ACS60(5) Truck & Bus **Technology Subcommittee** Meeting

Tuesday, January 12, 2021 | 12:00 pm – 1:30 pm ET | Zoom Meeting

Type of meeting	Annual Subcommittee Meeting
Subcommittee Chair	Abby Morgan, Kittelson & Associates, Inc. (amorgan@kittelson.com)

Meeting Notes

Attendance Sheet

Provided on page 5

Presentation:

"**Vehicles Often Know More about our Roads than We Do**" – presentation by **Dr. Darcy Bullock**, Purdue University (*abstract attached on page 4*)

- Pre-recorded slides and narration "Big Data Applications for Managing U.S. Roadways On-Demand Webinar: Wejo & Purdue University": https://youtu.be/vwpG13VxzAA?t=492
- Correlating Hard-Braking Activity with Crash Occurrences on Interstate Construction Projects in Indiana https://link.springer.com/article/10.1007/s42421-020-00024-x
- I-35 Hard Braking: https://youtu.be/Yr9f26XIfAU
- Hard-braking Event Dataset for I-35, TX: https://doi.org/10.4231/N1FM-2D67
- Hard-braking Events on Indiana Interstates: https://youtu.be/lqxNNbI4Svg
- Hard-braking Event Dataset for Interstate Routes in Indiana: https://doi.org/10.4231/GK80-XG71

Interactive Discussion:

New Technologies & Deployments:

- Standards for Electrification (Asset side and Grid side)
- Availability of charging stations vs. gas stations
- Automated buses are now in development for deployment (like Connecticut DOT working with Robotic Research) and Port Authority of New York and New Jersey considering platooning buses.
- Buses: Recent development of "crowding" information for transit fleets using automated passenger count (APC) and automated vehicle locator (AVL) systems.
- 5G

Hot Topics:

- Data exchange from automated trucks to enforcement personnel (*details on next page*)
- Social supports for people who lose the relatively well-paid driving jobs as autonomy takes hold
- How does in-cab notification not become a distracted driving issue?
- Passive fatigue
- If a truck is in "autonomous driving mode" does that count against a driver's Hours of Operation limit
- How do we get equal application with the innovations that maybe the fleets can employ, but the owner and operator cannot afford?
- Mandatory versus voluntary guidelines in context of Advanced Driver Assist System (ADAS) development and deployment.

- Long haul trucks that get weight approved when they leave a port – why do they have to stop at weight stations?

Research Needs:
- Autonomous vehicle safety concerns and recommended requirements for last-mile delivery (how do AVs access the curb; what happens if an AV cannot access the curb and needs to double-park in a travel lane)
- Data and access management protocol research to control industry/vehicle data use by outside parties
- Solving the human factors of driver-take-over at SAE Level 3 automation. Timing doesn't seem to work.
  - Discussion: not aware of any truck or bus player bringing Level 3 AV to the market.
- SAE Level 4+ autonomous systems and how we get there versus trying to keep the driver in the loop.
- Remote control of vehicles for enforcement / emergencies
- Platooning and Truck AV deployments are mainly going on in the private sector – how do we expand the discussion to include the fleets and technical staff?
- Because event data recorders (EDRs) are not mandated, how can we consistently gather information on vehicle systems from other technologies to use for improvements, accident reconstruction, etc.?
- How do we prepare the assets and grid for vehicle electrification (specifically for truck and bus electrification)

Automated Truck Enforcement:
Will Schaefer notes that the Commercial Vehicle Safety Alliance's (CVSA) Enforcement and Industry Modernization (EIM) committee is tasked with following emerging/latest technologies that impact roadside enforcement inspections (e.g., electrification, aerodynamics, communications, camera monitoring systems, electronic screening/identification/inspections, ADAS, ADS, inspection tools, etc.). The EIM committee in September 2018 appointed a working group, principally members of enforcement to consider how best to inspect trucks equipped with ADS. The CVSA Automated CMV Working Group identified several options depending on level of driving automation and adopted two recommendations, one for ADAS (SAE J3016 Levels 1-3 automation) and the second for ADS (SAE J3016 Levels 4&5 automation). CVSA has publicly posted a working document that outlines its recommendations (https://www.cvsa.org/wp-content/uploads/CVSA-FMCSA-ADS-Report.pdf) and our group continues to consider how the concepts could potentially be implemented. Eventual implementation would require broad support among industry and public sector, including possible rulemakings or industry standards. CVSA is working to share information and coordinate with relevant organizations (e.g., SAE International, Transportation Research Board, Technology and Maintenance Council and others). For more information, visit EIM committee page https://www.cvsa.org/committees/enforcement-and-industry-modernization-committee/ or contact Will Schaefer (301-830-6154 williams@cvsa.org).

