



PacTrans

ISSUE 23 | WINTER 2019

University Transportation Center Newsletter

IN THIS ISSUE

- 01 2019 Transportation Research Board (TRB) Annual Meeting
- 02 PacTrans Associate Director David Hurwitz Awarded ITE Fellow
OSU's Jason Weiss Receives ACPA's Marlin J. Knutson Award for Technical Achievement
- 04 OSU Associate Professor Shane Brown Assumes the Role of Editor-in-Chief
WSU Graduate Research Assistant Receives Helene M. Overly Memorial Scholarship
WSU's Mehrzad Mehrabipour was Awarded the Helene M. Overly Memorial Scholarship
- 05 "Congestion vs. Connected Autonomous Vehicles" Video Lands OSU Graduate Student A Scholarship
Transportation Forecasting Competition Award
- 06 WSU Graduate Research Assistant Receives Four Awards In 2019
PacTrans Regional Transportation Seminar: Washington's Strategic Highway Safety Plan,
- 07 Engineering Open House that UAF held in February
- 08 PacTrans Seminar Series: Emerging Transportation Technologies & Their Potential Impacts to Traffic-Safety with David Yang
PacTrans Seminar Series: Commercializing UW Research with Laura Dorsey
- 09 Looking to K-12 for the future of transportation
- 10 PacTrans PI Sal Hernandez investigates truck parking shortages
- 11 Researchers from WSU and Stony Brook find a way to decrease both travel time and risk of collision
- 12 WSU research paper sees success in Transportation Research Part B: Methodological
- 14 PacTrans Board

2019 Transportation Research Board (TRB) Annual Meeting

The Transportation Research Board (TRB) 98th Annual Meeting was conducted this past January 13-17, 2019, at the Walter E. Washington Convention Center in Washington, D.C. More than 13,000 professionals within the transportation realm attended this yearly event. Over 5,000 presentations covering the hottest topics relating to this year's theme, *Transportation for a Smart, Sustainable, and Equitable Future*, were presented in almost 800 sessions and workshops.

PacTrans is one of the country's leading University Transportation Centers (UTC), and our participation in the TRB annual meeting - along with other policy makers, administrators, researchers, and

representatives of government, industry, and academic institutions - is an excellent opportunity for us to showcase our abilities, innovation, and research.

PacTrans student and faculty researchers from each of our seven consortium universities - Boise State University, Gonzaga University, Oregon State University, the University of Alaska, Fairbanks, the University of Idaho, the University of Washington, and Washington State University - were in attendance, participated in over 130 events, and submitted more than 100 papers at this year's meeting.

You can read more about PacTrans' involvement in the 2019 meeting in our TRB Newsletter!



PacTrans Associate Director David Hurwitz Awarded ITE Fellow

Associate Professor and PacTrans Associate Director at OSU, David Hurwitz, had the honor of being awarded a Fellow of the Institute of Transportation Engineers (ITE) last winter.

Active members of the ITE that have made meaningful contributions in their field of work and have displayed great leadership within ITE are encouraged to apply to become Fellows. Their eligibility is determined based on the following criteria:

- They have been a Member of ITE for at least five years.
- They have 10 years of professional experience.
- They have attained significant professional stature; this can be through having a license or certification based on education, examination, and experience, or by comparable evidence of professional status as determined by the Board.
- They have responsible charge of important transportation engineering or transportation related work, including scientific, educational, and managerial activities, for at least five years.
- They have demonstrated an active commitment and contribution to the work of ITE and the profession.

Much of Hurwitz's research revolves around engineering education, traffic control devices, transportation safety, and human factors relating to transportation. Hurwitz is most interested in user behavior and its influence on surface transportation systems' design, evaluation, and innovation. One project that Hurwitz led last year that went on to win an



Hurwitz is incredibly dedicated to his students and offers them interactive experiences in the classroom modeled after real-world engineering practices.

Outreach and Engagement Award for Excellence.

Hurwitz is also the director of OSU's Driving and Bicycling Simulator Lab, where the data that has been collected aids in the understanding of how and why current transportation systems function the way they do.

Additionally, Hurwitz has established a research program at OSU whose goal is to develop a curriculum and a set of assessment tools that are research-based by advancing practices in engineering education.

These experiences help to better prepare students once they graduate for entering the workforce. Hurwitz was honored for his exceptional teaching last year when he was awarded the OSU Faculty Teaching Excellence Award.

Hurwitz teaches in topics primarily focused on highway and traffic engineering, signalized intersections, and driving simulation.

OSU's Jason Weiss Receives ACPA's Marlin J. Knutson Award for Technical Achievement

Professor and Head of the School of Civil and Construction Engineering at OSU, Jason Weiss, was the recipient of the 2018 American Concrete Pavement Association's (ACPA) Marlin J. Knutson Award for Technical Achievement.

