

Updates for TRB 2021 from FHWA Safety R&D

HRDS02 (Yusuf's Projects)

- **TRIP Use and Instantiation** - The current two-year project is leveraging internal and external subject matter expertise for the following tasks:
 1. Testing of following four use cases for Safety and Operations research:
 - a. Measuring and Monitoring Operational Performance of TSMO Strategies.
 - b. Identifying Secondary Crash Occurrence and Contributing Factors.
 - c. Non-Recurring Congestion Monitoring and Analysis.
 - d. Pedestrian Activity and Safety
 2. Instantiating TRIP on Cloud Platform and STAC server
 3. Documenting the migration path needed to increase TRIP's TRL level from 5 to 8

- **Development of two Realistic Artificial Datasets (MIMIC & DREDGE)** - Realistic artificial datasets (RAD) with predetermined safety relationships built into them aim to bring greater fidelity to models of locations and crash occurrences. Using RAD as a testbed, models can be tested to determine its reflection of underlying cause and effect relationships.

Two RADs are being developed.

1. Multidisciplinary Initiative on Methods to Integrate and Create realistic artificial dataset (MIMIC)
 - a. Machine learning and statistical methods will be used to create artificial datasets for ramp terminals and speed change lanes for diamond interchanges.
 - b. Realistic driving simulator test beds will be created using the second Strategic Highway Research Program (SHRP2) Naturalistic Driving Study (NDS) data.
2. Development and Application of a Disaggregate Realistic Artificial Data Generator for Computationally Testing Safety Analysis Methods (DREDGE)
 - a. Trip-level (Microscopic) and Segment-level (Macroscopic) RAD generation framework will be developed for two use cases: Vehicle accidents and Pedestrian accidents.

HRDS10

- Annual IHSDM update in Sept 2019

HRDS 20

- HSIS Excellence in Safety Data Contest accepting application from students
 - ITE student chapters have been contacted.

- HSIS deployed social media campaign announcing data contest.
 - First student data requests have been received.
- Intersection Angle Final Report
 - HRT-20-067 has been released by Public Affairs.
 - FHWA Publications will post to the FHWA website in the coming days.
- PBCAT (Pedestrian and Bicycle Crash Analysis Tool)
 - Version 3 development is underway.
 - In mid-to-late February 2021 beta testing will occur.
- ELCSI-PFS recently Published Documents for:
 - HRT-19-036; Report _ *Safety Evaluation of Flashing Yellow Arrow at Signalized Intersections*
 - HRT-19-035; Techbrief _ *Safety Evaluation of Flashing Yellow Arrow at Signalized Intersections*
 - HRT-20-052; Report_ *Contributing Factors for Focus Crash and Facility Types*
 - HRT-20-053; Report_ *Contributing Factors for Focus Crash and Facility Types: Quick Reference Guide*
 - HRT-20-061; Report_ *Developing Crash-Modification Factors for High-Friction Surface Treatments*
 - HRT-20-062; Report_ *Developing Crash-Modification Factors for High-Friction Surface Treatments: Friction Change Report*
 - HRT-20-069; Report _ *The Development of Crash Modification Factors: Highway Safety Statistical Paper Synthesis*
- *SHRP 2 Naturalistic Driving Study Pooled Fund: Advancing Implementable Solutions*, <https://www.pooledfund.org/Details/Study/613>
 - Utah DOT is new partner (states now include: AL, CT, IA, IL, UT, NV, WA) and three FHWA Offices (HRDS, HEP, HOP).
 - Six projects are underway:
 - *Verification and Calibration of Microscopic Traffic Simulation Using Driver Behavior and Car-Following Metrics for Freeway Segments*
 - *Incorporating the Impacts of Driver Distraction into Highway Design and Traffic Engineering*
 - *Freeway Guide Sign Performance at Complex Interchanges: Reducing Information Overload*
 - *Investigating How Multimodal Environments Affect Multitasking Driving Behaviors*
 - *Validation of Performance-Based Design*
 - *Developing Speed Crash Modification Factors (CMF) Using SHRP 2 RID Data*
 - 5 of the 6 are in their Phase 1/ feasibility stage and will be presenting results to the TAC between Feb-May 2021. If approved by TAC – the projects will proceed to final phase – with results due 9/ 2022.
 - One project – *Verification and Calibration of Microscopic Traffic Simulation Using Driver Behavior and Car-Following Metrics for Freeway Segments* –

started earlier than the rest and had their TAC review meeting in Dec 2020. The TAC approved the project to move to the final phase. Results due 9/2022.

