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University Transportation Center Newsletter

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PacTrans Convenes Inaugural Meeting of Newly Formed Technology Transfer Advisory Board

As part of PacTrans' continuing effort to strengthen our practical impact on the transportation network and industry, as well as our Technology Transfer Plan, we have been working to set up a new Technology Transfer Advisory Board (T2AB). Last week Thursday, we had the inaugural event of the PacTrans T2AB, hosted on the University of Washington campus.

The advisory board, which is comprised of nine representatives from industry and agencies, joined PacTrans' Board of Directors and staff for a half day introductory meeting. PacTrans Director, Yin Hai Wang, first gave an overview of PacTrans, followed by some time for each of our new advisory board members to share about their experiences and general thoughts on technology transfer. This was followed by a brief presentation by PacTrans Assistant Director, Cole Kopca, on our current technology transfer program as well as our Technology Transfer Plan. The meeting concluded with some frank discussion about how the advisory board can contribute most effectively as well as next steps so the advisory board can hit the ground running!

This board has been established to assist PacTrans in strengthening our overall technology program, help identify new partners and emerging research needs, consult on the potential and technology transfer components of our funded research, and give input into ways we can use technology transfer funds to bring successful research results into practice in a more robust way. PacTrans efforts to meet with this group in person at least one time per year, centered on our spring research and technology transfer workshop, as well as integrating them into various parts of our research and technology transfer processes. We are very grateful to this group of people for their willingness to contribute and look forward to introducing them to you.

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PacTrans Meets with Tulalip Tribe to Discuss Collaboration Opportunities

In July of this year, PacTrans faculty, student researchers, and staff met with several representatives of the Tulalip Tribes to discuss potential opportunities for collaboration. The Tulalip Tribe, which has over 2,500 members, owns roughly 35 square miles of land off of Interstate 5, about an hour North of Seattle, WA.

Directly adjacent to the Interstate, their land contains a large outlet mall and a hotel and casino. These functions bring in significant revenue but also pose major traffic implications for both visitors and reservation inhabitants. The majority of the rest of land considered rural. Many of the roads on the reservation are two lane highways and few have paths or

sidewalks for pedestrians. This poses a problem for residents who commute to the outlet mall or hotel and casino for work without a vehicle. There are also, tribal officials tell us, several complicated intersections that have a high frequency of incidents.

Much of this discussion revolved around these issues and ways that our researchers could assist in better understanding the problems and offering potential solutions to those problems.



PacTrans remembers Brian Dyer, Researcher and Friend



On July 22, 2019, the PacTrans family lost a great researcher and friend, Professor Brian Dyer.

Brian joined the University of Idaho in 1995 as a human factors psychologist in the Department of Psychology. His research focus included mathematical modelling of visual processes, visual psychophysics, and the impact of human factors on automation and highway safety.

Dr. Dyer participated in several PacTrans research projects that modeled passing behavior on two-lane rural highways.

He will surely be missed as a researcher, and as a friend, who had a great passion for life.

Development of UAF Traffic, a Traffic Counting App

Counting traffic at intersections is a valuable tool for communities to enable data-driven improvements. Yet the commercial offerings of counting hardware or software do not address the rich variety of vehicles often seen in rural Alaska. The project designed UAF Traffic, an app easily installed on an Apple iPad to enable anyone to collect traffic data. The project combined gamification and hardware design principles with audio and visual feedback to aide a user in recording data. The potentials for this include offering the software for use in rural communities as part of a potential STEM project.

