Wrong-Way Driving Detection and Prevention System: A Pilot Deployment

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Wrong Way Driving Statistics

- Wrong way collisions
  - 3% of crashes on high-speed divided highways
  - Fatality rate: 12-27 times higher than other types of accidents

- Nationally between 2004 and 2009:
  - 1,566 fatal wrong way crashes on limited access highways
  - 2,139 fatalities
  - Averages 260 fatal collisions nationally
  - Averages 360 fatalities per year
Wrong Way Driving Statistics

Related Factors for Drivers and Motorcycle Riders Involved in Fatal Crashes, 2011

FARS/GES 2011 Data Summary (USDOT)

<table>
<thead>
<tr>
<th>Factors</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Driving too fast</td>
<td>20.8</td>
</tr>
<tr>
<td>DUI</td>
<td>13.8</td>
</tr>
<tr>
<td>Failure to keep in proper lane</td>
<td>9.2</td>
</tr>
<tr>
<td>Failure to yield right of way</td>
<td>7.2</td>
</tr>
<tr>
<td>Distracted driving</td>
<td>7.1</td>
</tr>
<tr>
<td>Reckless driving</td>
<td>6.0</td>
</tr>
<tr>
<td>Overcorrecting/oversteering</td>
<td>4.8</td>
</tr>
<tr>
<td>Failure to obey traffic signs, signals, or office</td>
<td>4.2</td>
</tr>
<tr>
<td>Swerving or avoiding</td>
<td>4.0</td>
</tr>
<tr>
<td>Vision obscured (rain, snow, etc.)</td>
<td>3.0</td>
</tr>
<tr>
<td>Drowsy, asleep, fatigued, ill, or blackout</td>
<td>2.6</td>
</tr>
<tr>
<td>Wrong way driving</td>
<td>2.5</td>
</tr>
<tr>
<td>Making improper turn</td>
<td>2.3</td>
</tr>
<tr>
<td>Other factors</td>
<td>15.0</td>
</tr>
<tr>
<td>None reported</td>
<td>29.8</td>
</tr>
<tr>
<td>Unknown</td>
<td>10.5</td>
</tr>
</tbody>
</table>

2.5%
Wrong Way Driving Statistics

NTSB analysis of FARS data (2004-2009) showing reported BAC levels of wrong-way drivers

- 0.00 (29%)
- 0.01 - 0.07 (2%)
- 0.08 - 0.14 (10%)
- ≥ 0.15 (59%)
Studying WWD on Central Florida Expressways

• Research study conducted by the University of Central Florida (UCF)

• Phase I Study (2012 – 2013)
  • Examined crash reports, citations, conducted phone survey
  • Determined WWD driving activity may be under-reported
  • Data collection required to determine the full extent of the problem

• Phase II Study (2014 – 2015)
  • Provided research support during deployment of first pilot ramp

• Phase III Study (Under negotiation)
  • Would investigate additional deployment scenarios
WWD Countermeasures Pilot Project
WWD Countermeasures Pilot Project
WWD Countermeasures Pilot Project
Ramp Detection Equipment

- Add top and bottom red RRFB to wrong-way signs at existing locations.

Notes: Modify as appropriate for multi-lane crossroads.

- Add supplemental wrong-way signs and RRFB between existing wrong-way signs and the expressway mainline.

Legend:
- Direction of Travel
- Wrong-Way Arrows
- Lane-Use Arrows
- Optional

Use stop line if STOP sign is installed.

05/27/2015
Ramp Detection Equipment

- Red RRFB (two bars per sign)
- Radar (one forward-facing, one rear-facing)
- Camera (one forward-facing, one side-facing)
- Retroreflective red tape on pole
- Cellular modem antenna
WWD enters ramp
Detected by first radar
Confirmation photo
Ramp Detection Equipment

WWD enters ramp
Detected by first radar
Confirmation photo
Beacons activate
Ramp Detection Equipment

WWD continues
Detected by second radar
Confirmation photo

BlinkLink alert
WWD Confirmation Alert
Mainline Detection Equipment

- Leveraging existing Wavetronix HD sensors on mainline
- 10 test locations to be equipped with Click 512! units to enable WWD detection
- WWD detection data to be logged with SunGuide ATMS software
Concept of Operation

1. TAPCO Radar 1
2. TAPCO Radar 2
3. TAPCO Radar 3
4. TAPCO Radar 4
5. BlinkLink
6. SunGuide
7. Log Event
8. Wavetronix Site 1
9. Wavetronix Site 2

UCF (Primary)
WAVETRONIX SYSTEM (Secondary)

05/27/2015
Parking Lot Testing

- Temporary parking lot test conducted to verify technology
- Tested visibility of beacons during day and night conditions
- Experimented with radar detection zones in a controlled environment
Parking Lot Testing
Preliminary Lessons-Learned

- Two light bars per sign (top and bottom) will be used to improve visibility of beacons.
  - Initial test only had one light bar.
- Two pair of signs will be deployed at each ramp (beacons at the remote pair slaved to the first pair).
  - Provides enhanced visibility of warning in the event the driver passes the first sign before beacon activation.
Status of Deployments

- Ramp 1 (Site 1):
  - Installed January 2015
- Ramps 2-5 (Sites 2-3):
  - Under construction
  - Targeted completion: June 2015
SR 528 Ramp Demonstration
SR 528 Ramp Demonstration
Future Considerations

• Phase III Research Study:
  • Document performance of pilot system over the next year
  • Explore emerging technologies for future consideration
• Deployment of sensors at additional ramps
  • Incorporate lessons-learned from pilot deployment
Questions

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