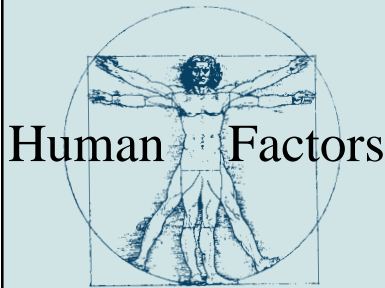


Summary Report



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 ITS CAPABILITIES IN TRANSIT 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 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 transit vehicles, 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 Systems (ITS) technologies for drivers of transit vehicles.

Transit Vehicles Configuration

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

ITS Technologies for Transit: Tight Maneuver/Precision Docking, Transit Passenger Monitoring, Transit Passenger Information, Location-Specific Alert and Warning, Vehicle Diagnostics.

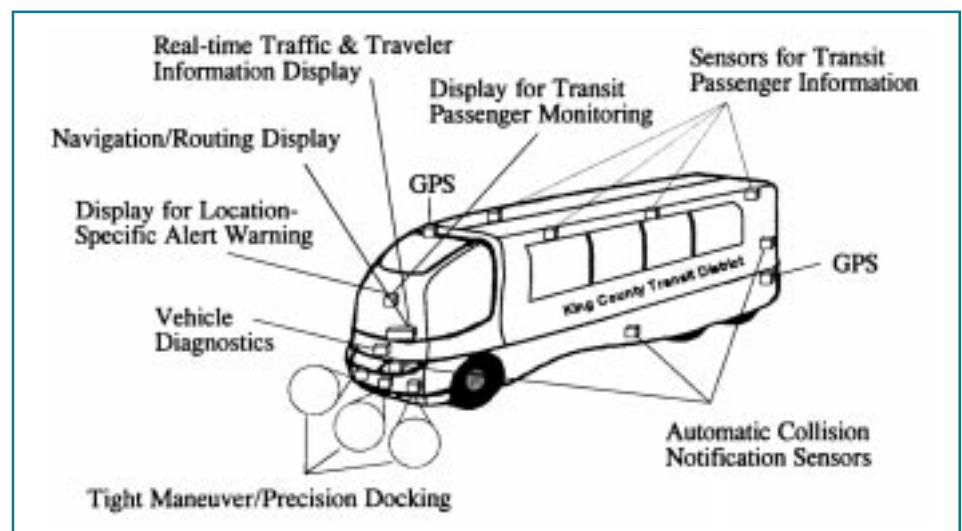


Figure 1. ITS Capabilities for Transit Vehicles

Human Factors Research Needs

A primary research issue for this IVI configuration will be to **conduct a series of human factors analyses to better understand the transit environment.**

No human factors research that we are aware of has examined the driver capabilities, tasks, driver messages, workload, or physical environment associated with transit research statements generated during the recent human factors workshop for the IVI. Basic information on the transit environment is crucial to developing an understanding of how to integrate IVI technologies and driver information systems into the transit environment. Key objectives of this research include: (1) developing driver profiles for transit operations to include data on issues such as driver skills, training, and perceptual/cognitive/motor abilities; (2) conducting a function/task analysis of relevant transit operations; (3) identifying driver information needs based on relevant transit tasks; and (4) identifying methods of integrating IVI technologies into the transit environment.

A secondary issue involves **determining the frequency, density, and timing for IVI information that is presented to the transit driver.** Transit operations are different from commuter driving or commercial driver operations driving in a number of ways, but the most important difference may be the number of planned stops and opportunities for interruptions (e.g., from passengers asking questions or needing assistance) associated with transit operations. These issues present both opportunities and challenges for the IVI. In particular, there is a crucial need to develop IVI messages and presentation formats that “fit” this environment and do not confuse or overwhelm the driver. Key objectives of this research include: (1) identifying requirements for message timing—what is the proper interval between message presentation and performance of a related task?; (2) identifying requirements for repeating messages—how often should messages be repeated to support successful task performance?; and (3) identifying limits on message density—how much information can effectively be presented within a specific time period or within a physical area?

Research Directions From Configuration #5

The following research directions were identified from this configuration:

- Conduct fundamental human factors analysis and research on transit driving tasks and the environment, including driver profiles, task analysis, driver information needs assessment, and driver workload.
- Determine how to integrate IVI technologies and driver information systems into the transit driving environment while maintaining a manageable workload for the driver.
- Develop IVI messages appropriate for the transit environment, with special attention to message timing, message repetition issues, and message density limits.

For More Information

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