



FAST LANE

Exploring Human Behavior

Turner-Fairbank

Highway Research Center

Safety R&D Program

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Meet the Team

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Source: FHWA.

Figure 1. Photograph. An articulated child pedestrian dummy configured for thermal testing for the Enhancing VRUs project.



Source: FHWA.

TRAVEL LANE

Current Research:

- **Enhancing Vulnerable Road User (VRU) Detection and Volume Data Through Advanced Imaging Techniques** has completed data collection at the Turner-Fairbank Highway Research Center (TFHRC). This study used different VRU types, including an articulated child pedestrian dummy ([figure 1](#)), a human pedestrian, an electric scooter rider, a bicyclist, and a wheelchair user—during both daytime and nighttime. Led by [Laura Mero](#), this project seeks to evaluate the ability and appropriateness of infrared thermal sensors to detect VRUs and their count data.
- **Research Key Automated Vehicle (AV) Safety Issues for Transportation Systems Management and Operations (TSMO)** has finished data collection for the *Response to Emergency Vehicles When Driving in a Mixed Vehicle Fleet* study. This study used the Federal Highway Administration (FHWA) Highway Driving Simulator (HDS) to evaluate the potential influence of cooperative technology and vehicle automation on a driver's response to emergency vehicles. This project is led by [Michelle Arnold](#).
- **Investigate Key AV Human Factors Safety Issues related to Infrastructure** has finished data collection for the *Driver Interaction With Partial Driving Automation Technology When Passing Bicyclists in a Shared Use Lane* study. This study, which took place in the FHWA HDS, explores the impact of vehicle automation on drivers' interactions with VRUs. This project has also finished data collection for the *Exploring the Effects of Vehicle Automation and Cooperative Messaging on Mixed Fleets Eco-Drive* study. This study evaluates the effects of in-vehicle messages, AVs, and adaptive cruise control on driver behavior ([figure 2](#)). This project is led by [Jesse Eisert](#).
- **Human Factors Issues Related to Truck Platooning Operations** has concluded data collection for both the first and second FHWA miniSim™ experiments, which evaluated the design of truck platooning signs. This project, led by [Michelle Arnold](#), is investigating drivers' behavior and reactions to simulated automated truck platoons in various conditions.
- **Evaluation of Additional Alternatives and Arrow Sizes for Overhead Arrow-Per-Lane (OAPL) Guide Signs**, led by [Laura Mero](#), has concluded data collection and is undergoing data analysis. This project examines partial-width OAPL sign designs and arrow sizes and the effects these characteristics have on driver comprehension.
- **Evaluation of Aesthetically Treated Crosswalks**, project has completed data collection for both pedestrian and vehicle studies. This project looks to determine the extent, if any, aesthetically treated crosswalks have on the perception and behavior of road users (drivers and pedestrians). This project is led by [Ann Do](#).

THE ROAD AHEAD

Looking forward

■ Human Factors Virtual Reality (VR) Lab Upgraded with New VR Equipment.

The Human Factors Team has procured new VR equipment for TFHRC's onsite VR Lab, including an omnidirectional treadmill and VR headsets that will allow human pedestrian participants to walk over larger areas in VR-based simulation. The team plans to use the treadmill to conduct pedestrian safety research in the future. For more information on this upgrade, contact [Brian Philips](#).

■ Automated Road Transportation Symposium 2022 (ARTS22).

Members of the Human Factors Team will attend, in-person, ARTS22—a Transportation Research Board (TRB) annual conference, held July 18–21, 2022, in Garden Grove, CA. The team will present on the key human factors safety issues associated with operating AVs in different infrastructure situations, as well as under TSMO use cases.

■ Intelligent Transportation Systems (ITS) World Congress 2022.

Members of the Human Factors Team will demonstrate recent research with VRU safety using an articulated pedestrian dummy, associated infrastructure, and vehicle-based sensors. The demonstration will also feature potential research with the team's VR bike simulator.



Source: FHWA.

Figure 2. Photograph. In-vehicle signal and display control system for Exploring the Effects of Vehicle Automation and Cooperative Messaging on Mixed Fleets Eco-Drive project.

MILEPOSTS

Recent activity

■ Ensuring Cooperative Driving Automation (CDA) and VRUs' Safety Through Infrastructure.

The research team on this project, led by [Jesse Eisert](#), has completed their work, and the literature review has entered the publication process. This project examined the potential impact of automated driving system (ADS)-equipped vehicles and CDA technology on VRU safety, and the potential role of infrastructure for safe interactions.

■ 2022 TRB Annual Meeting.

Members of the Human Factors Team attended the 2022 TRB meeting, in-person and virtually, held January 9–13, 2022. The Human Factors booth provided information about ongoing research and featured a presentation of a pedestrian dummy riding the virtual reality bike simulator (figure 3).

■ Final Presentation for Driver Acceptance of Vehicle Automation–Function-Specific Automation (Level 1) Applications.

On January 4, 2022, the Human Factors Team gave the final presentation for the Driver Acceptance of Vehicle Automation–Function-Specific Automation (Level 1) Applications project, which was led by [Brian Philips](#). The project included a series of experiments aimed at assessing drivers' acceptance of, and safety issues related to, various advanced driver assistance systems.

■ VR Presentation to the Human Factors Coordinating Committee (HFCC).

On February 23, 2022, [Jesse Eisert](#) presented, virtually, the Human Factors VR capabilities and potential VRU research ideas using VR at the HFCC meeting.

MILEPOSTS *(continued)*

■ Traffic Control Device (TCD) Consortium Pooled Fund Study (PFS).

Led by [Laura Mero](#), the TCD PFS 2022 first quarter and second quarter meetings were held on February 24, 2022, and June 2, 2022, respectively. The third quarter TCD PFS meeting will be held, in-person, September 2022, in San Diego, CA.

■ TFHRC ITS America Leadership Visit.

On March 15, 2022, ITS America leadership visited TFHRC to learn about ongoing AV research. The Human Factors Team demonstrated cutting-edge VRU safety research using in vehicle sensors and a state-of-the-art articulated pedestrian dummy at TFHRC's smart intersection.

■ National Committee on Uniform Traffic Control Devices (NCUTCD) Presentations.

On April 27, 2022, [Jesse Eisert](#) presented, virtually, an overview of the Human Factors Team's pedestrian and bicyclist VRU projects at the Pedestrian Joint Task Force meeting. In June 2022, [Laura Mero](#) also presented an update of the VRU projects at the Pedestrian Joint Task Force meeting and an overview of relevant FHWA research at the Research Committee meeting.

■ Highway Driving Simulator Visual Upgrade.

Renovations for the FHWA HDS at TFHRC are currently underway and anticipated to be completed by late summer 2022. The new system will use the latest upgraded hardware and software to produce world class realistic simulation scenes to enable the next generation of human factors driving research. Contact [Brian Philips](#) for more information on this project.



Figure 3. The Human Factors Team's setup at the 2022 TRB Annual Meeting with an articulated dummy and virtual reality bike.

Source: FHWA.

