

Jeffrey Miller's Current Research

BSE Faculty Research Series

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Outline

- Intelligent Transportation Systems Overview
- My Current Research
- Open Topics

Intelligent Transportation Systems

- Intelligent transportation systems improve transportation safety and mobility and enhance productivity through the use of advanced communications technologies
 - Relieve congestion
 - Improve safety
 - Enhance productivity

ITS Application Overview

- **Intelligent Infrastructure**
 - Arterial Management
 - Freeway Management
 - Transit Management
 - Incident Management
 - Emergency Management
 - Electronic Payment and Pricing
 - Traveler Information
 - Information Management
 - Crash Prevention and Safety
 - Roadway Operations and Maintenance
 - Road Weather Management
 - Commercial Vehicle Operations
 - Intermodal Freight
- **Intelligent Vehicles**
 - Collision Avoidance Systems
 - Driver Assistance Systems
 - Collision Notification Systems

My ITS Research

- **Intelligent Infrastructure**

- **Arterial Management**
- **Freeway Management**
- **Transit Management**
- **Incident Management**
- **Emergency Management**
- Electronic Payment and Pricing
- **Traveler Information**
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- **Crash Prevention and Safety**
- Roadway Operations and Maintenance
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- **Intelligent Vehicles**

- **Collision Avoidance Systems**
- **Driver Assistance Systems**
- **Collision Notification Systems**