- Contact Charles Fay charles.fay@dot.gov)

HRDS30

I have given several updates at TRB committee meetings that has mainly focused on the work we have been doing regarding AV human factors and safety issues, with projects that use simulator and field experiments. See the descriptions below. (This is what the human factors committee I involved with primarily want to hear about.) I also talked about how we are doing remote monitoring using the FRVs (Field Research Vehicles) to collect data in the field, while keeping people safe and socially distancing during the Covid-19 health emergency.

- **Driver Acceptance of Vehicle Automation – Function Specific (L1 – L2) Automation Applications**
 - The goal of this research is to increase our understanding of human factors safety and acceptance issues when using vehicle automation. Data from driving simulator and on-road experiments will help to build a more complete picture of how drivers use, accept, and adapt to vehicle automation technology. We have conducted experiments on lateral control strategies, and a field study to look at gap acceptance at different speeds, and are currently finishing up a study on driver adaptation to vehicle automation over time.
- **Research Key Automated Vehicle Human Factors Safety Issues Related to Transportation Systems Management and Operations (TSMO)**
 - Develop increased understanding of AV human factors and safety issues related to TSMO. TSMO use cases:
 - Basic Travel (congestion).
 - Work Zones.
 - Weather
 - Traffic Incident Management (TIM)

Developing TSMO strategies that optimize our roadways containing vehicles with Level 2 and 3 automation as well as manual vehicles requires a strong understanding of the human factors issues related to vehicle automation and connectivity and the impact these human factors issues may have during various TSMO use cases.
- **Investigate Key Automated Vehicle Human Factors Safety Issues related to Infrastructure**
 - Increase understanding of AV human factors and safety issues related to roadway infrastructure. For example, how would drivers in an AV interact with a vulnerable road user such as a bicyclist when traveling to and from roads with a dedicated bike lane. We will also be studying the behavior of drivers in a mixed

fleet situation, e.g., a driver in a Level 2 vehicle interacting with a Level 3 vehicle.

- **Human Factors Issues Related to Truck Platooning Operations**
 - Examine road user behavior while trucks are actively platooning: Drivers' responses to merging on and off the freeway, cut-ins, and signs or signals indicating active truck platoon.
- **(Human Factors Truck Platooning Twinning with the EC Ensemble Project)**
 - Similar project in the EU called Ensemble, which is looking at truck platooning issues involved with truck platoons that use different truck manufacturers and employ long platoons as they travel through different countries in Western Europe.
- **ADS for Rural America Demonstration Grant project (U. of Iowa)**
 - ADS for Rural America Demonstration Grant project examines how AVs perform in rural settings. This project also focuses on how ADS can help improve mobility for aging or other transportation-challenged populations in rural communities. This project will unfold across eight different phases that will gradually introduce more complexity (increasing automation, lighting, weather, roadway types, roadway conditions, etc.) to the drives. The end goal of this project is to be able to demonstrate how ADS work in rural settings and share this information across various webinars, knowledge transfers and cloud based data sharing.
- **Ensuring Cooperative Automated Driving System (C-ADS) Vehicles and Vulnerable Road Users (VRU's) Safety Through Infrastructure**
 - This is a new project and is scheduled to start sometime this year. The goal of this two-phase research effort is to identify infrastructure based solutions, countermeasures and strategies to ensure safe interactions between C-ADS vehicles and VRU's in crowded, unpredictable urban roadway environments of the future. The first phase will be a literature review and then the second phase will involve two experiments.

Laura gave an update at the TCD Committee meeting and highlighted two TCD PFS projects (one regarding OAPL and arrow sizing, the other about enhanced conspicuity and retroreflectivity on standard signs). Also highlighted the Evaluating Aesthetically Treated Crosswalks project and Charles' NDS PFS *Freeway Guide Sign Performance at Complex Interchanges: Reducing Information Overload*.