



PacTrans

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University Transportation Center Newsletter

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The Right Equation: *i*NNOVATION + *t*ECHNOLOGY = *s*USTAINABILITY

The Pacific Northwest Transportation Consortium (PacTrans) held its third annual regional transportation conference on October 16, 2015 at the University of Washington. In attendance were more than 180 faculty, researchers, practitioners, and policy makers from both the public and private sectors of the transportation industry. Topics covered included: Safe Users & Operations, Technology Transfer: Translating Results to Professional Practice, Workforce Development, and Safe Infrastructure.

PacTrans' five consortium universities continuously study and analyze issues involving transportation safety and sustainability within the Pacific Northwest region. Locally, as major regional employers such as Microsoft, Starbucks, Boeing, and Amazon remain strong, and other large national employers such as Expedia, Weyerhaeuser, and Facebook continue growing their Seattle presence, the transportation system in the Puget Sound will continue to feel the growing pressure. University of Washington's **Vice Provost Vikram Jandhyala** remarked during his keynote that current infrastructure and even the way we conduct and think about transportation will become insufficient in the future.

As regional issues of growth, congestion, and safety remain, **Dr. Yinhai Wang**, Director of PacTrans, is always on the lookout for new partners in innovation and technology. Partnerships with PacTrans can take many forms: from joint research projects to financial contributions, from event sponsorships to education and workforce development opportunities such as graduate student internships. PacTrans is resolved in its commitment to conduct practical and applied research and make sure it gets into the hands of those who will implement its findings.

To read more about the regional transportation conference see our Conference Special Edition newsletter...[click here](#). To learn more about the many ways you can get involved in partnering with PacTrans visit our website...[click here](#).



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Researchers from PacTrans Test the Feasibility of Utilizing Bluetooth and Wi-Fi Sensing from Mobile Devices for Better Data Collection Methods

When engineers build transportation forecasting models, the traditional process involves four steps:

1. **Trip Generation** – predicts the number of trips originating in or destined for a particular traffic analysis zone
2. **Trip Distribution** – matches tripmakers' origins and destinations to develop a "trip table", a matrix that displays the number of trips going from each origin to each destination. Historically, this component has been the least developed component of the transportation planning model.
3. **Mode Choice** – analysis allows the modeler to determine what mode of transport will be used, and what modal share results
4. **Route Assignment** – concerns the selection of routes (alternative called paths) between origins and destinations in transportation networks

Once the engineer has completed these steps, they can build an invaluable forecast to guide policy, planning, and infrastructure development surrounding our transportation systems.



As the above definitions suggest, trip distribution, or the creation of origin-destination matrices, has historically been the crux in this process. Researchers have had to rely on surveys, head counts, and smart

cards (like the ORCA card) to gather this information. These processes tend to offer incomplete information about how people use transit...until now.

PacTrans researchers have developed an alternative system that uses Wi-Fi and Bluetooth signals from passengers' mobile phones and devices. This method



would enable the gathering of data about where transit users enter and exit the system, how many people use a given stop, and even how long they wait to transfer to another bus/train/light rail.

Each mobile device has a unique identifier called a Media Access Control (MAC) address. The system, which employs a \$60 sensor (per vehicle), would simply detect MAC addresses as they board and exit each bus/train/light rail to offer complete and real-time travel data.

This technology has already been used to estimate vehicle travel times on highways and roads, but this is among the earliest attempts to investigate its possible use for collecting passenger origin and destination data on a transit system.

The PacTrans research team of Dr. Yin Hai Wang, Kris Henrickson, Matthew Dunlap, and Zhibin Li tested the system in May 2015 by installing these sensors on the South Lake Union Shuttle and Health Sciences Express buses. "We were able to prove the concept and demonstrate that it's much cheaper to collect data this way," Wang said. "This is really just at the beginning stage, but this technology is going to become more universal in the age of smart cities."

OUTREACH: A Key Component of PacTrans

Mark Hallenbeck is the PacTrans Associate Director for Outreach. The concurrent UW Director of TRAC delivered presentations and moderated a session at the ITS America workshop, Building a Smart Diverse and Shared Travel Network, on July 16; at the State Transportation Commission on July 21, he spoke about the Rise of New Transportation Alternatives, such as, car sharing; at the ASCE/ITE/WTS joint meeting on October 14, he presented the ORCA Data Analysis Project; and at the Urban@UW Fall Workshop where he was involved with the breakout session, “Transportation, Growth & Equity” on October 29.

