Improve Intersection Safety
Enhanced Red Light Violation Enforcement

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Project Background

- Joint Effort between MnDOT and DPS
- MnDOT
  - Intersection safety needs
- DPS
  - Field Enforcement Safety Needs
  - Court Contest
  - Targeted Enforcement Data Needs
- Team:
  - MnDOT and DPS
  - URS Minneapolis and Indiana Offices
  - Iron Mountain Systems
Goals

- Monitor and report real-time violations in the field
- Provide real-time visual evidence for law enforcement
- Enhance safety of law enforcement officers
- Provide surrogate crash data
- Provide flexible system installation and deployment
- Enhance intersection safety
Project Location

Project Locations
TH 15 and 2\textsuperscript{nd} St in St. Cloud
DVR-Based System

- DVR & Logic
- Cameras
- Radio Receiver
- Pic-Pic Video Inserter
- Laser Sensor
- Antenna
- Central Unit
- Radio Transmitter
- Tablet Computer
- Toroid
- Toroid
- DVR-Based System
- DVR & Logic
- Cameras
- Radio Receiver
- Pic-Pic Video Inserter
- Laser Sensor
- Antenna
- Central Unit
- Radio Transmitter
- Tablet Computer
- Toroid
- Toroid
System Operations
System Installation
Violation Video 1
Violation Video 2
Remote Access
Challenges

• Video Transmission Latency
• False Calls

• Challenges with DVR
  ◆ Proprietary software
  ◆ No control of software
  ◆ Customized Interface
Enhancements

• Replaced DVR with a Microprocessor
• Eliminated proprietary Software
• Reduced video transmission latency
• Implemented remote control (camera and laser)
• Developed Web-based Interface
  ♦ Live Video
  ♦ Three consecutive high resolution pictures
Microprocessor-Based System
Web-Based Interface
Violation Video 3
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Sample Violation Profile

Violation Profile

Number of Violations

Time of Day

0:00 - 2:00  2:00 - 4:00  4:00 - 6:00  6:00 - 8:00  8:00 - 10:00  10:00 - 12:00  12:00 - 14:00  14:00 - 16:00  16:00 - 18:00  18:00 - 20:00  20:00 - 22:00

0  1  2  2  2  2  1  1  0  0  0  0

24-Sep  25-Sep  26-Sep
Sample Violation Profile

Violation Profile

Time of Day

Number of Violations

0:00 - 2:00
2:00 - 4:00
4:00 - 6:00
6:00 - 8:00
8:00 - 10:00
10:00 - 12:00
12:00 - 14:00
14:00 - 16:00
16:00 - 18:00
18:00 - 20:00
20:00 - 22:00

Total Violations
Lessons Learned

- Protocol works effectively
- Accurate red phase detection
- Effective violation reporting
- Effective visual evidence and playback
- More user friendly interface
Lessons Learned

• Help troubleshoot false calls
• Pedestrians can cause false calls
• Some occlusions occurred
• 3G Modem bottleneck
What’s Next

• Add features per feedbacks
• Collect violation data and develop violation profiles
• Targeted Field Enforcement
• Before and After Assessment
  - Violation reduction
  - Crash reduction
• Consider to use different vehicle presence sensors to eliminate occlusions (ISS)
Contact

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Thank You!