The Marlin J. Knutson award honors the second President and CEO of the ACPA, Marlin J. Knutson, who was a strong advocate for applied research and technology during his lifetime. Annually professionals that have made a meaningful contribution to the advancement, development, and implementation of technical innovations and practices in the creation of concrete pavements receive this award.

Weiss received this honor for his applied research focused on the advancement of concrete pavement durability. Encompassed in his research was the application of the ring and dual-ring tests, resistivity test, and the "formation factor."

Many of Weiss' achievements are important to the Performance Engineered Mixtures program and have become a catalyst to the development of the next generation specification for concrete pavement quality assurance.

On top of his position as a professor and Head of the School of Civil and Construction Engineering, Weiss is also the Edwards Distinguished Chair in Engineering, as well as the Director of the Kiewit Center for Infrastructure and Transportation Research.

Prior to joining OSU, Weiss spent 16 years as a faculty member at Purdue University, where he was the Jack and Kay Hockema Professor of Civil Engineering and Director of the Pankow Materials Laboratory.

Weiss attended Pennsylvania State University where he earned his B.A.E. in 1997, and went on to receive his M.S. and Ph.D. from Northwestern University in 1999.



OSU Associate Professor Shane Brown Assumes the Role of Editor-in-Chief

It was announced early last March that Shane Brown, associate professor in the School of Civil and Construction Engineering at PacTrans consortium university OSU, would be stepping into the role of Editor-in-Chief for the ASCE *Journal of Professional Issues in Engineering Education and Practice (JPI)*.

The preceding EIC of JPI, Southern Utah University's Matthew W. Roberts, has assumed the role of deputy editor, along with University of Colorado's Angela Bielefeldt.

Brown graduated from OSU with a B.S. in Civil Engineering in 1995 and returned to earn his Ph.D. ten years later, in 2005. He is a licensed professional engineer with over five years of professional engineering experience.

Brown's research centers on engineering education. His research primarily focuses on cognition and learning, and looks at student engagement inside the classroom, as well as faculty decision making outside the classroom,

with the goal of improving students' ability to understand complex engineering concepts.

Brown's Engineering Cognition Lab conducts research in four key areas: conceptual change, situated cognition, teacher practices and change, and social capital.

Using theories of conceptual change, Brown's research attempts to figure out why certain concepts in engineering are harder to grasp than other concepts. Through theories of situated cognition, he explores how fundamental concepts are utilized in real-world engineering design.

The JPI discusses issues in a variety of professional areas and includes a wide range of views regarding engineering education and practice. There is a focus on civil engineering in comparison to varying disciplines and professions, particularly in the obligations and responsibilities of engineers and constructors.



WSU Graduate Research Assistant Receives Helene M. Overly Memorial Scholarship



WSU's Mehrzad Mehrabipour was awarded the Helene M. Overly Memorial Scholarship by the Women's Transportation Seminar (WTS) Puget Sound last March, receiving a grand total of \$5,000.

"The fact that improving a small process can enhance and impact the quality of an entire system inspired me to receive a B.S. degree in 2012 and an M.S. degree in 2014, both in Industrial Engineering," Mehrabipour said in an email.

"Since Industrial Engineering is a broad field, I explored different areas while I was working as a lecturer until I became interested in the improvement of transportation systems as a critical need for a vibrant society, which impacts people worldwide.

"I came to the U.S. in 2016 to pursue my graduate degree in Transportation Engineering at Washington State University. I received my second M.S. degree in Civil Engineering, with a specialty in Transportation Engineering. I have developed an approach to find real-time signal timing plans in large-scale transportation networks for my M.S. thesis.

"Currently, I am studying Ph.D. in the same field. So far, I have developed different approaches to find optimal drivers' routes in large-scale transportation networks.

"I have presented my research for the Transportation Research Board, the Institute for Operations Research and the Management Sciences, and PacTrans.

"In the fall of 2017, I was in an undergraduate class for Transportation Engineering, and the instructor asked everyone to tell their reasons for taking this class. I became so upset that no one mentioned an interest to Transportation Engineering as a reason. Then, I realized they were not familiar with Transportation Engineering at all.

"This inspired me to establish the Institute of Transportation Engineers Student Chapter at WSU (ITESC-WSU). My main goal is to familiarize students with Transportation Engineering and promote the advancement of transportation by involving students with transportation projects, inviting transportation professionals, and designing innovative transportation-related activities.

"I also represented the Civil and Environment Engineering department at the Graduate and Professional Association at WSU from 2017-2018. My efforts resulted in an increase of awareness of Transportation Engineering, even at the university level, and growth in the number of ITESC-WSU members.

