DETECTING WRONG WAY DRIVERS

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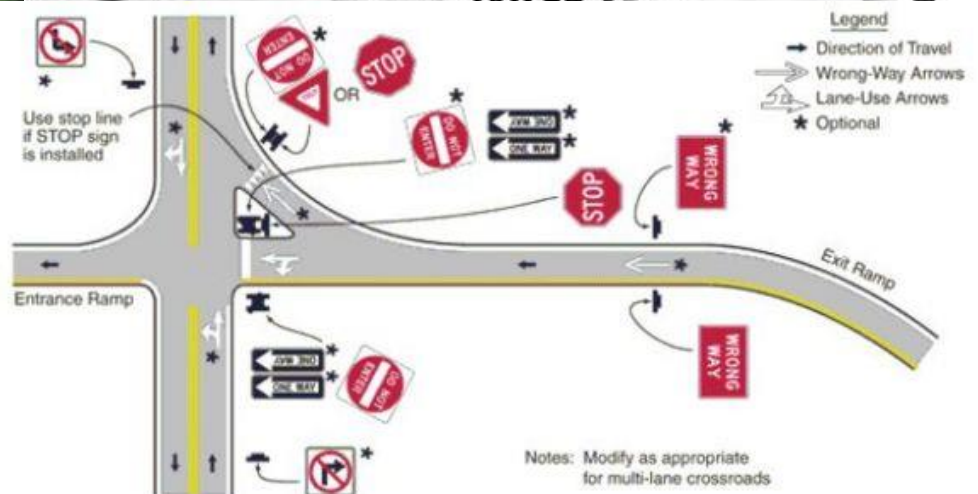lynne.randolph@swri.org

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
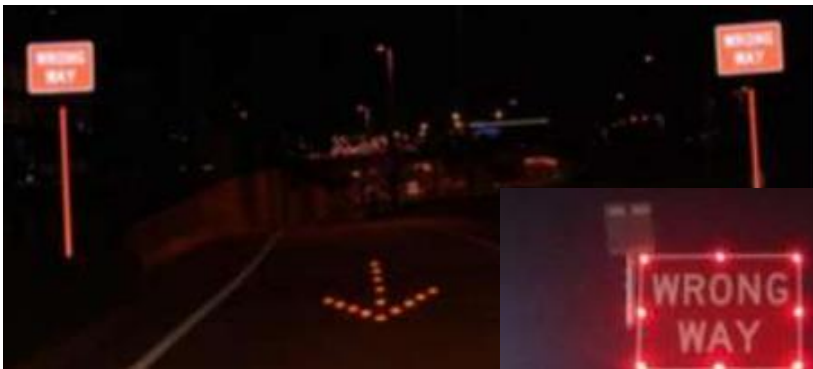
VEHICLE MANUFACTURERS

- 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

Warning! Wrong Way!

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

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 - Ex35S-154.140

A Wrong-Way Alert has been detected for detector "Ex35S-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).

OK

Wrong Way Alarms Report

Alarm Name	Alarm Type	Equipment Name	Equipment Type	Operational Status	Alarm Timestamp
LNK-140116-021125-0	Reported	281NB @ Josephine	detector	Active	1/16/2014 2:11:25PM
LNK-140116-021125-1	Reported	281NB @ Josephine	detector	Active	1/16/2014 2:11:25PM
LNK-140116-021125-0	Cancelled	281NB @ Joseph			
LNK-140116-021125-1	Cancelled	281NB @ Joseph			
LNK-140116-023725-0	Reported	281NB @ Joseph			
LNK-140116-040745-0	Reported	281NB @ Joseph			

Wrong-Way Alert Detected - Ex35S-154.140

SwRI@swri.org

Sent: Wed 1/22/2014 1:16 PM

To: Fierro, Sidney J.

