Anchorage Real-Time Traffic Gathering and Distribution

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Outline

- Intelligent Transportation Systems Overview
- Current Traffic Assessment in Anchorage
- Proposed Traffic Assessment in Anchorage
- Current Results
- Future Projects

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

From http://www.itsoverview.its.dot.gov/

ITS Applications Summary

- There are two common trends with all of the ITS applications
  - How do we get the data?
    - Data gathering and detection
  - What do we do with it once we have it?
    - Information analysis or dissemination

Current Traffic Assessment in Anchorage

Current Traffic Gathering in Anchorage

Video Cameras

Current Traffic Gathering in Anchorage

Inductive Loop Detector

Current Traffic Gathering in Anchorage

Air Tubes

Current Traffic Gathering in Anchorage

Police Reports

Current Traffic Gathering in Anchorage

Driver Call-Ins

Current Traffic Gathering in Anchorage

Manual Gathering

Current Traffic Gathering in Anchorage

Speed Sensors

Proposed Traffic Assessment in Anchorage

Proposed Traffic Gathering in Anchorage

- Video cameras
- Inductive loop detectors
- Air tubes
- Police Reports
- Driver call-ins
- Manual gathering
- Speed sensors (not yet installed)
- **Probe Vehicles**

Distributed Data Gathering

- Instead of just gathering data at discrete locations, data can now be gathered from individual vehicles
- This can be accomplished through devices installed in vehicles or devices that are traveling with the vehicle reporting
- This allows real-time data to be gathered

Proposed Traffic Gathering in Anchorage

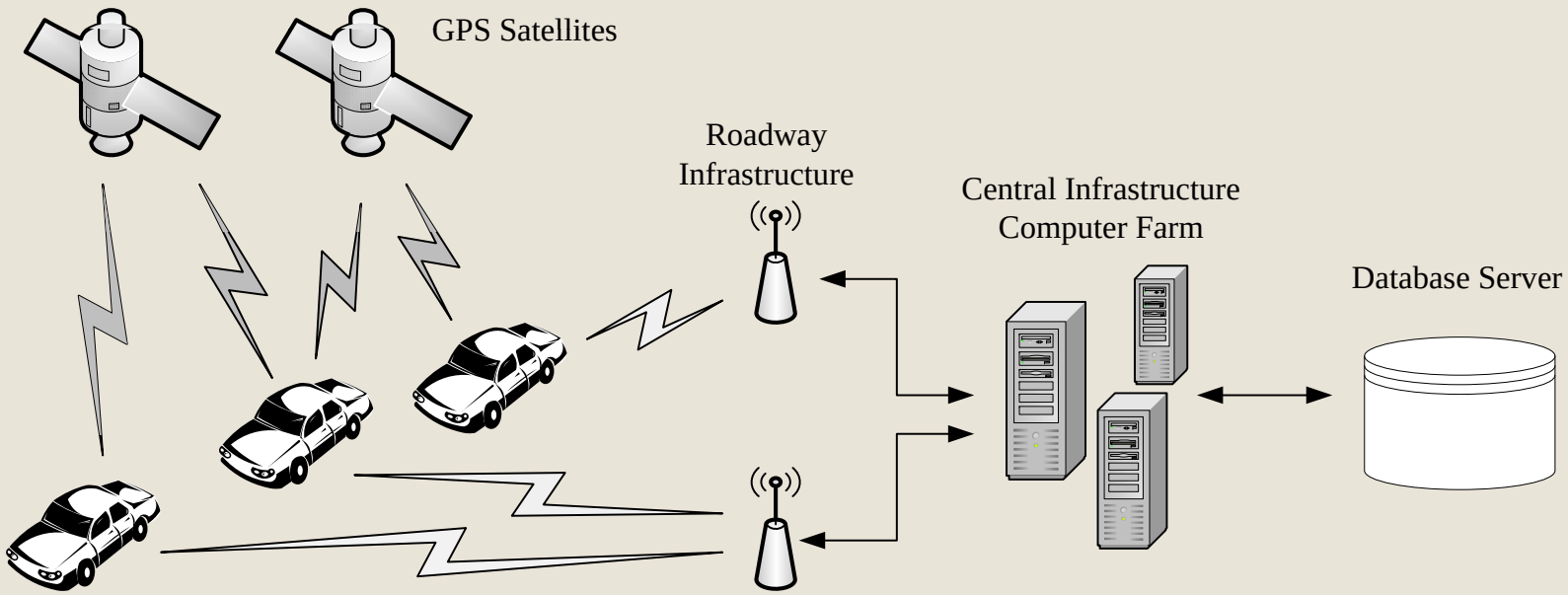
Vehicle-Tracking Devices

Proposed Traffic Gathering in Anchorage

Cellular Probes

Proposed Traffic Gathering in Anchorage

Architecture



Privacy Concerns

- The data which is transmitted has a unique identifier associated with it, but this identifier is not associated with a vehicle
- We are only interested in the main arterials and not residential streets
- The location of the device is not exposed to the public, but only a map showing an aggregation of the data