TRB ACS60(5) Truck and Bus Technology Subcommittee - Annual Meeting Discussion - 2021

New Technologies & Deployments

Standards for Electrification (Asset side and Grid side)

Automated buses are now in development for deployment (like CT DOT working with Robotic Research) and PANYNJ platooning buses

Availability of charging stations vs. gas stations?

5G!!!

Buses: Recent development of 'crowding' information for transit fleets using APCs and AVLs

Hot Topics

data exchange👍👍 from AV trucks to enforcement personnel (an active CVSA topic)

How do we get equal application with the innovations that maybe the fleets can employ, but the O&O cannot afford?

If a truck is in "autonomous driving mode" does that count against a driver's Hours of Operation limits 👍

Mandatory versus voluntary guidelines in context of ADAS development and deployment.

Social supports for 👍👍 people who lose the relatively well-paid driving jobs as autonomy takes hold

How does in cab 👍 notification not become a distracted driving issue?

Passive fatigue 👍

Long haul trucks that get weight approved when they leave a port why do they have to stop at weigh stations?

Research Needs

Autonomous 👍👍 vehicle safety concerns and rec 👍 requirements for last mile delivery

Remote control of vehicles for enforcement/ emergencies?

Level 4-plus autonomous systems and how we get there versus trying to keep the driver in the loop.

Solving the human 👍 factors of driver-take-over at Level 3 automation. Timing doesn't seem to work.

Platooning and Truck AV deployments are mainly going on in private sector! (so the fleets and tech guys arent talking about it)

Because EDRs are not mandated, how can we consistently gather information on vehicle systems from other technologies to use for improvements, accident reconstruction, etc.?

Data access & 👍 management 👍 protocol research to control industry/ vehicle data use by outside parties

Presentation to TRB Technology Subcommittee on Truck and Bus Safety (ACS60(5))

"Vehicles Often Know More about our Roads than We Do"

Darcy Bullock, P.E.
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Well over 500 billion records a month are generated by connected vehicles in the United states. Within the State of Indiana, over 11 billion vehicle trajectories and 6.5 million hard braking events are monitored each month. The State of Indiana is using these data to monitor interstate slow downs *(1)*, occurrence of hard braking events greater than 0.27g *(2) (3)*, and traffic signal performance *(4)*.

This presentation will briefly summarize a study of 23 construction work zones that covered approximately 150 centerline miles of Indiana interstate roadway in the summer of 2019. The study examined 196,215 hard-braking events over a 2-month period in the summer of 2019 and 3132 crashes over the same 2-month period in 2018 and 2019 for the 23 interstate work zones. The study found there was approximately 1 crash/mile for every 147 hard-braking events in and around a construction site. The R^2 was approximately 0.85. As a result of this study, Indiana developed real time dashboards in 2020 to monitor hard braking events on Indiana Interstates to quickly identify emerging work zone locations that show relatively large number of hard-braking events for further evaluation. https://youtu.be/lqxNNbI4Svg. These real-time monitoring efforts are being expanded in 2021 and ratio of hard braking events to crashes will be updated as the connected vehicle penetration increases.

Fatal Back of Queue Crash Scene in Indiana on I-65 on September 12, 2019 *(5)*.

1. 2021 TRB Annual Meeting Paper: 21-01649
2. 2021 TRB Annual Meeting Paper: 21-01539
3. http://doi.org/10.1007/s42421-020-00024-x
4. 2021 TRB Annual Meeting Paper: 21-01472
5. https://www.jconline.com/story/news/local/lafayette/2019/09/12/fatal-crash-closes-southbound-65-south-lafayette/2299932001/

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