A Wrong-Way Alert has been detected for detector "Ex35S-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
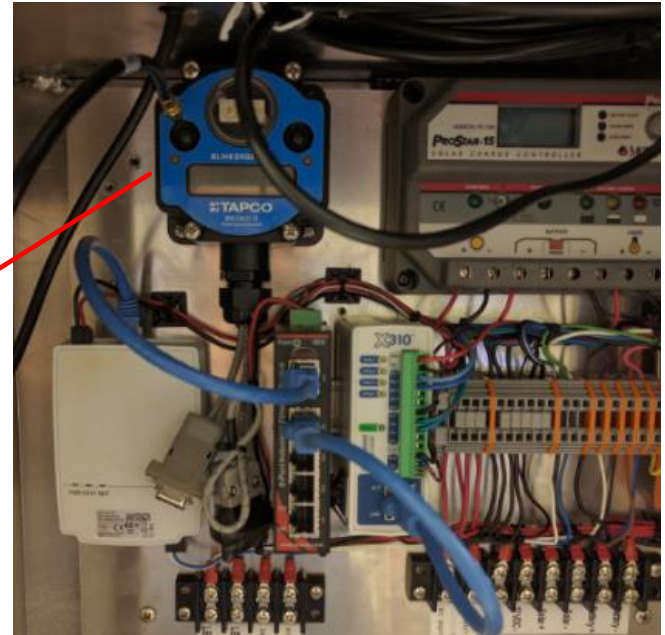
Without Illuminator

With Illuminator
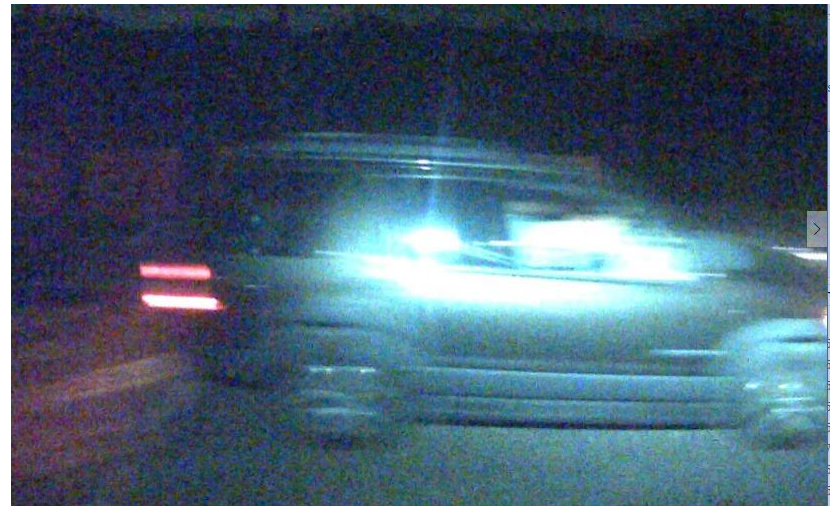
TAPCO: WHAT'S NEW
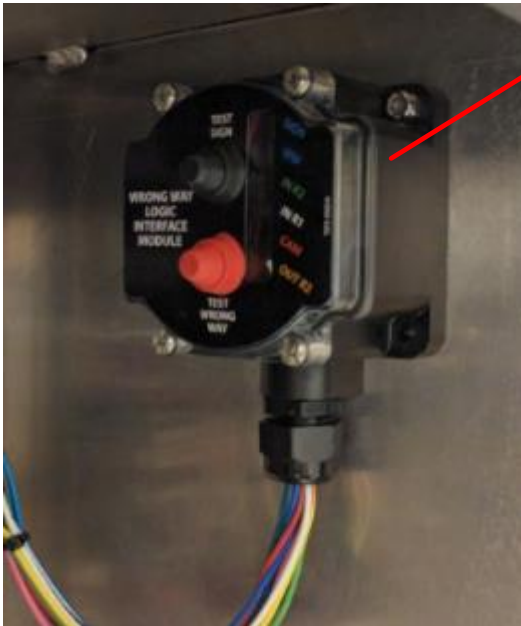
TAPCO Wrong Way Logic Module