9th & 8th Sts 1/2
Olympic Blvd 3/4
Santa Monica Fwy 10 11/4





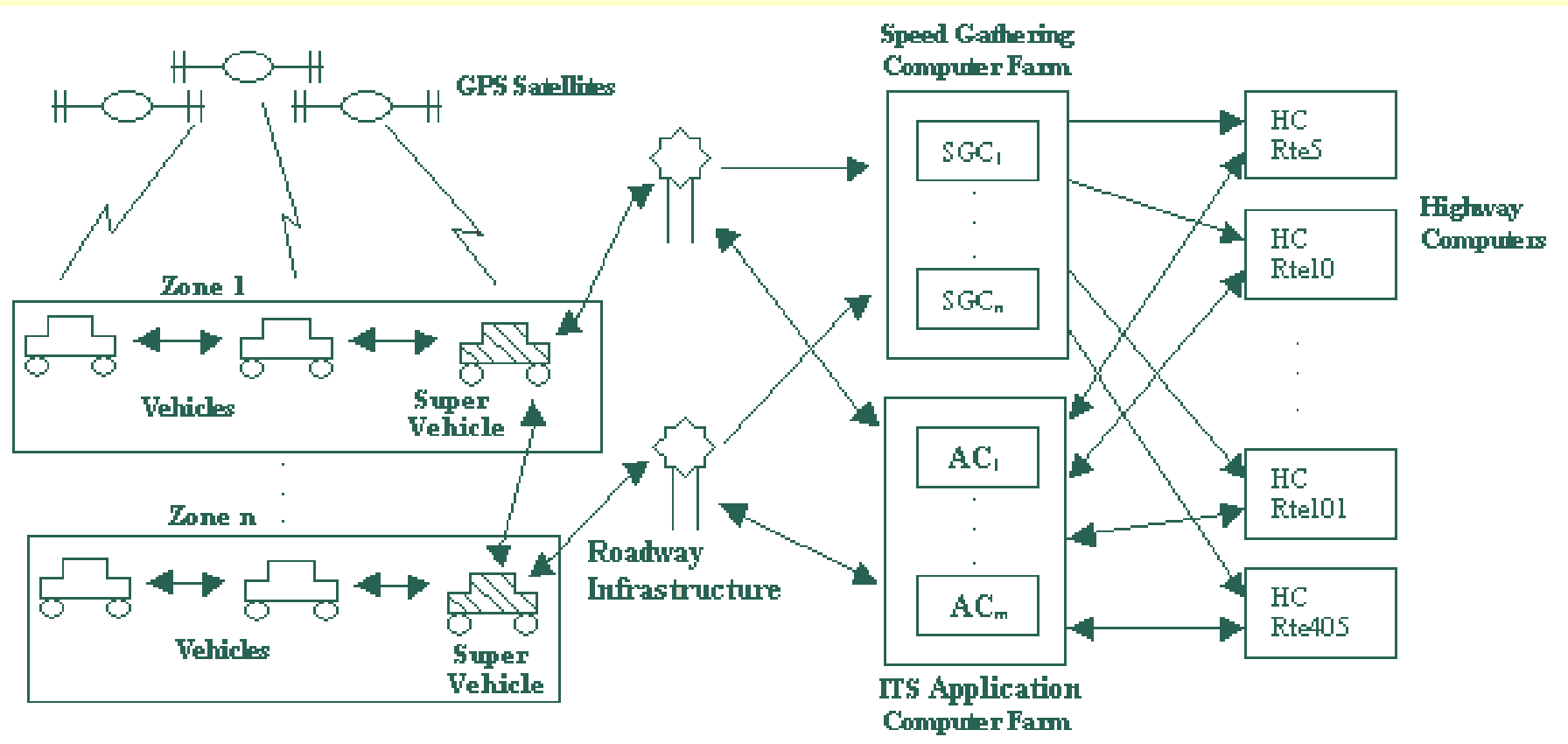
My Research

- Improving the flow of traffic based on using the latest mobile technologies (Intelligent Transportation Systems - ITS)
- Improving the safety of traffic based on alerts for conditions that pose a higher probability for an accident to occur
 - Road conditions
 - Weather conditions
 - State of driver (intoxicated, tired, etc.)
 - Number of vehicles on the road
 - Section of road
 - Etc.

My Research (cont.)