"After so many years of studying, I find myself strongly passionate about Transportation Engineering. I totally sense how improvements in delays, accidents, and air quality can affect an entire society.

"My goal is to work as a researcher and faculty member that contributes to creating smarter, safer, and more efficient transportation systems."

Mehrabipour's research interests include operation research in traffic congestion management, large-scale traffic assignment, signal timing optimization, and network optimization.

The Helene M. Overly Memorial Graduate Scholarship was established in honor of WTS's first Executive Secretary for her dedication to public service, organizational skills, and determination that helped double WTS's membership in two years. This scholarship is available to women enrolled in a transportation-related graduate degree program.

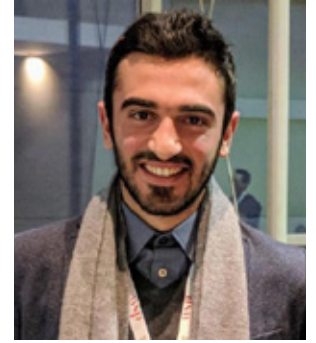
The Women's Transportation Seminar is an organization dedicated to aiding other women in the pursuit of a career in transportation by offering a countless amount of programs, networking opportunities, and access to the highest level of the transportation industry. The organization, born in 1977, currently thrives with 6,500 members, consisting of both women and men, and has strong professional relationships with 40,000 transportation professionals.

In addition to receiving this scholarship, Mehrabipour received the President Leadership Award by WSU earlier this year.

Congratulations on these fantastic achievements, Mehrzad!

STUDENTS

“Congestion vs. Connected Autonomous Vehicles” Video Lands OSU Graduate Student A Scholarship



Doctoral candidate, Alireza Mostafizi, from PacTrans consortium university, OSU, was the recipient of the 2018 – 2019 Bill Kloos scholarship, presented by the Oregon Institute of Transportation Engineers (ITE) last March.

The Bill Kloos scholarship, offered by the Oregon ITE and the Bill Kloos Scholarship Fund, named after William C. Kloos, who had spent 25 years of his life serving as the Signals and Street Light Manager at the City of Portland.

Kloos was most well-known for his ability to communicate technical information in a way that a variety of audiences could understand. This scholarship was created to both financially aid students pursuing careers in transportation engineering, and promote the same communication skills and innovative thinking that Kloos had.

Candidates are asked to submit an application in order to be considered for the scholarship. However,

the application has no set format. Students are encouraged to express their ideas in whichever way they choose, whether that be in the form of an essay, poster, Powerpoint presentation, or video. This unique approach is an effort to push students to think outside the box.

Mostafizi was recognized for his video, “Congestion vs. Connected & Autonomous Vehicles,” which discussed emerging technologies in connected and autonomous vehicles, and how they will change our transportation system and increase mobility.

Mostafizi is a data scientist and has been at OSU for the past four years. He first acted as a Graduate Teaching Assistant, later moving up into

his current position as a Graduate Research Assistant, all the while earning his M.S. and Ph.D. in Transportation Engineering, and a minor in computer science.

While obtaining his M.S., Mostafizi was heavily involved in OSU’s ITE Student Chapter, playing the role of secretary and social events coordinator.

In addition to his current role at OSU, Mostafizi is also a data scientist and R&D consultant for AirSage, who he had previously interned for in 2018.

Mostafizi has over five years of professional experience and is interested in working with artificial intelligence and machine learning.

Congratulations, Alireza!

Transportation Forecasting Competition Award

When it comes to analyzing transportation data, a team of CEE graduate students from the intelligent Urban Transportation Systems (iUTS) Lab went the extra mile. Actually, they went 2,300 miles to Washington D.C., where they received fourth place at the Transportation Forecasting Competition (TRANSFOR 19) last January.

Leading up to the competition, the UW CEE team, iUTSgo, received second place for the accuracy of their transportation predictions during the first round of the competition, where they competed against 31 student teams to predict the average speed for a segment of roadway in the city of Xi’an, China. To do so, they used two months of data to develop traffic-forecasting models.

The iUTS Lab is directed by associate professor Jeff Ban.



WSU Graduate Research Assistant Receives Four Awards In 2019

Graduate Research Assistant, Rasool Mohebifard, from PacTrans constituent university WSU, has been the recipient of multiple awards granted in 2019 thus far.

So far this year, Mohebifard has been awarded the following:

- Washington State University Outstanding Research Assistant Excellence Award, Washington State University
- Civil and Environmental Engineering Department Outstanding Teaching Assistant Award, Washington State University
- Ph.D. Student Workshop on Transportation and Logistics Challenges and Opportunities travel scholarship, National Science Foundation
- Pertee Engineering Graduate Fellowship in Civil Engineering, Washington State University

Mohebifard has filled a variety of roles at WSU, including graduate teaching assistant and graduate instructor. In addition to his current role, he acts as the Budget

Committee Chair for the WSU ITE Student Chapter. Prior to joining the WSU staff in 2016, Mohebifard worked in transportation planning at Behin Taradod Kavir.