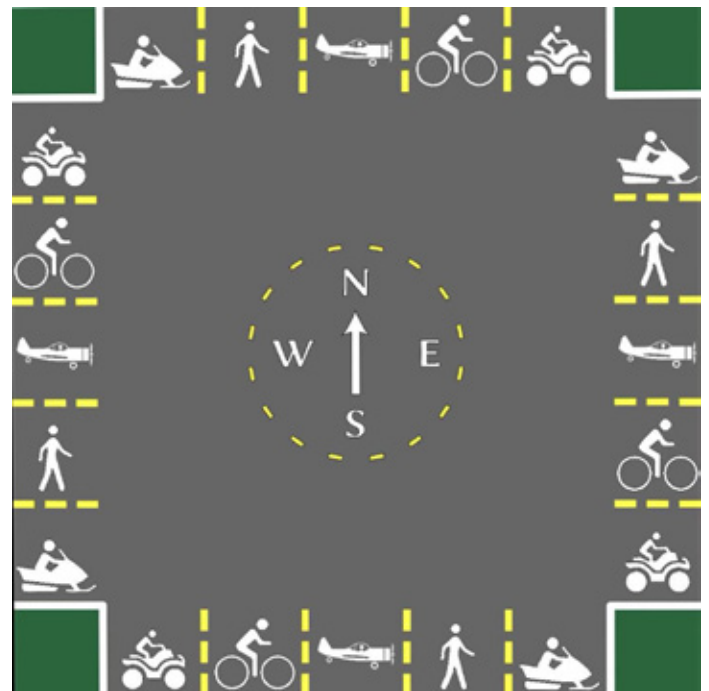
If you live in a large enough community, it is not uncommon to see traffic counting recorders used on the streets. They often use pneumatic road tubes and record measurements such as speed and traffic volume. However, these devices are expensive and do not account for non-traditional traffic such as all-terrain vehicles, or snow machines, perhaps even dog sleds, commonly found at different times of the year in northern rural communities. Low-cost tablet computers enable the design of such tools combined with the power of the Internet.

The project created an application using Apple's Xcode software to create an iOS application and a prototype for a backend data management service that can process uploads of data. Otherwise, the app relies on the Comma Separated Values (CSV) format for enabling the user to process the data in their spreadsheet of choice. The user is able to choose up to five kinds of traffic types from pedestrians to ATVs or even dog sleds. They can also enter additional information like street names or geographical position. The application is able to handle two-, three-, and four-way intersections.

UAF Traffic is not a video game, but the project wanted to embrace gamification, incorporating elements from game design in non-game contexts. The user interface offers audio and visual feedback when moving vehicles towards their intended destination. Adding these components retains its professional polish while offering important feedback to the

user. For example, the app flashes a turn sign graphic on and off to indicate what data point just recorded. This allows the user to undo a mistake and helps them know whether their data saved. Using these design fundamentals enable us to broaden the user base that can use the software.

The normal audience for traffic counting might be a traffic engineer or city planning personnel, but we think that it could be used to introduce high school students to civil engineering and computer science. Our vision is to see how we can incorporate this app as part of a STEM curriculum to teach rural communities how to understand or improve traffic patterns. In particular, we want to show how to use recording, analyzing, and reporting data to make informed decisions on transportation issues. The App is available for free through the App Store for iPhone and iPad.



RESEARCH HIGHLIGHTS

WSU Aviation Biofuel Research Attracts Interest from Delta Air Lines

WSU research on aviation biofuels have grabbed the attention of Delta Air Lines and Northwest Advanced Bio-fuels LLC (NWABF), who have partnered together on a \$2 million investment, looking towards sustainable biofuel refinery in Washington state.

WSU's Northwest Advanced Renewables Alliance (NARA) found that wood waste can be turned into sustainable aviation fuel by using residual forestry, such as limbs and branches, left behind after managed forest harvesting. NARA's research was funded by the U.S. Department of Agriculture's National Institute of Food and Agriculture (USDA-NIFA).

"The announcement by Delta and NWABF, and its investment of \$2 million in participating in the development of a Washington State based biofuel production facility, is further proof of the value of federal research in advancing renewable energy, creating extra income sources for forest product companies, and bringing manufacturing jobs back to rural Washington," Bill Goldner, Biofuels National Program Lead for USDA-NIFA, told the *WSU Insider*.

It was NARA's published research surrounding feedstock supply chain and related infrastructure that influenced NWABF's decision to build a biorefinery in Washington state, specifically.

The American Society of Testing and Materials (ASTM) has recognized two different sustainable aviation fuel production pathways that can be taken using feedstocks, based on NARA's research.

"NARA Project research demonstrates that using forest harvest residuals to produce sustainable aviation fuels, not only reduces emissions from the aviation sector but also provides for much needed jobs in the rural and timber-dependent regions of the Pacific Northwest," Michael Wolcott, WSU Regents Professor and NARA Project Co-Director, told the *WSU Insider*.

