

Center for Safety Equity in Transportation

If you have a right to get there, you have a right to get there safely.

April 2022

CSET Research Showcase

Evaluation of Delivery Service in Rural areas with CAV

Urban areas have been experiencing automated delivery technology, such as several servings of food or a few bags of groceries, with automated (robotic) mini vehicles. The benefits of such automated delivery may be much more significant for rural areas with long distances due to the large potential savings in travel time, travel cost, and crash risk. Compared to urban areas, rural areas have older and more disabled residents, longer distances, higher traffic fatality rates, and high ownership of less fuel-efficient vehicles such as pickup trucks. An evaluation of connected autonomous vehicle (CAV) delivery service in rural areas was conducted. A detailed methodology was developed and applied to two case studies: One for deliveries between Hilo and Volcano Village in Hawaii as a case of deliveries over a moderate distance (~50-mile roundtrip) in a high-energy-cost environment, and another for deliveries between Spokane and Sprague in Washington State as a case of deliveries over a longer distance (~80-mile roundtrip) in a low-energy-cost environment. The delivery vehicles were based on the same compact van: A person-driven gasoline-powered van, a person-driven electric-powered van, and a CAV electric-powered van. The case study results suggest that the CAV van can be a viable option for implementing a delivery business for rural areas based on

the evaluation results that accounted for a large number of location-specific costs and benefits and the number of orders served per trip.

Rural deliveries by CAV will reduce the number of the elderly on rural roads making it safer and reliable for them to access food and supplies from stores. While 100% substitution of trips for groceries and household goods by deliveries is unlikely, because the households likely chain several trip purposes for their (long) trips to the city, lower substitution rates are possible and all of them confer benefits.

Additional potential benefits include lower pollution and lower crash risk on rural roads. Human factors cause approximately 94% of crashes and an additional 2% of crashes are due to issues with the vehicle. About 96% of crashes can be attributed to the responsibility of the driver or the vehicle. This represents a very high potential for crash reduction by Level 4 and 5 CAV which operate within the limits of the law and have the ability to reduce at-fault crashes substantially.

There are positive implications of the COVID-19 pandemic (and similar future threats) in the development and deployment of CAVs. The combination of distancing requirements at crowded stores along with the substantial sensitivity to the disease by older persons and persons a variety of health conditions provide additional impetus for contactless delivery of goods. This bodes well for urban delivery with mini CAVs and rural delivery with Level 4 and 5 van CAVs.

Announcements

CSET has positions open for post-doctoral researchers, graduate and undergraduate students interested in RITI transportation equity and safety research. Please contact us at cset.utc@alaska.edu.

CSET Webinar is scheduled for April 21, 2022 at 11 am PDT. The webinar will be presented by Jacob Garretson, Logan Prescott, and Ahmed Abdel-Rahim of the National Institute for Advanced Transportation Technology (NIATT), University of Idaho. The title of the webinar is "Impacting Traffic Safety Culture among Youth in Tribal and Rural Communities: Opportunities and Challenges." **Please join us on zoom for the presentation.**



Nissan e-N200 van used for the calculations in the evaluation.

CSET has been funded through the 2016 University Transportation Center Program by the US Department of Transportation as part of the FAST Act at approximately \$1.4 million in each of the next five years.

Bus 142 Preservation Project

Bus 142 was made famous by Jon Krakauer's book "Into the Wild" and the 2007 film of the same name. The 1940s-era bus moved into the Conoco Phillips High-Bay facility of the College of Engineering and Mines at the University of Alaska Fairbanks in October 2021. The Bus is being preserved and prepared for permanent display at the University of Alaska Museum of the North. The preservation team will be working with UAF engineering students on design and fabrication of the bus's exhibit space which will be located outdoors, just north of the Museum of the North main building. The bus can be seen in the high-bay from the engineering building atrium weekdays from 8 am to 8 pm. It can also be viewed via a live webcam at https://uaf.edu/museum/collections/ethno/projects/bus_142/livestream/index.php. Additional information about the bus and preservation project can be found online at https://uaf.edu/museum/collections/ethno/projects/bus_142/updates/index.php.



UAF photo by JR Ancheta. Bus 142 is lowered at the Engineering, Learning and Innovation Facility's high bay structural lab for preservation Wednesday, October 6, 2021 at the University of Alaska Fairbanks campus.

CSET Webinars on YouTube

CSET has launched a monthly webinar series to showcase the research completed by the projects funded through CSET. The webinars are recorded and made available through the UAF Arctic Infrastructure and Development (AIDC) YouTube channel, <https://www.youtube.com/channel/UC8MoM5IFHjIDcaKe6XniOVg>. Other video presentations for projects affiliated with previous transportation and infrastructure projects are also available on the channel. Of broad interest are a series of webinars on technical writing that were sponsored by the Center for Environmentally Sustainable Transportation in Cold Climates and a series of two webinars that accompany a manual recently published for the Alaska Department of Transportation and Public Facilities. The manual is titled "ROADS AND AIRFIELDS CONSTRUCTED ON PERMAFROST: A Synthesis of Practice."

Come study with us!

The University of Alaska Fairbanks is actively seeking graduate students interested in research related to rural, isolated, tribal and indigenous transportation safety. Civil engineering is preferred, but also looking for interdisciplinary and Alaskan Native students. For more information contact Nathan Belz at npbelz@alaska.edu.



Roadway damage resulting from thawing permafrost. Photo by Thomas Kinney