Greater Yellowstone Rural ITS Priority Corridor: Rural AHS Case Study

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Montana State University-Bozeman

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Greater Yellowstone
Automated Highway System

- Accident Analysis
- AHS Countermeasure Assessment
- Benefit-cost Analysis
- Jurisdictional/Institutional Issues
Safety Analysis Methodology

Accident Analysis

- Accident Rates
- Severity Rates
  - Potential Atypical Accident Locations
  - Identify Trends

- Analyze Geometric Data (Lane & Shoulder widths)
- Analyze Meteorology Data
- Analyze Communications Data

- Detailed Corridor Descriptions

- Counter-Measuring

- Develop Final Report
  - Task C: Assessment of Performance of AHS
Potential AHS Countermeasures

- Night vision enhancement
- Driver impairment monitoring
- Friction/ice detection
- Lateral lane-edge detection
- Dynamic horizontal curve advisory and control
- Detection for objects in roadway
- Headway control
- Presence of oncoming vehicles detection
- Lane keeping
### Greater Yellowstone AHS Applications

<table>
<thead>
<tr>
<th>Accident Trend</th>
<th>% of total</th>
<th>AHS countermeasure</th>
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</thead>
<tbody>
<tr>
<td>Single Vehicle Run-Off-Road Accidents</td>
<td>23</td>
<td>Lateral Lane Edge Detection Warning and Steering Correction</td>
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<tr>
<td>Unsafe Speeds on Slippery/Icy Roads</td>
<td>17</td>
<td>Friction/Ice Detection and Warning (Roadway or Vehicle Based)</td>
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<td>Rear-End Collisions</td>
<td>19</td>
<td>Headway Control and Modified Cruise Control</td>
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<tr>
<td>Failure to Yield Right of Way</td>
<td>11</td>
<td>Warning Drivers on Minor Approach of Vehicle Presence on Major Approach</td>
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<td>Animal/Vehicle Conflicts</td>
<td>15</td>
<td>Longitudinal Control for Objects in the Roadway</td>
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AHS Countermeasure Assessment

- Friction/Ice Detection and Warning Systems
- Intersection Warning
- Animal-vehicle Collision Avoidance
- Horizontal Curve Speed Advisory
Deployment Phases

I. Near term deployment - Infrastructure based drivers aids

II. Short term - Warning systems & partial automation

III. Intermediate term - mixed lanes

IV. Full Automation
Assumptions and Benefits

• Assumptions
  – Information Assistance with 20% market penetration in 10 years.
  – Control Assistance with 50% market penetration in 20 years.

• Benefit
  – Total crash reduction potential (82% overall)
  – specific applications
Final Results (near-term)

- **Friction Ice Detection and Warning System**
  - Montana U.S. Highway 191
- **Intersection Crossing Detection**
  - Idaho U.S. Highway 26
  - Idaho U.S. Highway 20
- **Animal Vehicle Collision Avoidance**
  - Wyoming U.S. Highway 89
- **Horizontal Curve Speed Advisory**
  - Wyoming U.S. Highway 89
Institutional Issues

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<th>Issues</th>
<th>Rural</th>
<th>Urban</th>
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Summary

- Focus on Non-Interstate Safety Applications
- Focus Safety/Incident Based
- Potential AHS Countermeasures Applicable (82% of Accidents)
- Limited Infrastructure
- Phased Deployment
- Rural Institutional Challenges