Current Results

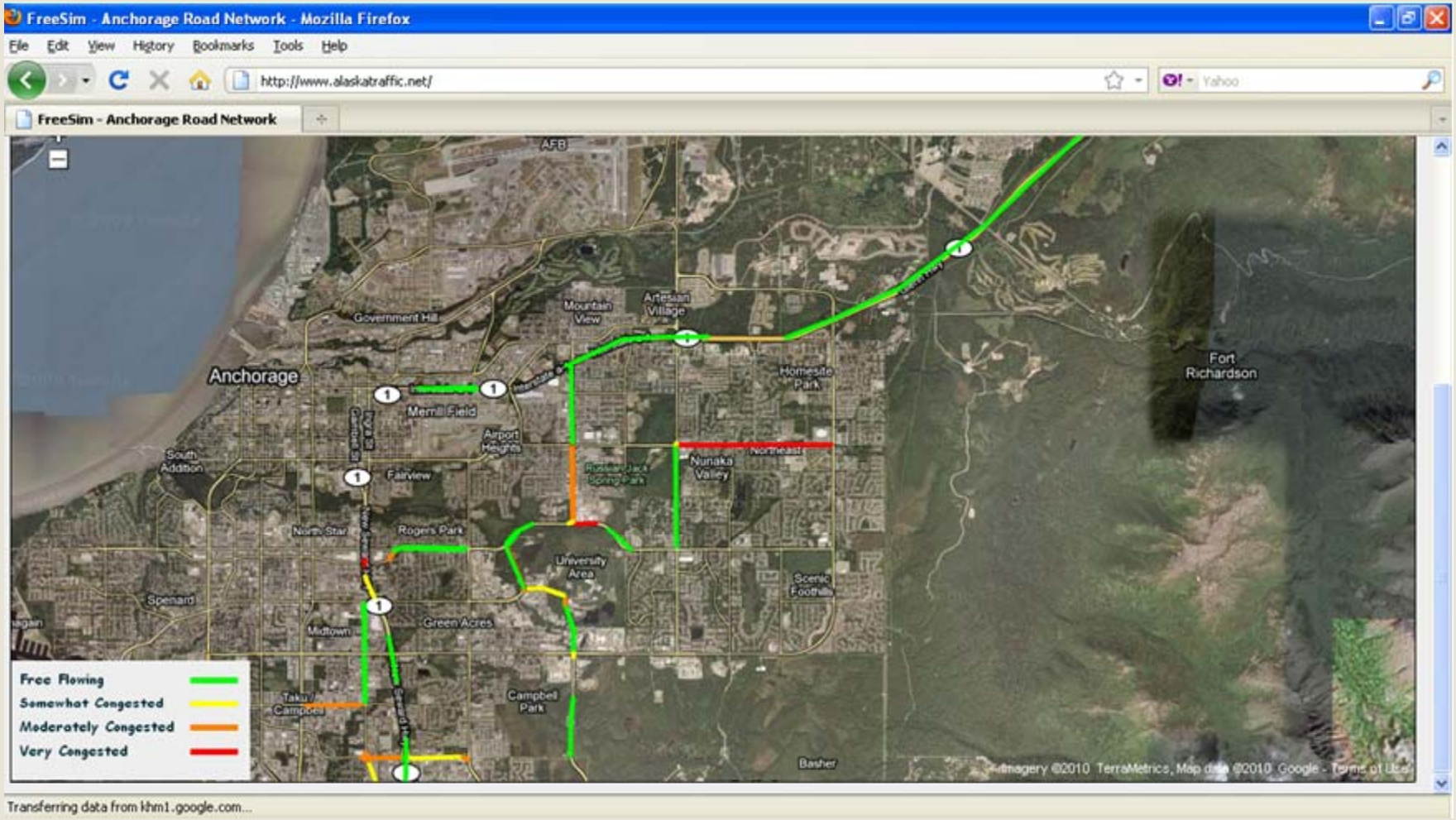
Research Team

- Professor Jeffrey Miller – Computer Systems Engineering, UAA
- Professor Sun-il Kim – Computer Systems Engineering, UAA
- Professor Muhammad Ali – Mechanical Engineering, UAA
- Timothy Menard – Computer Systems Engineering Student, UAA
- Another Student – Computer Systems Engineering, funding available
- Another Student – Mechanical Engineering Student, funding available

