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Human factors research supports the research being done under all four other IVI platforms (light, commercial, transit, and specialty vehicles). When designing and testing IVI technologies, a thorough understanding of driver performance and behavior is required to help maximize system effectiveness and minimize driver distraction. Such in-vehicle technologies include vehicle collision warning systems, wireless telephones, in-vehicle computers, route guidance/navigation systems, etc. Further information on the human factors program is available at: <http://www.its.dot.gov/ivi/ivihf/index.html>.

Wireless Phone On-Road Study: In this quarter (April – June, 2002), a study at the Vehicle Research and Test Center (VRTC) on the effects of hand-held versus hands-free phones on drivers behavior neared completion. Vehicles were equipped to monitor 10 members of the general public during their normal driving. Preliminary findings suggest that drivers have difficulty with hands-free phones due to complications with speaking and being heard by the device. Some drivers chose to bypass voice dialing, which indicates that drivers find hands-free dialing inconvenient or difficult. Subjects looked forward more during handheld conversation, possibly reducing driver awareness of sudden changes in peripheral vision. Hands-free conversation is associated with more time spent looking left and right. However, significant glance time was spent looking at the phone during hands-free conversation.

Voice Interface Test Track Study: Another VRTC project related to driver distraction effects also neared completion this quarter. This study is being conducted cooperatively between the National Highway Traffic Safety Administration (NHTSA) and Transport Canada. A comparison of voice versus manual interfaces was studied for phone dialing, radio tuning, and e-mail retrieval. Subjects were asked to drive around a track while performing the aforementioned tasks. The level of distraction was quantified by the driver's ability to follow a car with fluctuating speeds and to respond to flashing lights in his or her peripheral vision every few seconds. Overall, the voice-based interface did not have significantly less distraction effects than the visual/manual interface. This could be a result of the voice interface design. Future voice interface research is underway to examine how distraction measures are influenced by various parameters, such as menu length, menu depth, message length, and voice quality.

The results from the above two projects were presented at the driver distraction session of the Society of Automotive Engineers (SAE) Government Industry Meeting. More information about these projects may be found at the following website: http://www-nrd.nhtsa.dot.gov/pdf/nrd-01/SAE/SAE2002/RGarrott_distract.pdf.

Utah 511 Review: In another related study, the human factors team reviewed a real-time traffic information telephone hotline called "Utah 511" to identify potential safety concerns. This quarter, some preliminary observations were made. Drivers unfamiliar with the system are required to listen to about 20 seconds of introductory material before requesting conditions on a particular road. Further interaction with the system can take several minutes depending on the number of segments and reportable items per segment. In terms of understandability, the 511 voice was very clear, although the system did not always understand commands coming from

the speakerphone. In reporting incidents (e.g., accidents and construction work areas), little or no indication of the severity of the problem or impact on traffic delay was provided. Additionally, no “repeat” option is available for drivers who might not have understood the information the first time around; the driver would have to restart from the beginning of the menu.

Naturalistic Driving Study: Virginia Tech is equipping 100 cars with devices to record driver behavior and performance in pre-crash and near crash situations. The experimental design was completed this quarter, and the scope of the project has been expanded to include how air-bag activation affects drivers, how drivers interact with heavy vehicles, and how headlight glare affects drivers.

In-Vehicle Display Icons: There are many devices in cars designed by many different vendors. The objective of this project is to facilitate the standardization of in-vehicle display icons to help minimize confusion. This quarter, Battelle is finalizing their report.

Driver Workload Metrics: This initiative is another project under CAMP. The objective is to determine which devices should be accessible to drivers while they are driving. The idea is to develop valid measures of distraction that can be used by manufacturers to make decisions regarding what devices should be operable while the vehicle is in motion. An annual report is coming out shortly.