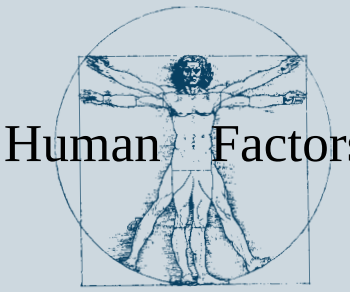
Summary Report



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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Integrated Capabilities in Heavy Vehicles: Human Factors Research Needs

Introduction

As part of the U.S. Department of Transportation's Intelligent Vehicle Initiative (IVI) program, the Federal Highway Administration (FHWA) 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 integrated in-vehicle systems for Commercial Vehicle Operations (CVO), 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 an integrated set of Intelligent Transportation System (ITS) technologies for drivers of commercial or heavy vehicles.

Heavy Vehicle Configuration

ITS Collision Warning Systems for Heavy Vehicles: Road Departure Collision Avoidance, Vehicle Stability and Warning Assistance, Driver Condition Warning, and Low-Friction Warning and Control Assistance.

ITS Information Systems for Heavy Vehicles: Driver Comfort and Convenience, Vehicle Diagnostics, Cargo Identification, and Automated Transactions.

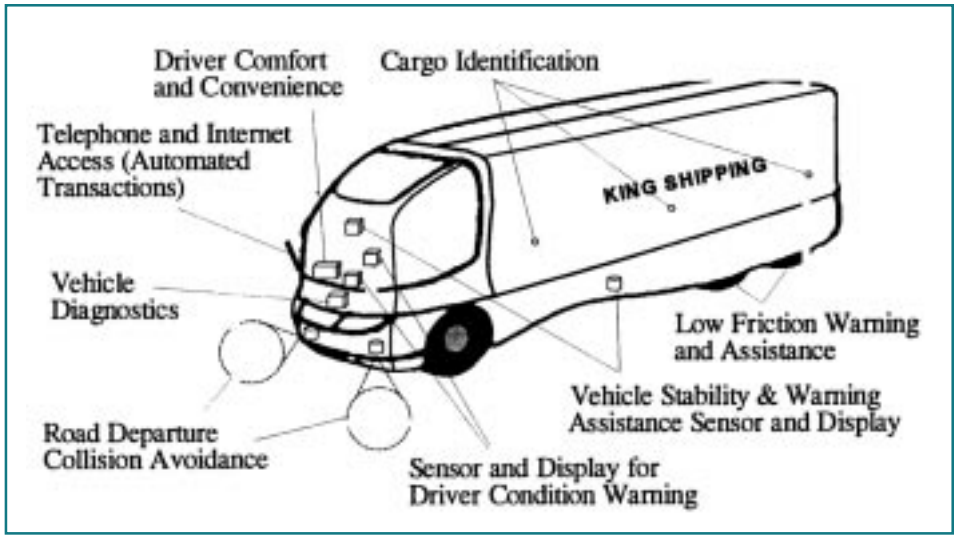

Figure 1. ITS Capabilities for Heavy Vehicles Configuration

Human Factors Research Needs

A primary research issue for this IVI configuration will be to ***determine the most effective methods of integrating IVI information with existing dashboard displays and roadside signs.*** Currently, heavy/commercial vehicle drivers are provided with a number of displays dealing with vehicle status, cargo parameters, and trip requirements. More recently, a number of additional display/control devices providing communications capabilities with dispatch are also being used. In addition, truckers—perhaps more so than the average commuter—must pay close attention to service, directional, and regulatory signs along the highway. In particular, IVI design must make sure that displays and prompts do not conflict. Key objectives of this research include: (1) identifying CVO driver information requirements, (2) identifying the most appropriate information source(s) for this information, (3) investigating opportunities for multifunction displays and controls, and (4) developing design guidelines for coordinating IVI and traditional CVO information.

A secondary issue involves ***determining information priority within the CVO environment.*** While this is an important issue for the IVI in general, it is particularly important for the CVO environment due to the high workload and the varied nature and volume of information presented to the CVO driver. Key objectives of this research include: (1) identifying priorities among CVO information elements, and (2) developing standards and guidelines for consistent timing, formats, and locations of CVO/IVI driver information.

Another secondary issue involves ***assessing the effectiveness of driver condition warning devices.*** Much remains to be learned about the relationship between driver fatigue and driver performance, as well as driver reactions to "drowsy driver" warning devices. Key objectives of this research include: (1) determining if alertness can be restored or fatigue ameliorated by warning systems, (2) identifying the range of feasible warning options, and (3) testing these options to determine the most effective approach.

Research Directions From Configuration #4

The following research directions were identified from this configuration:

- How to integrate new IVI-related technologies with existing dashboard displays and roadside information.
- Identify and prioritize CVO driver information requirements and the most appropriate information sources to meet these needs.
- Determine appropriateness of multifunction displays and controls for presenting IVI-related information to CVO drivers.
- Investigate the effectiveness and range of warning options of "drowsy driver" warning devices for restoring driver alertness.

For More Information:

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Issued November 1998 Publication No. FHWA-RD-98-187