Researching Mobile-based Data to Improve Weather & Pavement Observations on the Nation’s Highways

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VII & Weather Applications

- FHWA’s Road Weather Management Program envisions VII as an opportunity to
  - Leverage probe data as a new data set for surface transportation meteorology & the entire weather enterprise
  - Fill in data gaps for both atmospheric & pavement condition observations
  - Invigorate the state of weather & transportation management practices & strategies
  - Improve mobility, productivity & safety on the nation’s roads
Pre-VII Mobile Sensing Research

Snap Shot

Road temperature modification during heavy traffic

Precipitation Intensity
- none
- light
- moderate
- no heavy

Precipitation Type
- none
- drizzle
- rain
- snow
- no freezing rain, sleet

Visibility
- good
- light fog
- snow
- no dense fog, rain, ice

Road Conditions
- dry
- wet
- no slushy, snow covered

Strong Winds
- on
- yes
- no

Road Spray
- yes

Time of Day

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VII Test Bed – Detroit Metro

Air Temperature

Pressure

22:20 UTC
VII Feasibility Report

• Weather Applications and Products Enabled Through Vehicle Infrastructure Integration

Links to the Report:

ops.fhwa.dot.gov/publications/viirpt/index.htm#toc

www.ral.ucar.edu/projects/vii

• Provides a vision for the Weather Data Translator
Detroit PoC

- Detroit Proof of Concept Demonstration (PoC)
- 56 Roadside Units installed
- 25 DSRC-equipped vehicles
- PoC data acquisition period: mid Aug - mid Sept
- Extended probe data collection with 10 vehicles through Feb 2009 is under consideration
Vehicle-based Probe Data Elements

- Barometric Pressure
- Headlight Status
- External Air Temperature
- Brake Status & Boost
- Accelerometer Data (steering & yaw)
- Windshield Wiper State & Speed
- GPS Position, Heading, Elevation & Vehicle Speed
- Tire Pressure
- Vehicle Traction Control
- Vehicle Stability Control
- Anti-lock Braking System

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Probe Data Collection Works!

- Over 600 probe data messages received during a 2 hour demonstration using 6 vehicles

Congestion on I-96

-40 = error code for malfunctioning temperature sensors
Including Truck-based Research

- Over 8 million long haul trucks registered in the U.S.
- These account for
  - 3.5% of all vehicles
  - 7% of all vehicle miles traveled
  - 11% of all fatal crashes
- Nearly 500,000 long haul trucks contain transponders to transmit real-time vehicle operating characteristics & environmental conditions
Research Objectives

- Assess the feasibility of commercial vehicle data for surface weather applications
- Evaluate the practicality and value of continued truck-based research
- Provide a foundation for the weather community on what data are currently available and what might be needed in the future
Partnering with ATRI

- FHWA has contracted with the American Transportation Research Institute (ATRI)
  - Coordinate with at least 3 trucking companies
  - Establish agreements to capture probe data
  - Collect information on probe data elements and formats
  - Protect commercially sensitive data and effectively address institutional challenges related to data access/dissemination
  - Provide a feasibility study on how truck-based data could be used to support surface transportation weather research
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