Applications for the Environment: Real-Time Information Synthesis (AERIS) - Overview

Fall/Winter Webinar Series
Webinar #2

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AERIS
Overview

- What is Connected Vehicle Research?
- Transportation and the Environment
- AERIS Research Program
- BAA Research Projects
- AERIS Fall/Winter Webinar Series
What is Connected Vehicle Research?

Connected vehicle research is a suite of technologies and applications that use wireless communications to provide connectivity:

- Among vehicles of all types
- Among vehicles and roadway infrastructure
- Among vehicles, infrastructure, and wireless consumer devices
Why Is Connected Vehicle Research Needed?

- USDOT connected vehicle research aims to tackle some of the biggest challenges in the surface transportation industry in the areas of safety, mobility, and environment
  
  - **Safety** | In 2009, there were 5.5 million crashes, resulting in 33,808 fatalities and 2.2 million injuries. Motor vehicle crashes are the leading cause of death for people ages 3 through 34.
  
  - **Mobility** | U.S. highway users waste 4.8 billion hours a year stuck in traffic – nearly one full work week (or vacation week) for every traveler. The overall cost (based on wasted fuel and lost productivity) reached $115 billion in 2009 – more than $808 for every U.S. traveler. Delays in truck operations alone resulted in $33 billion in wasted fuel and lost productivity.
  
  - **Environment** | The total amount of wasted fuel topped 3.9 billion gallons in 2009 according to the Texas Transportation Institute.
Transportation and the Environment

Surface transportation has a significant impact on the environment:

- 3.9 billion gallons of wasted fuel each year
- Transport sector accounts for 28% of GHG emissions in the US
- Vehicles represent almost 80% of the transport sector GHG emissions

AERIS Research Objectives

Vision | Cleaner Air through Smarter Transportation

Objectives | Investigate whether it is possible and feasible to:

- Generate/capture environmentally-relevant real-time transportation data (from vehicles and the system)
- Use this environmental data to create actionable information that can be used by system users and operators to facilitate “green” transportation choices for all modes
- Assess whether doing these things yields good enough environmental benefits to justify further investment by the USDOT

TRANSFORMATIVE and INNOVATIVE
The AERIS Program

- Five Years, Six “Tracks”
- Multimodal Approach
- Working with Data Capture and Management Program and Dynamic Mobility Applications Program

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<th>Track 2: Identification</th>
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<td>Establish the foundation by reviewing the state of the practice</td>
<td>Identify initial candidate strategies, scenarios and applications that appear to improve decisions by public agencies and travelers</td>
<td>Analyze and evaluate candidate strategies, scenarios and applications that make sense for further development and evaluation</td>
<td>Recommend strategies, scenarios and applications</td>
<td>Develop the facts and evidence needed to inform and respond to possible future policy and regulatory issues/needs</td>
<td>Engage stakeholders and foster technology transfer</td>
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Track 1: Establish the Foundation

AERIS State-of-the-Practice Assessments

- Applications for AERIS State of the Practice Assessment

- State of the Practice Assessment of Techniques for Evaluating the Environmental Impacts of ITS Deployment

- State of the Practice Assessment of Behavioral and Activity-Based Modeling

- State of the Practice Assessment of Environmental Models

- State of the Practice Assessment of Technology to Enable Environmental Data Acquisition

*All reports are now complete and will be publicly available soon*
Track 1: Establish the Foundation

Broad Agency Announcement (BAA) Research Projects

- **Purpose of Issuing the BAA:**
  - To expand knowledge of and experience with implementation of ITS applications to improve environmental performance by leveraging partners’ research results and investments

- **Objectives of BAA Research:**
  - Foster innovative research on ITS applications that improve environmental performance, and possibly develop new applications
  - Promote capture and management of real-time data that are relevant to environmental applications development and performance measurement
  - Support development and enhancement of evaluation techniques, performance measurement, and technologies to capture environmentally-relevant data
BAA Research Partners

