TESTING RESULTS

- Click512 module
  - Used with Wavetronix HD
  - Provides immediate alerts
  - False positive rate too high for automating public messaging

- TAPCO
  - Initial device showed similar results to TxDOT
  - Have not tried the newer units yet
Vehicle to Infrastructure (V2I)
- Connected vehicle reports location
- Infrastructure determines vehicle is going wrong way
- Notification is sent to the TMC

Messages to vehicles sent from TMC
- Wrong way driver receives message
- Other affected drivers receive warning messages
ROADSIDE UNIT

- Installed at mast arm intersection
- Communicates with vehicles and FDOT SunGuide software
- Performs local processing to facilitate applications (i.e. wrong way detection)
VEHICLE ONBOARD UNIT

- Portable units used in vehicles
- Contains the communication equipment and local processing unit
- Displays information in the vehicle
- Eventually, vehicle manufacturers will include their own displays or other types of feedback
DEMO VIDEO
QUESTIONS?

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