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 15th and will last through Mar 15th

    - 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
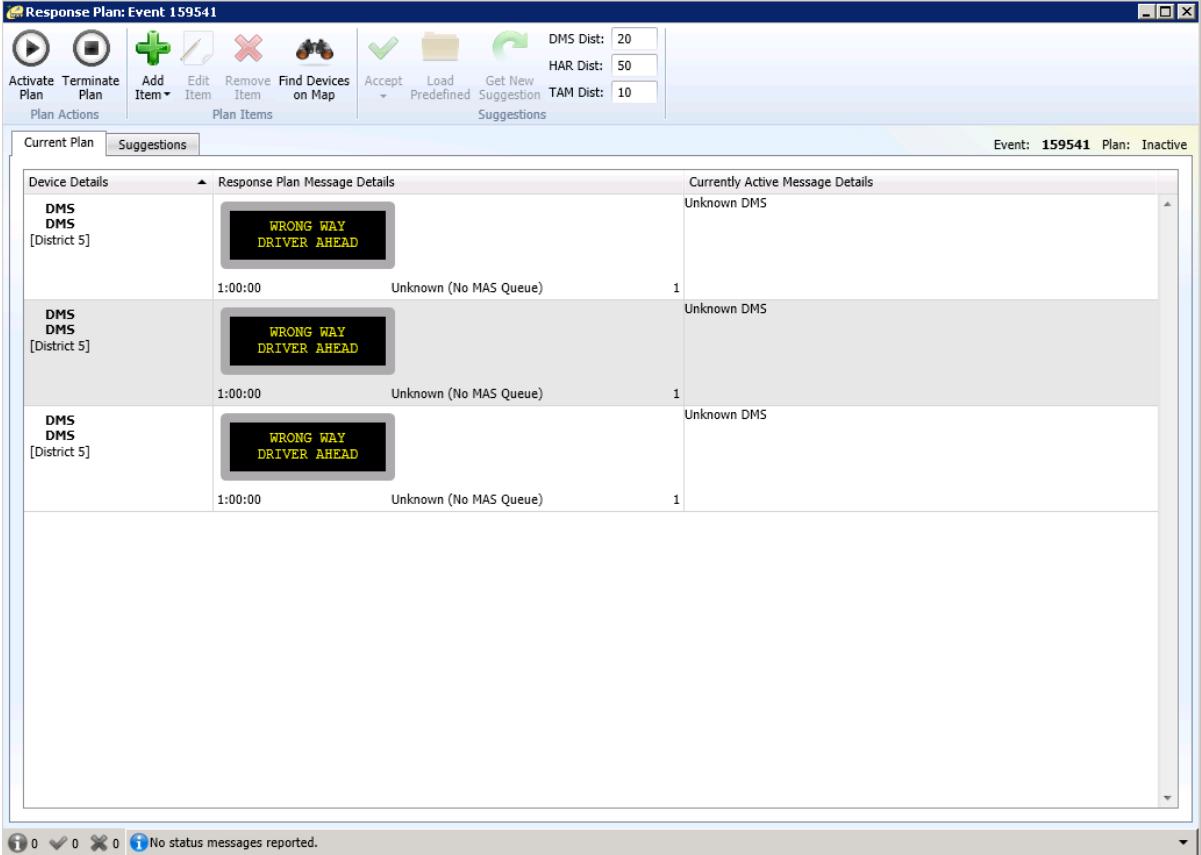
SUNGUIDE® WWD EVENT OPTIONS

- Automatically created

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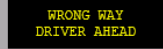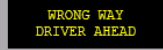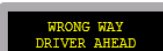
- Alarm which can be turned into an event

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

FDOT CONNECTED VEHICLE DEMO

- 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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