DRIVE ATLANTA: STUDY WILL MONITOR DRIVER BEHAVIOR TO DETERMINE ROLE OF SPEED IN HIGHWAY CRASHES

With a vehicle crash rate exceeding the national average, metro Atlanta is the natural test bed for a new comprehensive study of driver behavior, the driving environment and the role of speed in crashes.

Researchers leading the Georgia Institute of Technology's Drive Atlanta study have begun installation of data collection and telecommunications equipment in the cars of 1,100 metro drivers randomly recruited from participants in a recently completed Georgia Tech travel survey called SMARTRAQ. Installations should be complete by early fall, and two years of data collection and analysis will then get under way.

"Ultimately, we hope the data we collect can help make the whole system -- the driver, vehicle and the road -- safer and more efficient," said Jennifer Ogle, lead investigator and a research scientist in the Georgia Tech School of Civil and Environmental Engineering. "We hope to learn about all three pieces of the system. In particular, we are interested in travel routes, driver-vehicle interactions and exposure to crash risk. The sheer size of the data set allows for nearly limitless analysis possibilities."

Though the role of speed in crashes is the primary focus of the study, researchers also will examine other driving variables, such as seat belt use, time spent on the road (especially during congested periods), time spent on highways versus local roads and occurrences of extreme braking. Led by Ogle and her colleagues Associate Professors Karen Dixon and Randall Guensler, researchers hope to answer several questions. Does speeding lead to crashes? Does the driving environment contribute to speeding? Does the frequency of extreme vehicle maneuvers correlate with crash involvement?

"We know very little about pre-crash speeds," Ogle said. "Almost all of what we know relies on driver and witness reports or crash reconstruction activities. Each of these..."
sources is subject to errors. Our equipment will actually measure and record speed for us."

But researchers also want to learn more about travel patterns -- how, when and where people drive. This information will be useful to both Ogle's research team and to SMARTRAQ (Strategies for Metropolitan Atlanta's Regional Transportation and Air Quality), a Georgia Tech-led study to determine what types of land use and transportation investment policies have the best chance to reduce auto dependence.

"For years, we have collected information from the roadway and the vehicle," Ogle said. "Now, we will also be able to gain information on driver behavior. This information will allow transportation officials to target their countermeasure programs.

"Countermeasures can come in the form of safety enhancements for the vehicle or the roadway environment, such as the roadside grading, signage, air bags, seat belts or the setting of appropriate speed limits. This research may also lead to more appropriate driver training programs for younger and older drivers."

Drive Atlanta is primarily funded by a $1.9 million contract with the National Highway Traffic Safety Administration (NHTSA) and a $1.2 million in-kind grant from Atlanta-based Safety Intelligence Systems Inc. The private company is providing the development costs, prototyping and testing for the MACBOX, an event data recorder, which will operate -- transparently to the driver -- in all study vehicles.

The MACBOX will record high-resolution data for each vehicle trip and download that information to the researchers' secure server weekly. Data will include trip length, trip duration, route choice and second-by-second speed and acceleration.

Researchers will supplement MACBOX data with information on the freeway and major highway driving environments. The Atlanta Traffic Management Center will contribute data on prevailing traffic conditions, and researchers will gather weather data from the National Oceanic and Atmospheric Administration. They will combine all of these data within a geographic information system using the Georgia Department of Transportation roadway characteristics file and network as the basis for analyses.

In exchange for their participation, drivers have been assured of the privacy of data collected from their vehicles with a Certificate of Confidentiality provided by the National Institutes of Health. And they have the benefits of a vehicle theft-tracking system and automated 911 notification in the event of a crash.

Researchers will collect additional data -- both from the MACBOX and at the scene -- when a study vehicle is involved in a crash. Based on statistical probabilities, they estimate that at least 100 crashes will occur during the study period.

When a crash occurs, the MACBOX will record all of the vehicle deceleration data and simultaneously transmit a Mayday message to the Fulton County Public Safety Access Point, or 911 center, the central emergency agency for all vehicles involved in the study. Researchers are making plans on how to handle crashes that may occur outside the metro area, Ogle added.

Fulton County 911 officials will open a cellular telephone line into the vehicle using the onboard speakerphone system to verify that a crash has occurred and determine its potential severity. Global positioning system signals transmitted to 911 officials from the vehicle will reveal the crash location.

Meanwhile, algorithms embedded in the MACBOX software will automatically analyze crash data, such as impact velocity and severity, and inform 911 personnel about the probability of injuries or casualties associated with the wreck. Then after quickly looking at these data and attempting to contact the driver, they will dispatch rescue workers and police to the scene.

The in-vehicle equipment will automatically notify the on-call Georgia Tech research team, which will deploy and investigate the crash in coordination with police departments. All faculty members and graduate students involved in the study underwent crash reconstruction and investigation training. Researchers will analyze the MACBOX data and crash scene information to determine the role of speed in the crash.

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"Crash reconstruction is essentially more an art than a science," said Safety Intelligence Systems' Ricardo Martinez, a former NHTSA administrator and now an adjunct professor of civil engineering at Georgia Tech. "We look at the archaeology of the crash, witness reports and expert opinion to decide the 'facts.' With cars becoming more sophisticated like computers, we can actually measure what happens in a crash. So with the MACBOX, we can go from Flintstonian to Jetsonian."

Based on a pilot study she did in 1997 in Texas, Ogle believes Drive Atlanta will be successful in terms of data collection technology and data analysis. Ogle will issue periodic reports to NHTSA throughout the study and a final report late in 2004.

"There is a lack of comprehensive information on crashes," Ogle said. "With ABS brakes, skid marks are not as detectable…. But crash analysis is changing. The more information we have, the better off we are."

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For technical information, contact:

1. Jennifer Ogle, Georgia Tech, 404-385-0694
   E-mail: jennifer.ogle@ce.gatech.edu
2. Karen Dixon, Georgia Tech, 404-894-5830
   E-mail: karen.dixon@ce.gatech.edu
3. Randall Guensler, Georgia Tech, 404-894-0405
   E-mail: randall.guensler@ce.gatech.edu
4. Ricardo Martinez, Safety Intelligence Systems, 404-385-2551
   E-mail: rmartinez@safetyintelligence.com
5. Paul Tremont, NHTSA, 202-366-5587
   E-mail: ptremont@nhtsa.dot.gov

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