- Using mobile devices in vehicles that consist of a GPS receiver and a transmitting device (cell phone) that transmit to a central infrastructure the speed and location of the vehicle
- Aggregating this data into useful information about congestion, traffic flow, and incidents
 - Determine fastest routes, routes to avoid congestion, and hopefully routes to decrease the probability of an incident occurring

Vehicle-to-Vehicle-to-Infrastructure (V2V2I)



Current Sites

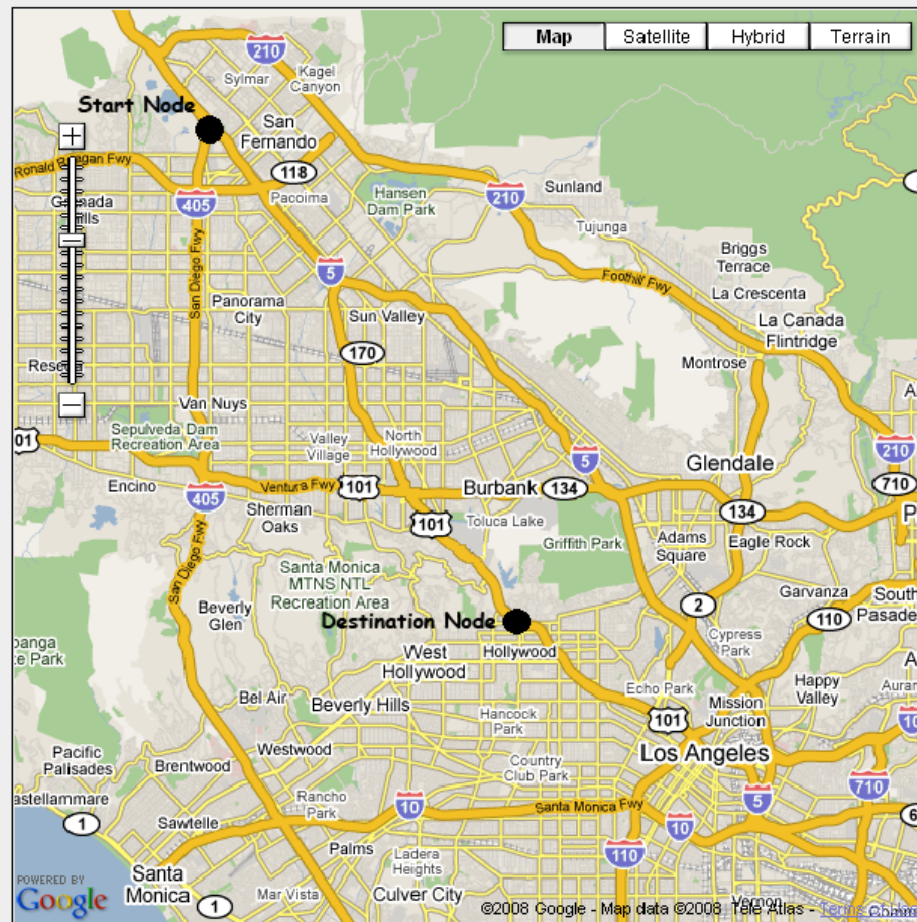
- [FreeSim version 1.1](#)
- [FreeSim version 2.0](#)
- [Live View GPS Map](#)