Mohebifard earned his B.S. in Civil Engineering at Shahid Bahonar University of Kerman in 2012 before going on to receive his M.S. in Transportation and Highway Engineering at Sharif University of Technology in 2014. Building on that, he obtained his Ph.D. in Transportation and Highway Engineering from WSU in 2016.

Mohebifard's research interests include traffic congestion management, smart cities, and network design. He and WSU Civil and Environmental Engineering Assistant Professor, Ali Hajbabaie, recently had their paper, titled, "Optimal network-level traffic signal control: A benders decomposition-base solution algorithm," published in *Transportation Research Part B: Methodological* last winter.



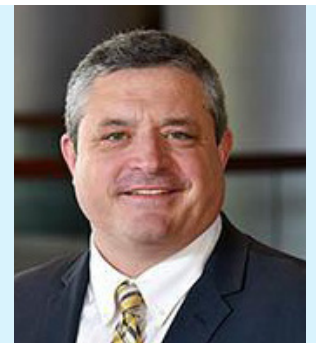
PacTrans Regional Transportation Seminar: Washington's Strategic Highway Safety Plan, Target Zero: Current Issues and Potential for Future Research with Darrin Grondel

This PacTrans seminar, held last March, went over Washington's Strategic Highway Safety Plan, Target Zero, which revolves around the goal of eliminating fatalities and serious injuries on state roadways. Target Zero coordinates traffic safety programs, aligns priorities and strategies, and builds a collaborative approach to traffic safety efforts across Washington State. A fundamental element of the plan is that it is data driven, identifying critical factors that contribute to fatal and serious injury crashes on Washington's roads.

Unfortunately, traffic fatalities in Washington State and across the nation are on the rise. Some critical issues in Washington include pedestrians and bicyclists, distracted driving, and impaired driving. Additionally, autonomous vehicles are at the forefront of traffic safety research and innovation, and were topics discussed in the 2019 update of Target Zero, presented by Darrin Grondel.

Grondel was elected as the Governors Highway Safety Association (GHSA) Chair in August 2018. He served as GHSA Secretary from August 2015-2018.

Grondel was appointed Director of the Washington Traffic Safety Commission (WTSC) by Governor Christine Gregoire in 2012 and, he was reappointed by Governor Jay Inslee in 2013. In this role, he provides statewide leadership in all aspects of traffic safety, with a heavy emphasis on human behavioral issues that affect traffic safety. Grondel has recently been elected as Chair of the Washington State Autonomous Vehicle Working Group.



Engineering Open House that UAF held in February

UAF's College of Engineering and Mines (CEM) hosts an engineering week open house every year in conjunction with national engineering week. The event is an opportunity for the Fairbanks community to discover, engage and enjoy all things engineering.

This year's open house was held Saturday, Feb. 23, 2019. Approximately 500 people attended the event and all activities were located in the Engineering Learning and Innovation Facility. CSET's "Safe Stopping Distance" activity focused on determining the friction coefficient for different surfaces to calculate the safe stopping distance.

Measurements obtained on ice, gravel, and dry pavement, were used to calculate the friction coefficient of each surface. The friction coefficients were incorporated into the stopping distance formula to calculate the distance required to stop at 45 mph on each surface. Many attendees were startled by the distances required to stop.

CESTiCC's "Making Concrete" activity taught young engineers and their families about the materials that go into building roadways and maintaining traction in the winter. The hands-on component of the activity was making playdough: introducing them to following a recipe, measuring ingredients, and mixing the materials together to make something new.

In the photo below at left, Tristan Sayre, a senior in Civil Engineering at UAF, demonstrates measuring the pull force to move a wooden block with tire treads across a gravel surface. The pull force is a required measurement for calculating the friction coefficient of a surface.

In the picture below, Diane Wallace assists her daughters, Hadrian (left) and Deidre (right) Eickermann, in making "concrete" during the Engineering Open House. Matt Encelewski, undergraduate student in Civil and Environmental Engineering at UAF, assists another concrete maker.



PacTrans Seminar Series: Emerging Transportation Technologies & Their Potential Impacts to Traffic-Safety with David Yang



This is a challenging time in the field of transportation - during the past decade, the U.S. has had more than 30,000 traffic fatalities on our roadways annually, and many cities are experiencing traffic congestion and delays.

This is also an exciting time to be part of the transportation profession, as new and emerging technologies are being introduced that could drastically reduce traffic related injuries and fatalities, and alleviate delays, moving people and goods from point A to point B safer and quicker.