Delta Air Lines has said that this study is expected to be completed sometime this year, after which next steps will be considered. Until then, this biofuel will be used by Delta operations in Seattle, Portland, San Francisco, and Los Angeles.

"The NARA Project team is immensely grateful for the partnership with our funding partner USDA-NIFA and the opportunity to do transformational research and educational projects that are helping to create a green economy here in the state of Washington," Wolcott told the *WSU Insider*. "WSU applauds the efforts of Delta and NWABF to use the results of the NARA Project to study the feasibility of producing exceptional quality sustainable aviation biofuels on a large scale from renewable, forestry-based feedstock resources here in Washington State."

OSU Assistant Professor's Paper Accepted for ASCE Construction Research Congress 2020



This past summer, OSU Assistant Professor and PacTrans PI, Joe Louis, along with two other researchers, had their paper, "Mixed Reality-

based Equipment Simulator for Construction Operations," accepted for the ASCE Construction Research Congress 2020. This paper was directly supported by PacTrans.

The primary limitation of using Head Mounted Displays (HMDs) for training heavy equipment operators is the inability to see their own hands inside the virtual environment without requiring special handheld controllers or gloves, which adversely affects the fidelity of the simulated experience for the user and thereby negatively affects transferability of knowledge from the virtual to the real world settings.

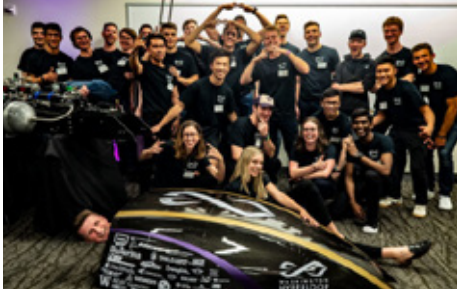
This paper provides an implementation of augmented virtuality to overlay real content in a virtual space by using a green screen-based mixed-reality applications resulting in user being able to see and use only their hands to control equipment through realistic joystick controls as would be found inside equipment.

This paper describes the framework used to create a reconfigurable virtual environment for training equipment operators and system architecture to utilize the growing availability of head mounted displays to create high-fidelity equipment simulators that can be applied to train construction.



STUDENTS

Washington Hyperloop Team places Top 10 at SpaceX Hyperloop Pod Competition



UW's Washington Hyperloop Team earned themselves a spot within the top 10 in the nation at this summer's SpaceX Hyperloop Pod Competition, which took place Sunday, July 21.

This competition aims to encourage students to work on and invest in Hyperloop-style engineering projects, supporting the idea of a world that features high-tech modes of transportation.

PacTrans showed their support by sponsoring the team, which helped them compete in this year's competition.

"As a student run organization, we desperately rely on our generous community to support our dreams and aspirations," the team said in an email. "The support [PacTrans] offered our team is truly impactful and we are extremely appreciative of the time and resources [they] dedicated to help facilitate our team's mission."

UW's Hyperloop team saw its beginnings three years ago with a handful of hopeful students who dreamed of improving transportation. Since then, the group has grown in size and experience, but continues to work towards a future that utilizes new, innovative technology.

"After arriving at the competition, our team was able to effectively demonstrate the constructional fortitude of our pod," the team said in an email. "By the 4th day of competition the members of the Washington Hyperloop team had passed through the rigorous structural, mechanical, and pressure systems

checks, demonstrating sound pod design and functionality.

"After being inspected by SpaceX employees our design was deemed stable to run and our control board was able to effectively generate the functional commands needed to control the pod.

Things took an unfortunate turn for the team, however, when some of their temperature sensors failed to respond.

"Due to the extreme time crunch the engineers were working under, we did not have enough time to replace the broken hardware," the team said in an email.

The UW team ultimately placed behind the University of Wisconsin Badger Loop and the MIT Hyperloop Team, still able to earn themselves both a place within the top 10 for the second year in a row, as well as an Innovation Award.

Congratulations to the team for their success in this competition!

Corvallis Public Works TripGen Work



The ITE OSU student chapter earned the opportunity to assist the City of Corvallis Public Works on their project to audit charges on the City Services bill this Summer. Students collected data on property classification and lot sizes

in Downtown Corvallis, then calculated the trips generated by each of those businesses.