Prof. Hallenbeck was interviewed last Sept. 10 by KING5 TV’s Jean Enersen for their Town Hall special which focused on traffic congestion. He was also interviewed on KIRO7 TV for segments that appeared in multiple news segments airing the week of Sept. 14 about worsening regional traffic congestion.

More recently, the Seattle Times LiveWire event entitled “Gridlocked: Driving Solutions to Our Region’s Traffic Jams,” featured Prof. Hallenbeck as one of the invited experts on issues involving transportation and traffic problems. The event included **Bryan Misteale**, CEO of INRIX, **Scott Kubly**, Director of Transportation of the City of Seattle, and **Jarrett Walker**, an international consultant on public transit network design and policy. The discussions focused on the region’s fast growing population, the movement of its people and goods, and Puget Sound’s rating as one of the worst in traffic congestion nationwide.



Prof. Mark Hallenbeck at LiveWire’s “Gridlocked: Driving Solutions to Our Region’s Traffic Jams”



Fully-packed Kane Hall during Seattle Time’s LiveWire session.

Engage and Stay Connected



Urban@UW recently conducted its Fall Workshop last October 29 at the Ethnic Cultural Center. The workshop connected professionals with their peers from academia, private and public sectors, and the community. There were six topics for discussions: Resilience in Disasters – Response, Outreach, Preparation, and Equity; Food Access & Economic Justice; Housing, Affordability, and Poverty; Climate Change & Urban Environmental Justice; Smart to Wise Cities / Data Driven Inclusive Innovation; and Transportation Plus (or what else can roads do?). Prof. Greg Miller, Prof. Mark Hallenbeck, and Dr. Weibin Zhang attended the workshop. The CEE department in general, and our transportation faculty in particular, stay attuned to transportation research, and keep abreast of transportation engineering trends. Their individual expertise in the field of transportation is a key element in engagement and connection with the issues across the academic field, not only in transportation but also in urban planning as well as building healthier, safer, more livable cities.

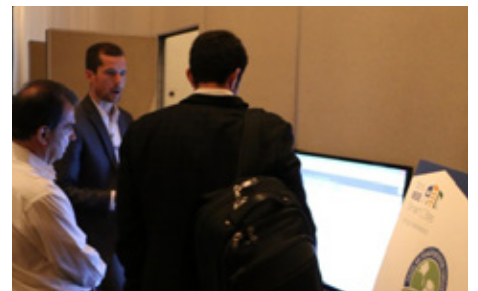
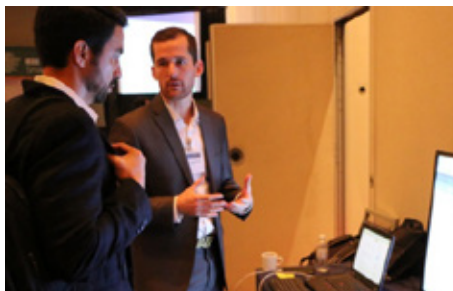
First IEEE International Smart Cities Conference

PacTrans sponsored the First IEEE International Smart Cities Conference (ISC2-2015) in Guadalajara, Mexico on October 25th – 28th. With an overarching theme of sustainability, this conference is focused on technology and policy topics central to human-infrastructure integration and data-driven decision making. This first annual conference brought together approximately 500 individuals working in a broad range of disciplines in the public and private sector around the world, to interact and learn about current and emerging trends in smart cities and sustainable economic development. Smart transportation is the most

popular track in this conference with over 30 talks in the program.

PacTrans Director, Dr. Yin Hai Wang attended the conference in his role as a general co-chair on the conference planning committee, accompanied by several University of Washington graduate students who gave presentations on their current research work. For example, second year University of Washington graduate student Ruimin Ke, presented a talk on mode inference from mobile device location data, based in part on the PacTrans-funded project “Data Collection and Spatial Interpolation of Bicycle and Pedestrian

Data”, led by Professor Michael Lowry at the University of Idaho and Professor Yin Hai Wang at the University of Washington. Students from the University of Washington also staffed the PacTrans exhibit at the conference, giving demonstrations and discussing PacTrans research with conference attendees. PacTrans demos attracted many working professionals and students who showed interest in PacTrans research products or coming to the UW for graduate studies. Despite the initial threat of Hurricane Patricia, attendees enjoyed warm, mild weather in Guadalajara throughout the conference.