This PacTrans seminar with Dr. David Yang, held early last January, explored some of the potential safety benefits of emerging transportation technologies, such as advanced driver assistance systems,

as well as connected and automated vehicles. Additionally, impediments that would prevent the realization of the full potential of these emerging technologies and future research gaps were topics discussed.

Yang is the Executive Director of the AAA Foundation for Traffic Safety. He oversees the day-to-day operations of this non-profit research and education organization. Previously, he was with the U.S. Department of Transportation (U.S. DOT) and the Federal Highway Administration (FHWA).

Yang was the recipient of the FHWA Administrator's Leadership Award and the U.S. DOT Secretary's Partnering for Excellence Award in 2014. Prior to joining FHWA, Yang worked in private consulting firms and the

U.S. DOT's Volpe National Transportation Systems Center.

Yang has authored and co-authored more than 50 peer-reviewed journal articles, conference papers, and government reports on subjects related to transportation safety, operations, planning, and Intelligent Transportation Systems.

Yang is currently on several advisory boards of transportation research centers and programs. He attended Purdue University and received his B.S., M.S., and Ph.D. in the field of civil engineering. In April 2018, he received the Civil Engineering Alumni Achievement Award from Purdue University.

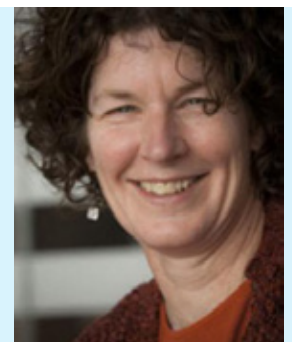
PacTrans Seminar Series: Commercializing UW Research with Laura Dorsey

This PacTrans seminar with Laura Dorsey, held last March, provided an overview of how UW's technology transfer process works including discussion of patents, trademarks, and copyright, and the resources available to support commercialization of innovations created by UW employees.

Laura Dorsey is a Senior Technology Manager at the University of Washington (UW) CoMotion, UW's technology transfer office.

She has worked at the interface of university innovation and companies for two decades, creating and fostering relationships, marshaling resources, translating the language of the university scientist to business professional and vice versa, and guiding teams to marketable products and services.

She supports the university's mission of creating public impact from research, attracting and retaining great students and faculty, and economic development.



RESEARCH

Looking to K-12 for the future of transportation

Transportation employees face challenges with stress and struggle in response to the shortage in transportation work, versus the increasing demands of our current market. One way to solve it: get kids excited about careers in transportation.

A PacTrans project, titled, “Inspiring Transportation Careers with K-12 Transportation Curriculum Activities,” led by WSU’s former Research Operations Engineer, Michelle Akin, was presented at Garfield-Palouse STEAM Night late last January.

This project brings a broad range of transportation topics to STEM fairs, classrooms, after-school programs, and summer camps, in an attempt to grow transportation knowledge, and

interest in transportation education and careers in elementary, middle, and high school students.

Equipping the next generation of potential transportation workers with a diverse background in multi-modal transportation, and new, innovative, and sustainable ideas, will open the doors to more accessible maintenance, operations, and expansion decision options.

With a focus on multi-modal transportation and isolated communities, and through the inclusion of diverse communities, this project aligns with PacTrans’ special topic areas, “Access for All” and “Improved Reliability Across Modes.”

Outreach events in Pullman, WA, Moscow, ID, and Coeur d’Alene Indian Reservation feature hands-on, transportation-themed activities. Young participants receive instruction on the positive impacts of the mobility, safety, and economic opportunity that will likely come with the future of our transportation system, while being encouraged to pursue a future in transportation.

The project was also displayed at Franklin Elementary STEAM Night last October, and the 9th Annual Nez Perce Tribe STEM Fair, pictured above, in Lapwai, ID last December.



PacTrans PI Sal Hernandez investigates truck parking shortages



Truck volumes in our nation are predicted to rise in upcoming years, but truck drivers are already struggling to find safe and adequate parking - there just is not enough of it.

Truck drivers have to resort to parking their long-haul trucks in odd places, like retail store parking lots or along access roads, because they can't find any place else to stop and rest. Many designated highway rest stops across the country have been closed down, eliminating even more of the already few options truck drivers have.

Assistant professor of Civil and Construction Engineering and PacTrans PI, Sal Hernandez, shared his research addressing this problem on *Engineering Out Loud*, a podcast hosted by Steve Frandzel from the College of Engineering at OSU.

"Federal law mandates that truckers can drive no more than 11 hours within a 14 hour window, so long as they've rested at least 10 hours beforehand," Frandzel said during the podcast. "Those hours are tracked and reported automatically by electronic logging devices."

When a truck driver's hours are up, they are required to pull over for a break. Regardless if they are near a truck parking location or in the middle of nowhere.