The City of Corvallis Public Works aims to provide efficient service to the entire community while also maintaining reliable public works facilities and systems that place a high value on customer satisfaction, public service, responsible use of resources.

The group is guided by City Council priorities, as well as the Imagine Corvallis 2040 community vision, which is made up of six focus areas that are essential in navigating the future of

their city. These focus areas include supporting and engaging a changing population; being safe, sustainable, and resilient; connecting health care, education, and human services together; having a diversified economy that supports good jobs and livable community; building an identity based on arts, culture, recreation, and celebration; and being a compact, well-planned, livable city.

This was a great chance to help out the community and give members intern level work experience!

STUDENTS

OSU Students Help Clean Up Roadway



The ITE OSU Student Chapter participated in this summer term's Adopt-A-Highway cleanup, and it was amazing! Five students and three faculty members participated on Saturday, Aug. 3 as they cleaned up their two mile section of Highway 34, collecting a total of 20 bags of trash.

The Oregon Department of Transportation (ODOT) provided the trash bags, reflective vests, roadside warning signs, and pickers.

Adopt-A-Highway is a program in which volunteers can help to pick up trash, get rid of weeds, remove graffiti, and maintain existing landscaped areas along highways across the country.

The ITE OSU student chapter has consistently cleaned this section of highway for almost every academic term for years. It has been a great way to serve the Corvallis community, and has become an ITE OSU tradition.

OSU's Dylan Horne at World Scout Jamboree

OSU's Dylan Horne was one of several participants at last summer's 24th World Scout Jamboree, held from July 22 to Aug. 2 at the Summit Bechtel Reserve in West Virginia.

The World Scout Jamboree is a 12 day educational event for young people from different parts of the world with an underlying goal to promote peace and respect between Scouts with diverse backgrounds.

The Boy Scouts of America, Scouts Canada, and Asociacion de Scouts de México hosted the Jamboree, and invited young National Scout Organization (NSO) members between the ages of 14 and 17 to unlock a new world at this year's event.

This year's theme, "Unlock a New World," was created by the Dream Team, made up of representatives from the Jamboree's three host countries. "Unlock a New World," encourages participants to go on new adventures, open up to new cultures, and create new friendships. Leadership development and global citizenship are also emphasized, along with traditional Scouting values, such as conservation and outdoorsmanship.

Horne is a recent doctoral graduate from OSU. He received his PhD in Civil Engineering with a focus on Transportation in Dec. 2019. His dissertation was on Sound and Vibration Analysis of Alternative Rumble Strips.

Horne also chairs the Corvallis Bicycle and Pedestrian Advisory Board, and leads the Benton County Statewide Transportation Improvement Fund committee.

Horne documented his Jamboree experience, which you can read on his blog, freewheelingdylan.wordpress.com.



The Impact of Shared Mobility Options on Travel Demand

On Aug. 23, 2019, PacTrans multi-institution project “the impact of shared mobility options on travel demand” held a workshop at the Puget Sound Regional Council (PSRC). PSRC and WSDOT are co-sponsors of the project. The workshop included almost 30 people, and attracted 16 from PSRC (the Puget Sound Region Metropolitan Organization), 5 from Seattle and one from Washington State DOT. Doctoral Student *Feiyang Sun* first presented the results of analyses of the PSRC Travel Surveys. Survey data showed that the number of ride-hailing and carshared trips tripled between 2015 and 2017. While those using shared mobility options were younger and somewhat wealthier than those who do not, they tend to travel more; use SOV, transit,

and bicycling less; but walk more. The combination of increased overall travel, less SOV and more walking indicates that the new travel options appear to increase accessibility with more sustainable travel modes. However, the lower use of transit and bicycling points to more negative impacts of new mobility options. Shared mobility option users also tend to live in higher development density areas. Additional questions remain, which include further understanding the geographic distribution of shared mobility trips—identifying areas that produce and attract such trips.

