TSMO STRATEGIES FOR PEDESTRIAN AND BICYCLE SAFETY

2018 TRANSPORTATION TECHNOLOGY TOURNAMENT

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Presentation Overview

- Description of Problem & Solution
- Scenarios
- Data
- Preliminary Results
- ITS Architecture
- Budget & Timeline
- Potential Benefits
Description of Problem & Solution

Problem
• Over 17% of all traffic fatalities involve pedestrians
• Bicyclists constitute 1% of all trips but 2% of all traffic fatalities

Solution
• Address both safety and mobility issues pertaining to vulnerable road users
• Use connected vehicle and autonomous vehicle technology & smart phone applications

Feasibility for Adoption
• Aligns with the Florida’s existing Pedestrian and Bicyclist Strategic Safety Plan
• Generic enough to be adopted by agencies within and outside Florida
Scenario A: Vehicle automatically stops in front of a pedestrian
Scenario B: Vehicles are aware of the presence of bicyclists, and are yielding to bicyclists.
Scenario C: Bicyclists are Given the Right-of-way When There are No Vehicles in the Conflicting Approaches

Green is extended for approaching bicyclists
Data from City of Gainesville

• Ped, Bike, & Vehicle Volume Data from Vantage Live
• Vehicle Speed Data from Waze
• Signal Timing Plans from the City of Gainesville
Preliminary Results for Scenario A Involving a Distracted Ped.

Conflict Analysis Results

Case 1: Conventional Vehicles

Case 2: AV with APCAS

Case 1
(241 Conflicts)

Case 2
(87 Conflicts)

64%
Proposed Deployment Location

6 Signalized Intersections along US Hwy 1 in the City of Miami Beach
ITS Architecture: Physical View

**ITS Roadway Equipment**
- CCTV Cameras
- Detection (Video, LiDAR)
- RSUs
- Communication (DSRC, Cell)

**Vehicles**
- OBU
- APCAS

**Personal Information Device**
- Smartphone with Apps for ped/bike safety

**Centers**
- RTMC
- TMC
- Central signal control systems

**Proposed: Roadway S&PM**
- High contrast and wider, closely spaced markings
- Technology enabled signs
Intersection-level Deployment Costs

- Two RSUs per Intersection: $12,000/unit
- Controller Upgrades: $8,000/unit
- Cellular Communications Infrastructure: $4,000/unit
- Collision Avoidance System: $5,000/unit
- Total for 6 intersections: $246,000
System-level Deployment Costs

- Smartphone Application: $300,000
- Sun Guide Interface Upgrade: $50,000
- 10 OBUs for testing: $5,000/unit
- 10 Smartphone OBUs for Ped/Bike Applications for Testing: $4,000/unit
- SE, CEI, Configuration & Integration: $150,000

Total: $590,000
Intersection-level Deployment Cost $246,000
System-level Deployment Cost $590,000
Contingency @12% $100,000

TOTAL COST $936,000
The deployment of the proposed system is anticipated to take 21 months.

The Design-build phase includes FIITT:

- Furnish
- Install
- Integrate
- Test
- Train
Potential Benefits

Safety
- Improved pedestrian/bicyclist detection, verification, validation, and response.
- Fewer pedestrian and bicycle crashes at signalized intersections.
- Reduce red-light violations.
- Help proactively prioritize locations for safety improvements based on conflict analysis.

Mobility
- Maximizing the available green time and signal phases to accommodate all modes.
- Reduced delay and number of stops for bicyclists.
- Increasing the throughput of bicycles and vehicles due to advanced detection.
- Accommodating higher pedestrian volume particularly in downtown.

Enforcement
- Future enhancement: An additional detection system that will determine the at-fault road user and issue a ticket.
Thank You!

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