The 2001-2003 Atlanta
Instrumented Vehicle Intensive

Randall Guensler
Jennifer Ogle

School of Civil and Environmental Engineering
Georgia Institute of Technology

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100 MPH

over

Speeding

Atlanta For

Each Year In

Are Written

1000 Tickets

THE 100-MPH CLUB

Pedal To The Metal

Highest speeds is up sharply

Number of drivers hitting

Pedestrians by [DEAN STARR/DM]
Please see ROAD RISKS, A12

The Georgia Legislature: teaching drivers the right way. Nicknamed the "hwy wars," thanks to hundreds of highway accidents and hundreds of lives lost, the drive to educate drivers and keep the highways safe must continue. The Georgia DOT is working to improve safety on the roads and highways. One percent of motorists are involved in 50 percent of accidents, according to the DOT. Through video cameras mounted on the highway, the DOT is able to identify and ticket drivers who are speeding. The DOT has implemented a new system that allows drivers to pay fines online or in person. This system is expected to increase the efficiency of the DOT's traffic enforcement efforts.

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Background: Three City Study

- Instrumented vehicle studies
  - Atlanta, Baltimore, and Spokane (and Los Angeles)
  - Date, time, engine start, rpm, map, throttle position
- Observed driving patterns were significantly different
  - Can match any vehicle-day of driving to the appropriate city 95% of the time
- Could not explain the reasons for the differences
  - No data to compare across driver characteristics
  - No data to compare across vehicle characteristics
  - No route data to compare infrastructure effects
  - No interaction analyses possible
NHTSA Study

- **Goal:** Develop an understanding of the relationships between driver behavior, onroad driving patterns, and crash risk across various demographic, environmental, and physical conditions.

- **Examine factors affecting crash occurrence**
  - Driver demographics/socio-economic factors, driver skill factors, vehicle factors, environmental factors, and transportation system operating characteristics.

- **Principle Investigators at Georgia Tech:**
  - Jennifer Ogle and Simon Washington
Project Scope

• Instrument 1100 vehicles from 600 representative households in Atlanta and monitor activity for 2 years
• Activity monitoring and crash detection equipment:
  – Onboard computer, tri-axial accelerometer, GPS, digital cellular modem
• Collect and upload details on tripmaking and onroad operating characteristics to a central data warehouse
• Collect data for the 100+ crash events (>5% annual crash rate/vehicle) and correlate the crash occurrence to high-risk driving patterns (speed-acceleration, congestion, near misses, etc.)
Timeline

- Equipment acceptance testing by April 2001
- Infrastructure set-up and testing by May 2001
- Installation and data collection begins June 2001
  - Staggered deployment over 3 month period
  - Continuous data collection for 2 years (all vehicles)
Participants

• Subjects will be selected in conjunction with the Year 2000 SMARTRAQ Travel Survey recruitment
  – Strategies for Metropolitan Atlanta’s Regional Transportation and Air Quality (SMARTRAQ)

• SMARTRAQ is based on 8,000 household travel survey to address land use, travel behavior, air quality, safety as well as other critical issues in the Atlanta region

• Random Sample of Households based on:
  – Income (4-5 strata)
  – Household Size (4-5 strata)
  – Land Use – Residential Density (4-5 strata)
Participant Data

- **Household demographics**
  - Household and individual survey data
    - Demographics and routine destination data
    - Standard travel diary survey(s)
    - Attitudinal data from periodic surveys
- **Vehicle data**
  - Vehicle Identification Number (VIN)
  - Engine and performance data
  - Safety systems
  - Fuel delivery and emissions control systems
Onroad Data Collection

- Driving characteristics (every trip)
  - High resolution activity data
  - Date, time, latitude, longitude, speed, acceleration, heading, DGPS status, # Satellites, PDOP, HDOP
  - GPS data at 0.2 Hz, speed/acceleration at 1 Hz
  - OBD-capable system
- Aggressive driving characteristics and near-miss data
- Crash detection and notification
  - Crash details via accelerometers
  - Field surveys of crash and prevailing conditions
Trip Data

• Trip origin
  – Date, time, location
  – Soak time (time since last trip end)

• Trip destination
  – Date, time, location
  – Trip duration (time)
  – Travel distance

• Driving characteristics
  – Speeds, accelerations, aggressive maneuvers

• Route choice
ALL TRIPS (GT Participant #28)
Histogram of Speed (mph)

July 1, 1998 Demonstration Run
Data Transfer

- Data transfer by cellular phone
- Data are transferred periodically (e.g., when storage reaches threshold or bi-weekly) during off-peak hours
- System can be remotely configured by cell phone
  - Each unit can be set 0.2 Hz to 1 Hz or at trip-level frequencies throughout the study period
- Crash notification messages are sent immediately upon detection, uploading the data preceding the crash
- Daily system integrity checks verify that units are communicating properly
Urgh!
GIS Mapping Detail

US Postal Service Facility
Angier Springs Rd NE
OBD II Capabilities

- System is capable of monitoring the OBDII data stream
  - Separate black box unit
  - Low-power scanning (hardware) and code conversion (software) system
- Will deploy 4 units during the study
- $400,000.00 supplemental research proposal
  - Submitted to EPA but not funded for FY 2001-2002
  - Currently seeking alternative funding sources
Histogram of Engine RPM

July 1, 1998 Demonstration Run
Travel Demand and Emissions Modeling Benefits

- GPS provides trip origin, destination, and route choice
  - Improved spatial and temporal resolution
  - Calibration of traffic flow and simulation models
- Second-by-second operating speeds and acceleration
- Engine start and soak distributions (by purpose)
  - Operating profiles after engine start
- Identify probable enrichment/enleanment locations
- Grade effects on operating conditions (GIS-grade)
- Congestion effects on operating conditions (ATMS)
- Identification of driver behavior interaction effects
Enhanced Engine Start and Onroad Emissions Modeling

Engine Start CO Emissions
7-8 AM, 1 KM Cells
(Zone-based, 33% of total)

Running Exhaust CO Emissions
7-8 AM, 1 KM Cells
(Road-based, 67% of total)

Total CO Emissions
CO 7-8 AM