TMCs – Nerve Centers of the Operation Activities of the Washington State Department of Transportation (WSDOT)

Organized by PacTrans, a site visit was paid on December 7 by 23 UW Transportation Engineering students at the Northwest Region Transportation Management Center in Shoreline, one of the six regional Traffic Management Centers (TMCs) of WSDOT, paved the way to better understand a 24-hour, 7 days a week complex operation. The TMC is the operation center of the many Intelligent Transportation Systems (ITS) used to make the system run more safely and efficiently. ITS devices include roadside cameras, ramp meters, variable message signs, speed and lane control signs, and radios.

With increasing traffic and challenges in managing resulting congestion, the Northwest Region TMC has grown to a team of approximately 30 engineers, technicians, and UW interns managed by Chris Thomas, coupled with the expertise of Maan Sidhu and Tim McCall. The TMC has grown with the expansion of ITS technologies such as variable speed limits and lane control with Active Traffic Management (ATM), tolling of SR 167 HOT Lanes and I-405 Express Toll Lanes, and the new SR 99 bored tunnel and retrofitted I-90 tunnels.

The TMC facility in Shoreline, being a data bank, has its own massive server room, ninety 46-inch screens, radio dispatched system, uninterrupted power supply and generator that can keep the facility operating for up to 7 days. The center can be activated as an Emergency Operations Center (EOC) during a major, long-term closure that will impact the transportation system. For the future, TMC is moving towards practical design, improved metering and tolling, and shoulder use lanes on congested corridors.



Timothy McCall shares the center's hub of ninety 46-inch TV screens and the center's Traffic Buster System.



Maan Sidhu explains that the center can be activated as an Emergency Operations Center (EOC) during real-time crisis that will impact the transportation system. He also provided a brief tour of the massive server room of the center.



Chris Thomas, Manager of the Northwest Region TMC in Shoreline, shares information about the new center.



The Northwest Region Transportation Management Center (TMC) at City of Shoreline.

Dr. Yinhai Wang

Guest Lecturer at Oklahoma Transportation Research Day

Each year, the Oklahoma Department of Transportation (DOT) and the Southern Plains Transportation Center (SPTC), Federal Region 6 University Transportation Center, host a transportation research day. This one-day event consists of keynote speakers, ODOT presentations of research and implementation of projects, and student transportation project posters.

This year (October 20, 2015) PacTrans and STAR Lab director, Dr. Yinhai Wang, was invited to be the “Invited Lecturer” for the event. Dr. Wang presented on a STAR Lab technology called DRIVE Net in his lecture titled, *“DRIVE Net: A Large-Scale Online Data Platform for Performance Analysis and Decision Support.”*

Transportation involves human, infrastructure, vehicle, and environmental interactions and is therefore a very complicated system. Traditionally, transportation has been studied through classical methods, typically with ideal assumptions, limited data support, and poor computing resources. While the theories (such as traffic flow and driver behavior models) developed through these efforts provide valuable insights in understanding transportation-related issues, they are often ineffective in large-scale transportation system analysis with massive amount of data. Also, transportation activities have been found to affect public health, air quality, etc., but our understanding in these relationships is far from complete.

With recent advances in sensing, networking, and computing technologies, more and more transportation-related data and

computational resources become available. These new assets are likely to bring in new opportunities to understand transportation systems better and address those critical transportation issues in a faster, more accountable, and more cost-effective way. To take advantage of big data, a new theoretical framework and its supporting platform are clearly needed to integrate the quickly growing massive amount of data, typically from numerous sources of varying spatial and temporal characteristics, into the large-scale transportation problem solving and decision making processes. Efforts along this line are likely to form a new subject area, namely e-science of transportation, in the years to come. Thus Dr. Wang shared his vision and pilot research on the Digital Roadway Interactive Visualization and Evaluation Network (DRIVE Net) in linking big data to big discoveries.