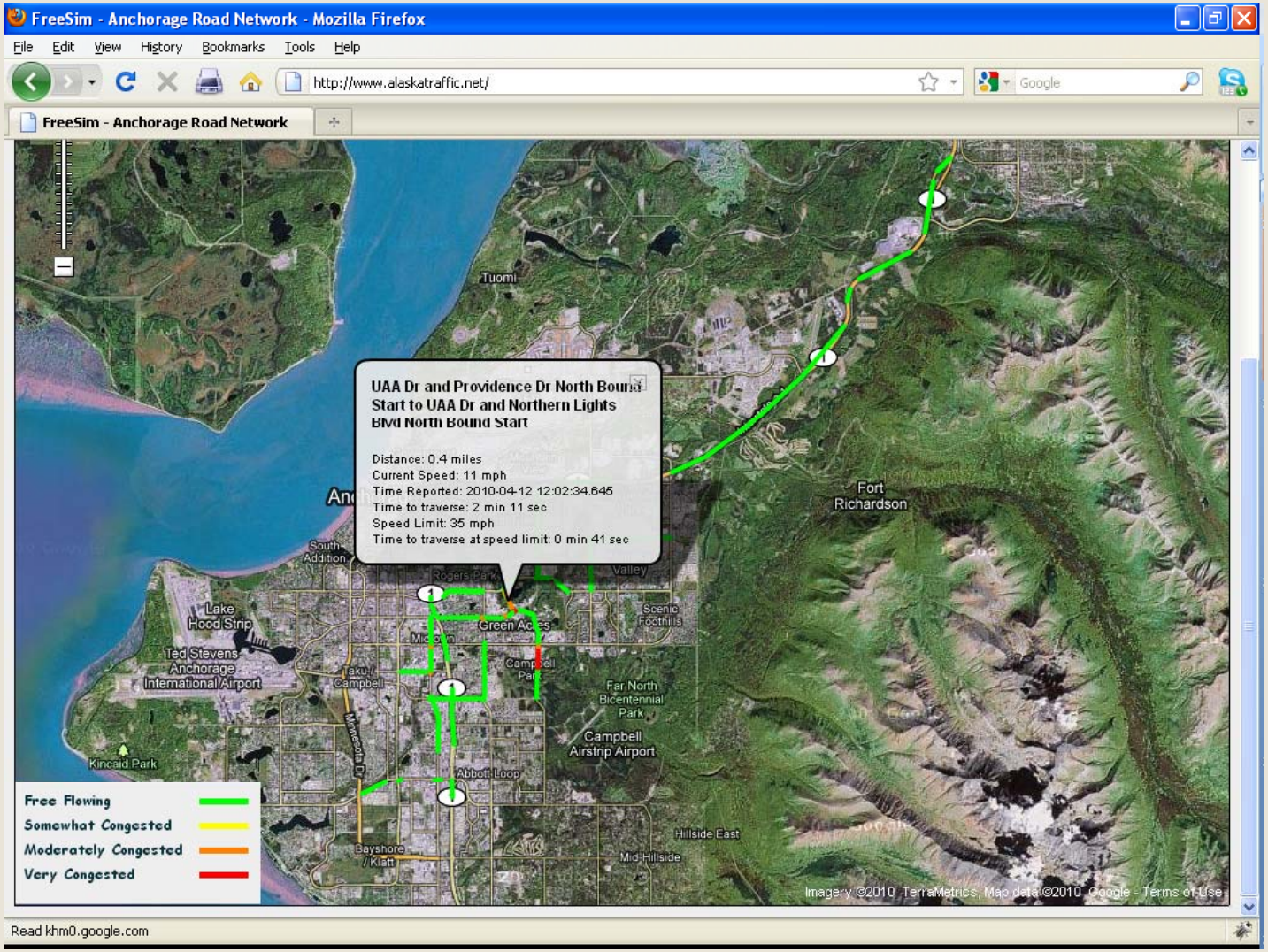
Current Status

- Currently, we have 30 vehicles being tracked
- We already have on-hand an additional 35 tracking devices
- We are currently working on creating the smartphone application
- We have spoken with Yellow Cab and Checker Cab in Anchorage, and they are both willing to work with us, though we have not received any data from them yet
- We have spoken with the Municipality about retrieving data from the Peoplemover, but have not received any data from them yet
- We are currently installing devices in VPSI Share-A-Ride vans

Current Results - FreeSim



Current Results - FreeSim



Additional Information

- The data shown on http://www.alaskatraffic.net stays live for 30 minutes if no other vehicle drives along the roadway
- The project is free and open-source, and it is being used by other universities in conjunction with departments of transportation
- The devices are installed in volunteer vehicles, delivery vehicles, and commuter vans

Future Projects

Future Projects

- The applications of this data are too many to enumerate, but here are a few of the projects that are on our short-term list
- Interfacing with the Municipality of Anchorage and the Alaska DOT to provide them with a summary of the data
- Advertising http://www.alaskatraffic.net for the public to view when we, the MOA, and the DOT feel the information displayed is accurate enough for the public
- Creating efficient and accurate algorithms for determining amount of time to traverse roadways based on data available (paper published at 2010 IEEE Intelligent Vehicles Symposium in San Diego, California)
- Retrieving GPS data from additional vehicles through devices already installed or through installing more devices
- Tracking snow plows and showing on the map the roads that have already been plowed in real-time

Future Projects

- Aggregating all of the data we can in real-time to provide a single interface
- Working with freight, delivery, and taxi companies to determine how they can use this data and what data they can provide
- Determining fastest paths in real-time and notifying drivers of the fastest way to get to their desired destinations
- Solving academic problems with practical applications, such as the Dynamic Traveling Salesman Problem (paper published at 2010 IEEE Intelligent Transportation Systems Conference in Portugal)
- Other projects as determined by key stakeholders

Questions?