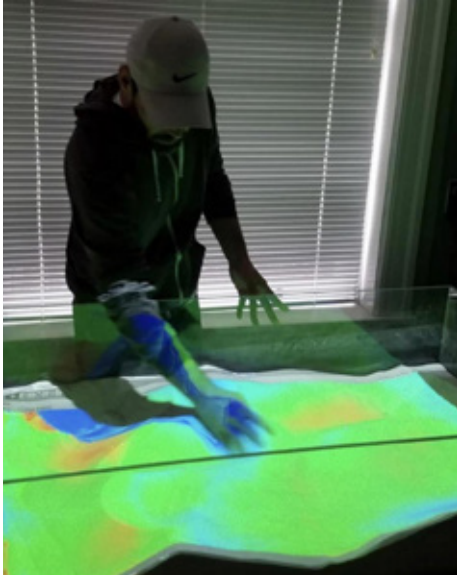
The second presentation was made by Professor Mike Lowry who has been researching bike sharing programs.

His team is in the process of collecting real-time bike and scooter trip data from different cities which some companies (including Lime and Jump) are putting on the web following a request from the North American Bike Share Association. While the data is being “scraped,” the team is preparing tools which will help process the data, identifying, for example, trip origin and destination zones.

The project will continue for another year. Analyses are being conducted of the WA State Commute Trip Reduction program and of travel log data from NIH sponsored study of health and mobility patterns in the Puget Sound.



Application of Augmented Reality and Tangible Interfaces to Minimize Workzone Effects on Mobility through Participatory Planning



OSU Assistant Professor and PacTrans PI, Joe Louis, gave a poster presentation this past summer on his research, titled, “Application of Augmented Reality and Tangible Interfaces to Minimize Workzone Effects on Mobility through Participatory Planning”. This is a PacTrans supported project.

This research uses augmented reality and virtual reality to provide real-time simulations of traffic flow through a work zone. Particularly, a tangible interface will be provided to enable stakeholders to physically interact with various work zone elements to view their effect on commuters in real-time.

A review of the state of the art and practice on the specification and standards for the design of highway work-zones will be performed to identify the key decision points. The Unity game engine will be utilized to create a reconfigurable highway work zone incorporating above decision alternatives and through which the flow of traffic will be simulated.

The Vuforia augmented reality platform will then be used to enable users to create tangible markers to physically manipulate the work zone elements, resulting in changes that are immediately displayed in the ongoing traffic simulation.

Finally the entire simulation will be set up on an AR sandbox interface that utilizes a camera and projector to enable decision-makers to physically affect the simulation by reconfiguring the work zone. It is expected that this research will result in a novel interface to study and design work zones that enables rapid prototyping and simulation of different work zone configurations.

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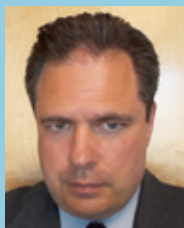


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SAVE *the* DATE

UNIVERSITY OF IDAHO
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OCTOBER 16, 2020

Annual

Region 10
Transportation
Conference

Conference Lodging available in Pullman, WA and Moscow, ID
Email questions to pactrans@uw.edu



About Pacific NW Transportation Consortium

The Pacific Northwest Transportation Consortium (PacTrans) is the Region 10 University Transportation Center (UTC) established in January 2012 with funding from the US Department of Transportation (USDOT).

PacTrans is a combined effort of transportation professionals and educators from the University of Washington (UW), Oregon State University (OSU), the University of Alaska Fairbanks (UAF), the University of Idaho (UI), Washington State University (WSU), Boise State University (BSU), and Gonzaga University (GU). With two active centers focusing on both Safety and Mobility, PacTrans serves as an engine and showcase for research, education, and workforce development in the Pacific Northwest.

The goal of PacTrans is to create an environment where consortium universities and transportation agencies within Region 10 work together synergistically. The PacTrans program

focuses on the USDOT-identified priority of Improving the Mobility of People and Goods. The Pacific Northwest offers a unique blend of opportunities to examine a variety of transportation issues, including those related to urban centers, rural communities, diverse geographic features (e.g., coastal plains, mountain ranges), and a growing population of pedestrians and bicyclists. This diversity makes the Pacific Northwest a natural laboratory in which to investigate transportation solutions that are applicable both locally and nationally.

PacTrans is dedicated to collaborating with transportation agencies, companies, and research institutions to jointly develop safe and sustain-able solutions for the diverse transportation needs of the Pacific Northwest.

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