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## DRIVING; Cars That Nudge You to Drive More Safely

By PHIL PATTON

SITTING in the front seat of a rolling auto-safety lab called the Chrysler 300M IT (for "information technology"), Ted Selker is one part mad scientist, one part absent-minded professor. Wearing a small red button (a copy of I.B.M.'s TrackPoint "pencil eraser" computer control, which he invented) clipped to his collarless shirt, he points out the car's capabilities -- it can tell if the driver is gripping the wheel loosely or tightly, where his eyes are focused and even whether he has taken his cup out of the cup holder. Then, Dr. Selker jumps out of the car and pops open the trunk to reboot a computer.

As part of a collaborative project of the Massachusetts Institute of Technology Media Lab, the carmaker DaimlerChrysler and the electronics company Motorola, Dr. Selker has wired the car with a network of cameras and sensors, all held together with black electric tape and Velcro. The aim is to turn the car, which Chrysler has been showing to journalists for the past few months, into a virtual driving coach -- an electronic back-seat driver turned front-seat friend -- to help reduce driver distraction.

The M.I.T. project is only one of many efforts by researchers and auto manufacturers to improve auto safety by getting rid of distractions. Just a few years ago, aggressive driving and road rage were blamed for most accidents, but now distraction has become the *bête noire* of safety experts. A study for the AAA Safety Foundation, conducted by the Highway Safety Research Center at the University of North Carolina and released this fall, found that distracted driving is responsible for about a quarter of all accidents. Or, as Jeff Greenberg, a safety researcher at Ford Motor Company, in Dearborn, Mich., said, "talking to your wife can kill you."

While cell phones have been singled out as a major cause of distraction-related accidents, the biggest diversions are fairly low tech, according to Jane Stutts, the author of the AAA study. Outside stimuli -- billboards or accident scenes that inspire rubbernecking -- accounted for almost 30 percent of crashes; adjusting the radio or CD player, 11.4 percent; talking with passengers, 10.9 percent; adjusting climate control, 2.8 percent; eating or drinking, 1.7 percent. Cell phones accounted for just 1.5 percent of accidents, the study found.

"Different age groups appear to be distracted by different things," Dr. Stutts said. Drivers under 20 were especially likely to be distracted by tuning the radio or changing CD's, while young adults (20 to 29) seemed more distracted by other passengers. Drivers over 65 were more distracted by objects or events happening outside the vehicle.

In almost 90 percent of these cases, just a one- or two-second warning could have averted a crash, researchers estimate.

All of which has Dr. Selker and his team monitoring everything from a car's rear-view mirror (a driver who rarely glances at it is prompted by a flashing light) to its carbon monoxide levels (if carbon monoxide builds up, an alarm goes off before drowsiness can set in). Some of the innovations reduce the driver's responsibilities. Water vapor sensors, for instance, activate the defroster when necessary, and the audio speakers are so tightly focused that the driver doesn't have to be bombarded by the latest OutKast single, even if his passengers want to be. Forget to signal a turn? A voice reminds you to do so next time.

At I.B.M., researchers are working on a different vision of the automotive future, called Smart Passenger. It focuses on using voice commands to operate the radio, get directions, answer the phone -- any task that could take a driver's attention away from the road. Voice recognition systems have a mixed record in the noisy environment of the automobile, but I.B.M. is looking to supplement its version with audio visual speech recognition (A.V.S.R.), essentially video images linked to a computer that reads lips. Cameras focused on the driver's mouth do the lip reading; I.B.M.'s Embedded ViaVoice does the speech recognition.

The I.B.M. car also develops a profile for each driver and keeps him alert by starting conversation. A slow or incorrect response that suggests the driver is drowsy or distracted would, for example, trigger the car to open a window or even send a spray of cold water to get his attention.

Not everyone thinks that fighting distraction this way makes sense. "What strikes me about the IT and other high-tech cars is that they are predicated on the car having a whole lot of processing power that somehow needs to be made use of," said Gary S. Vasilash, the editor in chief of Automotive Design & Production, a trade publication. Better education and less tolerance of reckless behavior on the roads would be simpler ways to fight driver distraction, he said.

As part of its distraction research, Ford has built a simulator like the ones used to train pilots, with the goal of fine-tuning current safety systems. Ford's Virtex (Virtual Test Track Experiment) is a 20-foot sphere containing a Taurus body perched on six hydraulic columns so it tilts and shakes like a car on the road. The test subject sees a virtual road (modeled on a real stretch of I-94) and is asked to push a button when a car suddenly veers into the lane in front of him; "wind gusts" push the test car out of its lane or phone calls arrive just as another car pulls ahead. Sensors in the simulator measure hand movements and a glasses-like device tracks eye movements.

Tests in the Virtex, according to Mr. Greenberg, the lab director, showed that younger drivers (ages 16 to 18) tended to do worse than older ones (25 to 66). In one test, which required drivers to retrieve a voicemail using a hand-held device while cars swerved toward them or stopped short in front of them, younger drivers failed to respond to the dangerous situation 50 percent more often than older ones, largely because younger drivers followed the vehicle in front of them too closely.

IN the M.I.T. car, the two most important elements, one on either side of the steering wheel, are the master alarm and the "busy button." The idea for the master alarm comes from airplane cockpits. If something goes wrong, the alarm goes off, and the driver, like a pilot, pushes it to find the specific problem. The busy button is designed to thwart information overload -- putting incoming phone calls or other distractions on hold until a

driver can deal with them.

Chrysler is already using some of the M.I.T. research to create something it calls the Driver Advocate, a three-button steering wheel-mounted system for managing the driver's workload. Now being tested on a Town and Country minivan, it enables the driver to control the inflow of information from cell phones, navigation systems and warning messages. The company said parts of the new technology could be in a production car in a few years.

Still, as enthusiastic as he is about the test car, Dr. Selker most often makes his way to work through the narrow streets of Cambridge, Mass., on a bike. "The signal I'd like most," he said, "is a warning light on every car to let bikers know when its door is about to open."

**Correction:** January 9, 2004, Friday An article on Dec. 26 about new devices to make driving safer misstated the name of the sponsor of a long-term study about the effect of distractions. It was the AAA Foundation for Traffic Safety, not the AAA Safety Foundation. The article also misstated the issue date of some conclusions. It was in 2001, not 2003. The article misattributed a statistic on accidents caused by distractions. It was from the National Highway Traffic Administration; Jane Stutts, the author of the AAA study, cited it in her work.

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