1. An Evaluation of Likely Environmental Benefits of Lowest Fuel Consumption Route Guidance in the Buffalo-Niagara Metropolitan Area | University at Buffalo

2. Developing and Evaluating Intelligent Eco-Drive Application | Virginia Tech

3. Developing Eco-Adaptive Signalized Intersection Algorithms | Virginia Tech

4. Preliminary System Development Plan for an AERIS Data Capture and Management System | Mixon Hill

5. Eco-ITS | University of California – Riverside (UCR)

6. Use of Trucks’ On-board Data for Real-Time Emission Modeling | Calmar Telematics and UCR

7. Engaging the International Community | University of California Partners for Advanced Transit and Highways (PATH) Program
AERIS Transformative Concepts

“Cleaner Air Through Smarter Transportation”

Goal #1: Improve Operations
- App #1
- App #2
- App #3
- App #4

Goal #2: Manage Demand
- App #1
- App #2
- App #3
- App #4

Goal #3: Change Driving Behavior
- App #1
- App #2
- App #3
- App #4

Goal #4: Support Use of Alternative Fuel Vehicles
- App #1
- App #2
- App #3
- App #4
AERIS Transformative Concepts

- Integrated operational concepts that use connected vehicle and other data and communications in **innovative ways** to operate surface transportation networks to **reduce environmental impacts resulting from transportation-related emissions and fuel consumption.**
AERIS Transformative Concepts | Context

- AERIS Transformative Concepts are scalable; varying in complexity, geographic limits, and deployment timeframes (30+ years in some cases).

- AERIS Transformative Concepts consider multi-modal applications understanding that significant environmental benefits can be achieved by transit and freight communities.

- AERIS Transformative Concepts include technical, policy, and other issues.

- At this time, AERIS Transformative Concepts are not recommendations for deployment.

- AERIS Transformative Concepts are “modeling scenarios” developed to: (1) determine potential environmental benefits, (2) understand mobility trade-offs, (3) assess data needs and availability of data within a connected vehicle environment, and (4) facilitate development/enhancement of environmental algorithms.
AERIS Transformative Concepts Down Selection

**TRACK 1**  |  Deliverables
---|---
State of the Practice Assessments (S)
BAA Research Reports (7)
Performance Measures White Paper
Standards White Paper

**TRACK 2**  |  Deliverables
---|---
Initial Transformative Concepts (TCs)
TCs/Applications Tech Report
Initial Benefit/Cost Analysis Report

**TRACK 3**  |  Deliverables
---|---
TCs/Applications Evaluation Plan
Model Development Tech Report
Baseline BCA Tech Report
Prototype Evaluation Report
Final Evaluation Report

**TC Down Selection Questions**
- Does the TC utilize connected vehicle technologies (i.e., V2V, V2I)?
- Are the environmental and transportation data required to model the TC readily available or could data be easily collected?
- Are algorithms in place – or could algorithms be developed with minimum to moderate effort – to model the applications identified in the TC?
- Could the TC be accurately modeled using existing behavioral, traffic simulation, and/or environmental models?
- Does the TC have the potential to yield significant environmental benefits?
- If research indicates that significant environmental benefits can be achieved, what is the likelihood that the TC would be deployed in the future?
- What is the role of the USDOT and state/local government in implementing the TC?
- Would ‘good’ modeling results justify further USDOT research investments in the TC?
AERIS Fall/Winter Webinar Series

- AERIS Broad Agency Announcement Foundational Research: Webinar #1
  Wednesday, September 14, 2011  1:00 p.m. ET

- ARIES State-of-the-Practice Modeling Assessments Webinar
  Wednesday, October 5, 2011  1:00 p.m. ET

- AERIS Broad Agency Announcement Foundational Research: Webinar #2
  Wednesday, November 9, 2011  1:00 p.m. ET

- AERIS Broad Agency Announcement Foundational Research: Webinar #3
  Wednesday, December 14, 2011  1:00 p.m. ET
Contact Information

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http://www.its.dot.gov/aeris/index.htm