Lack of long-haul truck parking not only affects the truckers, but also anyone that regularly drives, or even

rides, a car. When a truck driver has not rested enough, the likelihood of being in an accident with another vehicle rises exponentially.

Hernandez has been working with the Oregon Department of Transportation (ODOT) to look into the extent and impact of Oregon's truck parking shortage.

"We really couldn't look at the whole state, but we focused on U.S. 97 first to see what the issues were on that route," Hernandez said.

U.S. 97 is a highway that runs along the east side of the Cascades from California to Washington. Truck traffic is particularly heavy here, so Hernandez observed about 200 truckers in the PNW and collected seven years of data for truck crashes along U.S. 97, all while applying crash harm to his findings.

"Crash harm is a metric that we use. It allows us to quantify the impact of safety issues," Hernandez said on the podcast. "There are numerous studies out there that actually allow us to quantify injury severity, types of crash, the monetary loss, damage to goods, and so forth. So, we use these values, put them together, and that becomes the potential crash harm metric."

In addition to, confirming his theory that there were not enough truck parking locations. Hernandez's survey also gave detailed results, such as the worst season for truckers to be driving is winter, the worst day of the week is Friday, the worst time of day is between midnight and 6:00 a.m., and one of the biggest concerns for over half of truck drivers is the inability to find appropriate parking.

"What shook things up was the second part of the study, which found that crashes where truckers were at fault were far more likely

to occur when parking, was most difficult to find," Frandzel said during the podcast.

Hernandez found a correlation between at-fault truck crashes and a high demand for truck parking. Many at-fault truck crashes occur because drivers are fatigued and cannot find a designated location to park.

This often leads drivers to speed on highways in a race against their service clocks. When truckers give up trying to find parking, they resort to roadway exits and ramps. This poses a safety hazard to the general public.

Based on Hernandez's findings, crash harm can potentially total up to \$75 million. This number caught a lot of people's attention and it is scarier to think about how many injuries and deaths that number represents.

"In 708 at-fault crashes identified in the study, 30 involved fatalities, and 264 resulted in injuries," Frandzel said during the podcast.

With the trend that consumers are following, the demand for goods is only going to keep growing. Those demands are most likely going to be met using delivery trucks, and there is going to be a lot of them if we ever want to receive our food, fuel, and Amazon Prime orders.

So, what's next? How are we going to solve this problem?

"In the short term, I think when you look at the issue of truck parking, ... there's a lot of apps out there that provide information to truck drivers on the number of spaces available on both public and private truck parking locations," Hernandez said on the podcast. "As that technology ... becomes more prevalent in the market, we may be seeing better planning by our carrier and the truckers."

Researchers from WSU and Stony Brook find a way to decrease both travel time and risk of collision

Mehrdad Tajalli and Ali Hajbabaie from PacTrans constituent university, WSU, alongside Amir Mirheli and Leila Hajibabai from Stony Brook University in New York, had their paper, “A consensus-based distributed trajectory control in a signal-free intersection,” published in *Transportation Research Board Part C: Emerging Technologies* last January.

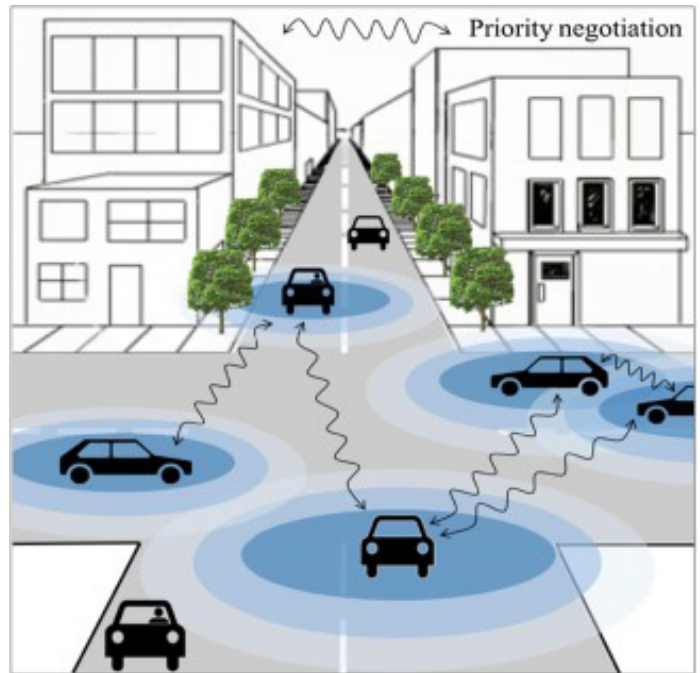
The paper, which the team had been working on since 2018, explores the development of, “a distributed cooperative control logic to determine conflict-free trajectories for connected and automated vehicles (CAVs) in signal-free intersections.” (Mirheli, Tajalli, Hajibabai, & Hajbabaie, 2019).