Open Questions

- After gathering data from a number of vehicles, will the algorithms and architectures hold?
 - In other words, will the theoretical research actually support the practical applications?
- Can we put probabilities on incidents occurring based on vehicular, environmental, and human conditions?
- Can we tie traffic-regulated streets into the free-flowing highway algorithms?
- Can we incorporate traffic prediction algorithms into the traffic algorithms?

Open Questions (cont.)

- What other technologies can be included to improve on vehicle reporting (such as lasers, cameras, sensors, etc.)?
- Can we identify the location of an incident in less than 5 minutes, which is the average amount of time before an incident can be verified by law enforcement?
- What other applications will arise to take advantage of this data?
- Will funding be available in Anchorage to support such a system?



Caltrans Northwest Loop Detectors

Freeway System
 Load Freeway System
 Zone Configuration
 Load Zone Configuration

Start
 End
 Fastest Path Algorithm
 Fastest Path Shortest Path
 Zoom In Create Vehicle

Messages
Fastest Path
 Path = LA-5-S S FERNANDO 1 ML1 LA-5-S S F
 Distance = 15.63 miles
 Time = 14 minutes 26 seconds
 Refresh Freeway System

Start
 End
 Speed Lane Update Speed

File Caltrans Loop Detectors Lanes Load File

Execute File Stop Execution

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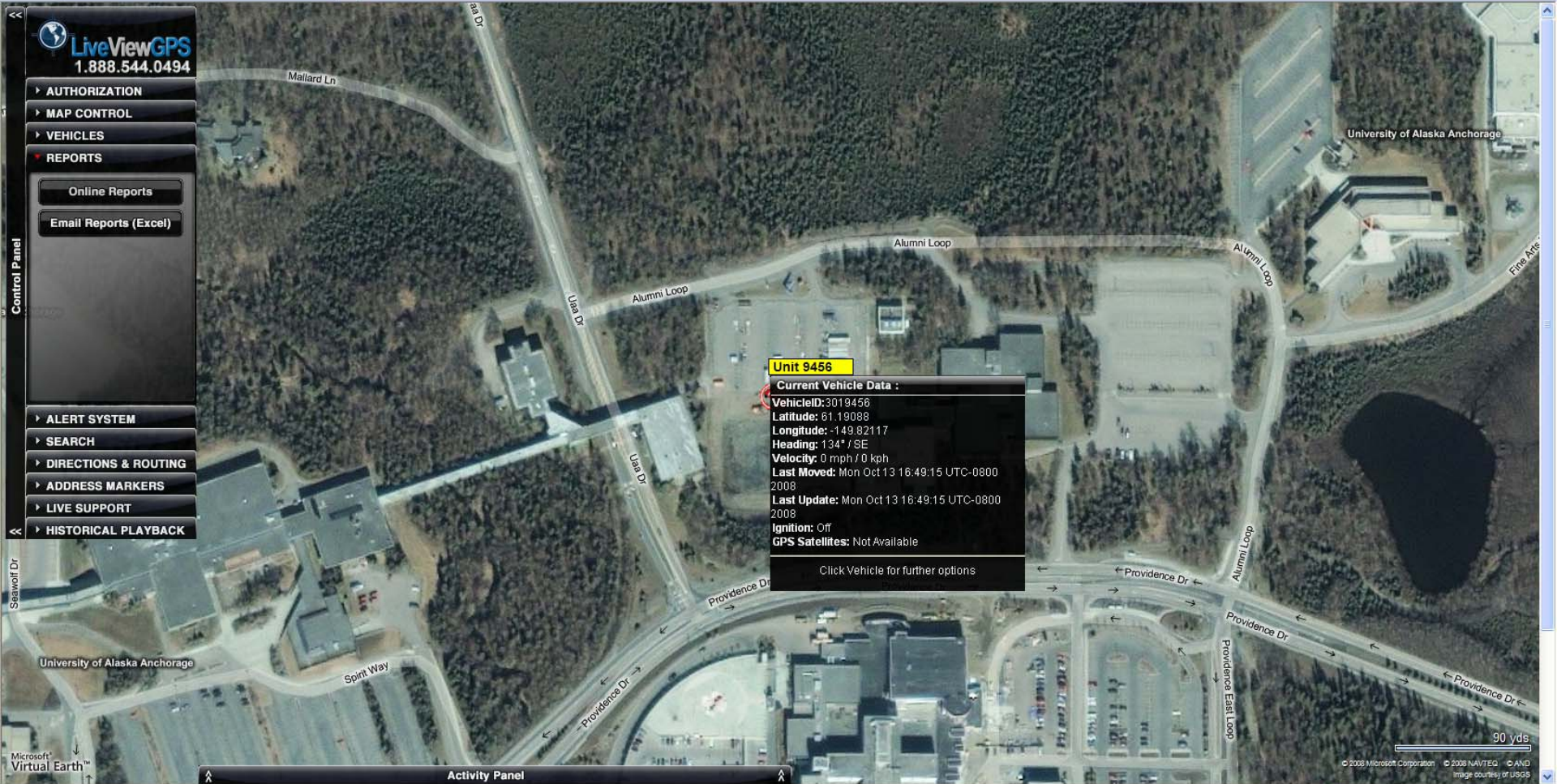
72|0|10|S FERNANDO 2|LA-5-S|BRAND|LA-5-S|78|ML1
72|0|10|S FERNANDO 2|LA-5-S|BRAND|LA-5-S|78|Summary
72|0|10|CHATSWORTH|LA-5-S|RTE 118 CN|LA-5-S|69|ML1
72|0|10|CHATSWORTH|LA-5-S|RTE 118 CN|LA-5-S|69|ML2
72|0|10|CHATSWORTH|LA-5-S|RTE 118 CN|LA-5-S|69|Summary
72|0|10|RTE 118 CN|LA-5-S|OSBORNE 2|LA-5-S|68|ML2
  
```

Messages
 Simulation Time
 0

Control Panel

LiveViewGPS
1.888.544.0494

- AUTHORIZATION
- MAP CONTROL
- VEHICLES
- REPORTS
 - Online Reports
 - Email Reports (Excel)
- ALERT SYSTEM
- SEARCH
- DIRECTIONS & ROUTING
- ADDRESS MARKERS
- LIVE SUPPORT
- HISTORICAL PLAYBACK



Unit 9456

Current Vehicle Data :

- VehicleID: 3019456
- Latitude: 61.19088
- Longitude: -149.82117
- Heading: 134° / SE
- Velocity: 0 mph / 0 kph
- Last Moved: Mon Oct 13 16:49:15 UTC-0800 2008
- Last Update: Mon Oct 13 16:49:15 UTC-0800 2008
- Ignition: Off
- GPS Satellites: Not Available

Click Vehicle for further options