

Potential Research Topics for FY 2010 NATSRL Program

**This document includes some of the potential research topics for NATSRL in the areas of the Intelligent Transportation Systems (ITS). It needs to be noted that UMD faculty and researchers can submit their proposals addressing those ITS-related research problems that are not listed here. Please contact Dr. Eil Kwon (726-8325, eilkwon@d.umn.edu) for any further information on the listed problems.*

Road Weather Condition Monitoring and Winter Road Maintenance Management

- New sensing technologies, including vehicle-mounted sensors, for detecting and measuring snow/ice conditions on the roads
- Improved understanding of the effectiveness of de-icing chemicals under various pavement/weather/traffic conditions
- Improved snow and frost prediction capabilities for local areas with real time measurements
- Advanced decision support methods for optimum snow-ice treatment recommendations and snow plow fleet routing
- Improved anti/de-icing technologies including mobile automated anti-icing systems
- Applications of AVL data for maintenance decision making
- Effective strategies for improving the safety of snow plow operations including the prevention of the plow truck-passenger vehicle collision under bad weather conditions

Traffic Safety

- Automatic detection and warning systems for dangerous road, vehicle and driver conditions including curves, pedestrian/bicycles, animal crossings, lane departures and driver fatigue/distraction
- New sensing technologies for detecting nearby vehicles for collision avoidance
- Effective counter measures for red-light running at intersections
- Automated incident/collision warning systems for intersections and freeways
- Low-cost rural highway-railroad intersection warning systems
- Effective queue detection methods for traffic back up related to incidents and work zones
- New strategies and devices that can improve the safety of work zones
- New strategies/technologies for improving school zone safety

Traffic Flow and Driver Information Management

- New wireless communication technologies, alternative to DSRC, to record and transmit real time traffic data/information for 'vehicle from/to Infrastructure' and 'vehicle to vehicle'
- New improved technologies for vehicle positioning
- Improved vehicle sensing technologies, infrastructure-based and vehicle-based, for collecting spatial data as well as spot measurements
- Obtaining Origin/Destination data from probe vehicles

- Cooperative driving systems on freeways to improve traffic performance including merge assistance technologies
- New traffic control strategies for freeways and arterials utilizing information technologies and probe vehicle data
- New technologies for traffic video data transmission
- Efficient methods to disseminate travel condition information to mobile devices
- Effective ways of representing traffic/road conditions on variable message signs, e.g., use of symbols
- Alternate route identification/recommendation systems for managing congestion
- Travel time estimation for signalized arterials
- New technologies for obtaining real time traffic data in rural areas and other locations where traditional detection methods are not feasible or economical
- Cost-effective surveillance systems for remote/rural areas
- Automatic vehicle occupancy detection technologies for enforcing car-pool and HOT lane operations

Incident/Emergency Management

- New technologies/strategies for improved automatic incident identification and notification
- Strategies to improve incident response time in rural areas
- Effective strategies for real time coordination of multiple agencies for incident management
- Effective communication methods including variable sign languages for emergency evacuation management
- Improved strategies for emergency vehicle preemption of traffic signals
- Automatic alert system for monitoring suspicious activity or unusual movement
- Improvement of emergency vehicle response routing

Freight Transportation

- New technologies and strategies to process and move cargo and trucks more quickly
- Real-time identification of highway bottlenecks for truck flows and mitigation strategies
- Efficient information strategies for parking availability on key trucking corridors
- Improved sensing technologies for heavy vehicles and weights, including weigh-in-motion detection, and applications of WIM/heavy vehicle data for enforcement/bottleneck management