The cooperative trajectory planning problem is expressed as vehicle-level mixed integer nonlinear programs (MINLPs), which Hajbabaie also worked with and describes in another one of his research papers, also published this year. In this case, the MINLPs are intended to decrease the travel time and speed variations of vehicles, while maintaining safety and avoiding collisions.

CAVs were used to design a coordination scheme, which observes any conflicting movements between vehicles and records their states, such as location, on a prediction horizon. This information is then relayed into a CAV’s MINLPs, allowing the CAVs to better determine the route that will take the least amount of travel time that is also the most conflict-free.

Some of the research highlights include:

- “Development of a consensus-based control logic for the movement of CAVs through signal-free intersections.
- “Development of CAV-level mixed-integer nonlinear programs.
- “Minimizing each CAV’s travel time and speed variations while avoiding near-crash conditions.
- “Development of a distributed coordinated algorithm to obtain real-time CAV trajectories.
- “Achieving 43% to 70.5% reduction in travel time under various demand levels.” (Mirheli et al., 2019).



SAL HERNANDEZ INVESTIGATES CONTINUED

The DOT is building both private and public partnerships with industries to establish more truck parking locations. Other forms of technology that have been introduced as a solution to this problem are viable message signs along highway routes that notify truck drivers to the nearest parking location, as well as the number of available spaces.

Another solution might be the integration of autonomous freight vehicles into the market. This would likely still require a truck driver to navigate more urban areas, but at least drivers will get the rest they need on long-haul journeys. However, this is still years away, we’re not going to be seeing flying cars à la the Jetsons anytime soon.

“Our economy really depends on [our truck drivers] ... If we don’t provide a safe and adequate location for them to park, it makes it really difficult for them, it makes it really dangerous for everybody,” Hernandez said on the podcast.

WSU research paper sees success in Transportation Research Part B: Methodological

After more than two years of dedicated work, WSU Civil and Environmental Engineering Assistant Professor, Ali Hajbabaie, and Graduate Research Assistant, Rasool Mohebifard, got their paper accepted and published in *Transportation Research Part B: Methodological* last winter.

Their piece, titled, “Optimal network-level traffic signal control: A benders decomposition-base solution algorithm,” focuses on the network-level traffic signal timing optimization problem and explores the ways in which it can be solved.

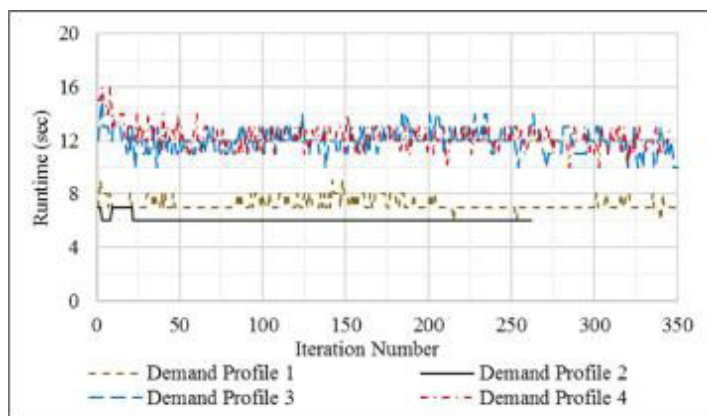
The problem expressed as a Mixed-Integer Nonlinear Program (MINLP), which is based on the Cell Transmission Model (CTM). This allows it to consider closed-form constraints and capture the fundamental flow-density diagram, ultimately getting rid of the flow holding-back problem.

The MINLP is divided into an Integer Program (IP), or the “master problem”, and a new MINLP, otherwise known as the “primal problem”, using a solution algorithm based on the Benders decomposition technique.

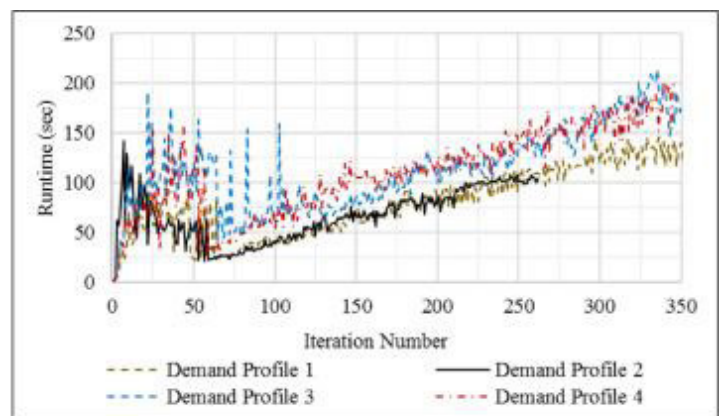
The image above compares the runtimes of solving the primal problem versus the master problem.

