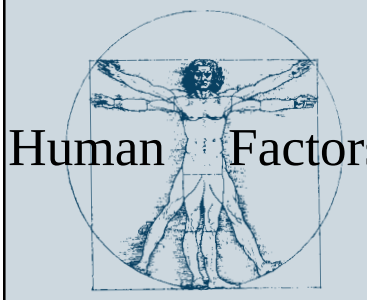
Summary Report



The Human Factors Research Program addresses human performance-related issues that affect highway system design. Current human factors research focuses on Highway Safety and Intelligent Transportation Systems (ITS).

FHWA is placing special emphasis on the trend of the United States to increase numbers of older drivers and implications of this trend on highway safety and ITS design. Human factors research products include highway system design guidelines and handbooks based upon empirical human performance data collected in the laboratory and in controlled, on-the-road tests.

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Advanced Traveler Information System Capabilities: Human Factors Research Needs

Introduction

As part of the U.S. Department of Transportation's Intelligent Vehicle Initiative (IVI) program, the Federal Highway Administration investigated the human factors research needs for integrating in-vehicle safety and driver information technologies into usable systems that provide manageable information to the driver. This investigation included a workshop in December 1997 for IVI stakeholders (i.e., universities, automotive manufacturers, vendors, and contractors) and a preliminary assessment of infrastructure and in-vehicle requirements. This flyer summarizes the identified human factors research needs for advanced traveler information system (ATIS) capabilities, one of five configurations of in-vehicle safety and driver information systems. A complete review of the research needs for all five configurations can be found in the final report (FHWA-RD-98-178). These configurations were developed based on: (1) identified safety and driver information systems and functions, (2) a thorough literature review of past research and research gaps related to these in-vehicle systems, and (3) combining logical groups of basic and advanced safety and driver information functions in passenger cars, commercial trucks, and transit vehicles such as buses. Each candidate configuration was meant to provide clear safety benefits to the driver as well as a solid technical foundation for the system configurations for the IVI. The goal of the configuration described below is to provide ATIS capabilities and basic collision warning to the three vehicle types.

Advanced Traveler Information Systems Configuration

Basic Collision Warning Technologies: Adaptive Cruise Control; Rear-End Collision Avoidance; Obstacle/Pedestrian Detection.

Basic Traveler Information Devices: Navigation/Routing; Real-Time Traffic and Traveler Information; Automatic Collision Notification.

Driver Convenience Devices: Comfort and Convenience (Cellular Telephones, Fax, E-mail); Vehicle Diagnostics; Automated Transactions.

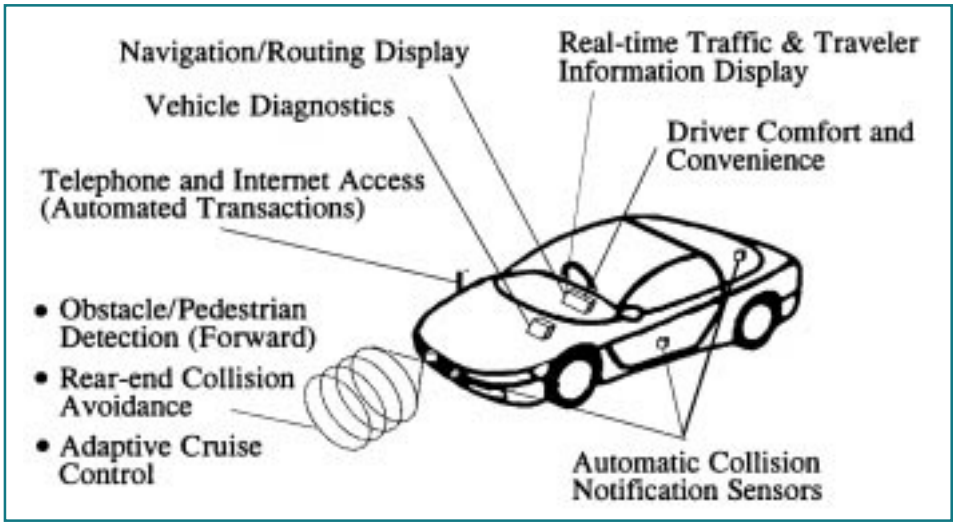

Figure 1. Advanced Traveler Information Systems Configuration

Human Factors Research Needs

A primary research issue for this IVI configuration will be to ***assess how an integrated information system that includes both routing and convenience devices affects driver performance and behavior***. How will such a system affect driver attention to the primary driving task; how can system design be optimized to improve driver performance? A critical issue associated with this research will be to identify the relative priorities associated with IVI information elements. Initial research findings on the effects of convenience devices, such as cellular telephones on driving performance, suggest that such devices may present a safety-reducing distraction to the driver. The key objectives of this research are: (1) to review relevant efforts on multi-task performance, attention theory, and driver/behavior performance; (2) to identify the workload demands associated with this IVI configuration; and (3) to develop tools and design guidelines that can support safe and effective IVI design.

A secondary issue is related to the ***special design requirements of older drivers.*** While older drivers present design challenges for all the candidate configurations, this particular IVI configuration has some unique characteristics due to the number of in-vehicle information system devices in the configuration and the presence of convenience devices. In particular, this IVI configuration represents a "cognitively complex" driving environment and older drivers generally perform poorer in such environments. For example, they generally have poorer perceptual abilities and slower reaction times than younger drivers. In the driving environment, these problems have manifested themselves in a number of ways, including longer glance times to displays, more variability in steering control, and more navigation errors. Key objectives of this research include: (1) identifying the information needs of older drivers; (2) developing driver-vehicle interface guidelines for the integration of collision avoidance systems, routing, and convenience information that specifically address the requirements of older drivers; and (3) identifying the design preferences of older drivers for the IVI.

Research Directions From Configuration #3

The following research directions were identified from this configuration:

- Determine how an integrated ATIS affects driver performance and behavior.
- Identify relative priorities of the various ATIS information elements.
- Assess ATIS information requirements and user preferences for older drivers.
- Develop design guidelines for integration of ATIS functions and collision avoidance systems.

For More Information

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