Rural Intersection Collision Avoidance System (RICAS)

KICK-OFF MEETING

presented to
RICAS Advisory Group

presented by
RICAS Research Team

February 3, 2009
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<td>US 53 and STH 77 Safety Characteristics (5 min.)</td>
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Role of the RICAS Advisory Group

- Wisconsin State Patrol
- Village of Minong
- Wisconsin DOT
- Washburn County Highway Department
- Washburn County Sheriff’s Department
- Washburn County Traffic Safety Commission
- RICAS Advisory Group
- FHWA (Oversight)
- TOPS Laboratory UW-Madison
- ITS Institute University of Minnesota-Twin Cities
- Private Sector Partner(s)
Role of the RICAS Advisory Group

- Advise on overall concept of operations
- Provide local perspectives on issues related to RICAS
- Guide requested outreach activities with local stakeholders
- Serve as a voice for the project
US 53 and STH 77 Safety Characteristics

Diagram showing incidents at various locations along US 53 and STH 77, with notes on weather conditions and types of incidents.
US 53 Corridor Preservation Study

- Project Overview
  - Map Long Term Vision
  - 75 Miles Between Rice Lake and Superior

- Intersection Considerations in Minong Area

Project Website:
http://www.dot.wisconsin.gov/projects/us53corridor/
Development of RICAS: the Minnesota Experience

**Origins**

- Started as means to address Inter-Regional Corridor (IRC) Safety
  - Priority of Al Pint, Mn/DOT IRC Manager

- Project Known as Intersection Decision Support (IDS)
  - Idea was to support safe decisions at by driver attempting to cross or enter major road traffic stream from minor road

**Goals**

- Determine mechanism to identify candidate intersections
- Not reduce traffic volumes on minor road (i.e., no traffic signals)
- Provide the safety benefits of a traffic signal
- Take a prohibitive reference frame (i.e., never tell a driver it is “safe” to go; instead, tell a driver when it is unsafe to go)
- Price goal: 4-way traffic signal (< ~$250K)
- Nationally deployable system
Development of RICAS: the Minnesota Experience

- **Pooled Fund Studies**

Results:
- Drivers reject gaps consistently across different geographic areas
- Driver gap rejection insensitive to vehicle size, time of day, time waiting, weather
- Gap rejection does depend on intersection geometry (primarily non-median separated)
Development of RICAS: the Minnesota Experience

- **Signing Studies**

  - **Baseline**
    
    Driver recognize hazard, gather information, decide on safety condition, and choose action.

  - **Alert**
    
    Driver must gather information, decide on safety condition, and choose action.

  - **Display**
    
    Driver must decide on safety condition, and choose action.

  - **Warn**
    
    Driver must choose action.

  - **Advise**
    
    Driver must choose to comply.

- **Location Study**

  - **Content Studies**

  - **Baseline**
    
    System detects hazard.

  - **Alert**
    
    System detects hazard & presents information relevant to vehicle gap. Prohibited actions also indicated.

  - **Display**
    
    System detects hazard and provides warning levels based on gap thresholds. Prohibited actions also indicated.

  - **Warn**
    
    Prohibited actions indicated (unsafe action advisory).
Development of RICAS: the Minnesota Experience

- Signing Studies

Simulator Studies

On-Road Studies
Development of RICAS: the Minnesota Experience
Development of RICAS: the Minnesota Experience

- Play Cannon Falls Videos
Development of RICAS: the Minnesota Experience

- **Findings**
  - Drivers during on-site testing comprehend the sign
  - Drivers behavior has changed: drivers using the sign reject gaps smaller gaps more frequently than drivers not using the sign
    - This is indicative of safer behavior: we want drivers to reject small gaps
  - **Timing**
    - The assumed 1 second sign comprehension time is likely too much; 0.5 seconds appears to be closer
    - The Sign should transition states when the car enters the crossroad, not after it clears:
RICAS in Wisconsin

- Project Goal - Demonstrate technology that improves the safety of rural thru-stop intersections by providing drivers information that promote safer gap selection (i.e., intersection crossing)

- Expected Benefits
  - Reduce frequency of crashes at US 53 and STH 77
  - Better understanding of driver behavior, both by frequent and infrequent users of the intersection
  - Documentation of the safety benefits to support a benefit-cost analysis
  - Pending proper evaluation, provide motivation for further deployments throughout the U.S.
RICAS in Wisconsin

- Video of Minong Crash
Mainline Radar Station
Mainline Radar Station Array

Power, Comm, Local processor

Radar Sensor
## A Team Approach

<table>
<thead>
<tr>
<th>WisDOT Electrical Section Procure/Installation</th>
<th>WisDOT Procurement Bid</th>
<th>Research Team Installation</th>
<th>Private Partner</th>
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<tbody>
<tr>
<td>Cabinet</td>
<td>Conduit, directional drill</td>
<td>Mainline sensors</td>
<td>DII display boards</td>
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<tr>
<td>Conduit, trench/plow</td>
<td>Beam guard</td>
<td>Computation system in cabinet</td>
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<td>Power cables</td>
<td>Mainline sensors (supply only)</td>
<td>RFID tags and readers</td>
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<td>Pull boxes/hand holes</td>
<td>Computation system in cabinet (supply only)</td>
<td>Cellular modem</td>
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<td>Bases for cabinet and camera masts (if required)</td>
<td>RFID tags and readers (supply only)</td>
<td>Airtime for the cellular modem</td>
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<td>DII sign posts</td>
<td>Modem (supply only)</td>
<td>Ethernet extenders</td>
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<td>Detector mounting posts</td>
<td>Ethernet extender (supply only)</td>
<td>Ethernet cabling</td>
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<td>Camera Mounting to light pole</td>
<td>Video cameras (supply only)</td>
<td>Video camera connections</td>
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<td>Post Installation</td>
<td>Sensor Cabinets (supply Only)</td>
<td>Ethernet Cabling Terminations</td>
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<td>Sensor Cabinet Installation</td>
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<td>Cabinet Disconnect</td>
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<td>Ethernet cabling</td>
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## Project Schedule

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Outreach Activities

- Intended to avoid intensive driver education – technology is supposed to be intuitive

- Available to provide limited outreach meeting support based on Advisory Group Feedback

- Work with Local Media

- Limited outreach material will be developed
  - Tri-fold brochure
  - Website
  - Presentations
Future RICAS Advisory Group Meeting Dates

- Meeting 2: April 7 - Pre-Underground Construction Status
- Meeting 3: August 4 – Pre-Aboveground Installation Status
- Meeting 4: October 6 – Pre-Testing Status
- Meeting 5: December 8: Post Operations Status
QUESTIONS