Some of the research highlights include:

- “Formulating a signal timing optimization program with explicit representation of the cell transmission model flow-density diagram to avoid the flow holding-back problem.
- “Developing an algorithm based on the Benders decomposition technique to convert the original MINLP to an IP and several CTM simulation runs.
- “Providing the optimality, convergence, and feasibility properties of the solution technique.
- “Developing a dual estimation algorithm for the MINLP to generate Benders cuts with a simulation-based approach.” (Mohebifard & Hajbabaie, 2019).



(a) Primal problem and dual estimation



(b) Master problem

PacTrans Board of Directors



Yinhai Wang, PhD
Professor, Civil & Environmental Engineering
Adjunct Professor, Electrical Engineering
Director, Pacific Northwest Transportation Consortium (PacTrans)
Director and Founder, Smart Transportation Applications and Research (STAR) Laboratory
 University of Washington



Billy Connor, MS
Director, Center for Safety Equity in Transportation (CSET)
Director, Alaska University Transportation Center
Associate Director, Pacific Northwest Transportation Consortium (PacTrans)
 University of Alaska - Fairbanks



Xuegang (Jeff) Ban, PhD
Associate Professor, Civil & Environmental Engineering
Affiliate Associate Professor, eScience Institute
Associate Director of Research, Pacific Northwest Transportation Consortium (PacTrans)
 University of Washington



Ahmed Abdel-Rahim, PhD, PE
Professor, Civil & Environmental Engineering
Director, National Institute for Advanced Transportation Technology (NIATT)
Associate Director, Pacific Northwest Transportation Consortium (PacTrans)
 University of Idaho



Anne Vernez Moudon, PhD
Professor Emeritus
Architecture, Landscape Architecture, and Urban Design and Planning
Associate Director of Education
 Pacific Northwest Transportation Consortium (PacTrans)
 University of Washington



Eric Jessup, PhD
Research Associate Professor and Associated Director
 Freight Policy Transportation Institute
Associate Director, Pacific Northwest Transportation Center (PacTrans)
 Washington State University

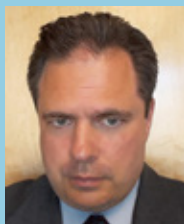


David S. Hurwitz, PhD
Associate Professor, Civil & Construction Engineering
Director, OSU Driving and Bicycling Simulator Laboratory
Associate Director, Pacific Northwest Transportation Consortium (PacTrans)
 Oregon State University

PacTrans External Advisory Board



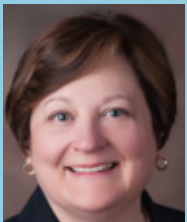
Michael Bufalino, MURP
Research Manager
 Office of Research
 Oregon Department of Transportation
 Research Advisory Committee



Brian Brooke
Senior Manager of Innovation and Performance
 Sound Transit



Carolyn Morehouse, PE
Chief of Research, Development & Technology Transfer
 Statewide Design and Engineering Services
 Alaska Department of Transportation & Public Facilities



Anne Freeman
Program Administrator of Research and Library Services, Washington State Department of Transportation, WSDOT



Wayne Kittelson, PE
Founding Principal
 Kittelson & Associates, Inc.



Ned Parrish, MPA
Research Program Manager
 Idaho Transportation Department



Scott Drumm, MUP
Director, Research and Strategic Analysis
 Port of Portland



Angela Konert, MPA
Vice President, Government and External Affairs
 BMW Group Representative Office,
 Sacramento, California



Jerry Whitehead
President and CEO
 Western Trailer
Chairman, Idaho Transportation Board
 Idaho Transportation Department

PACTRANS | CSET REGIONAL TRANSPORTATION CONFERENCE

OCTOBER 11, 2019
INTELLECTUAL HOUSE
UNIVERSITY OF WASHINGTON

Bridging Innovations and Practice for Enhanced Mobility and Safety

The 2019 PacTrans | CSET Regional Transportation Conference will bring together transportation researchers, practitioners, and public officials from throughout the Pacific Northwest to build relationships and share fresh ideas. PacTrans focuses on data-driven solutions to the diverse mobility challenges of the Pacific Northwest. Meanwhile, the Center for Safety Equity in Transportation endeavors to provide everyone with fair and equitable access to a safe transportation system, particularly those living in rural, isolated, tribal and indigenous communities. This PacTrans/CSET conference will cover topics on mobility and safety.



Get there. Safely.

<https://pactransconference.com/>

Contact

Dr. Yin Hai Wang
University of Washington
More Hall, Room 112

PacTrans.org

Email: PacTrans@uw.edu
Phone: (206) 685-0395
Find us on Twitter @PacTrans UTC