Welcome New PacTrans External Advisory Board Member



Frank Breust
Vice President
Government and
External Affairs
BMW Group
Representative Office
California

Frank Breust is heading the government and external affairs office of the BMW Group in Sacramento, California since July 2013. In this function he coordinates corporate positioning with all relevant stakeholders in the fields of environmental, mobility and sustainability policies.

Prior to this, Mr. Breust was responsible for coordinating the political communication of the BMW Group in Munich with regard to human resources related issues as well as sustainability engagements. Mr. Breust also steered social sustainability topics in the HR strategy. Before joining the BMW Group, Mr. Breust was an officer of the German Air Force and served as an air traffic controller and in the German Military Intelligence Service for twelve years.

Frank Breust was born and grew up in Oldenburg, Germany and holds a Diploma in Business and Economics Education and a Master of Business Administration (MBA) degree.

RESEARCH HIGHLIGHTS

PacTrans Researchers Work on Recycling Scrap Fiber into Permeable Pavements Sponsored by Boeing

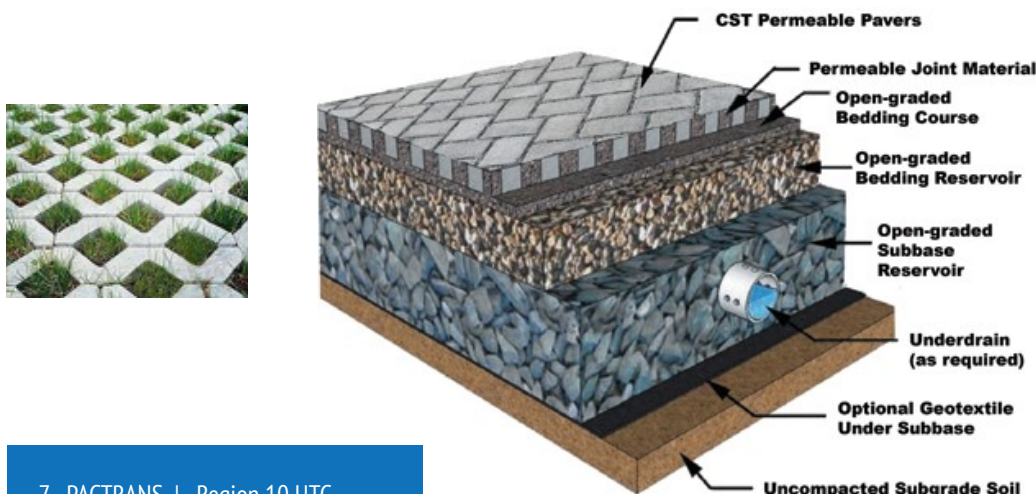
In his paper titled, *Paving Paradise: The Peril of Impervious Surfaces*, Lance Frazer eloquently articulates just how much of our country consists of impervious surfaces: “In the United States alone, pavements and other impervious surfaces cover more than 43,000 square miles—an area nearly the size of Ohio.” He then goes on to discuss the implications of this reality to both us as humans and our environment. One remedy to slow the rate at which we convert our permeable surfaces to impermeable surfaces is called permeable pavement.

In one hand, permeable pavements are a viable solution to improve water quality and more efficiently recharging ground water by directing storm water to infiltrate into underground soils. The durability of permeable pavement, however, is a concern. This is why current utilization of permeable pavements has, thus far, been generally reserved for parking spaces and low use roadways like single family home driveways.

On the other hand, carbon fiber reinforced composites are current used in over half of the body of modern aircrafts, such as Boeing 787 Dreamliner. Unavoidably, scrap carbon fiber presents an issue for manufacturers like Boeing, because it needs to be properly disposed of.

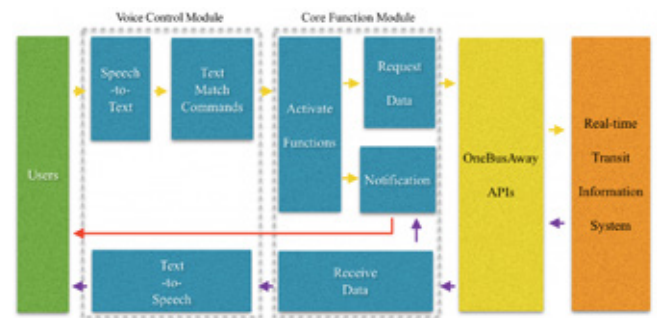
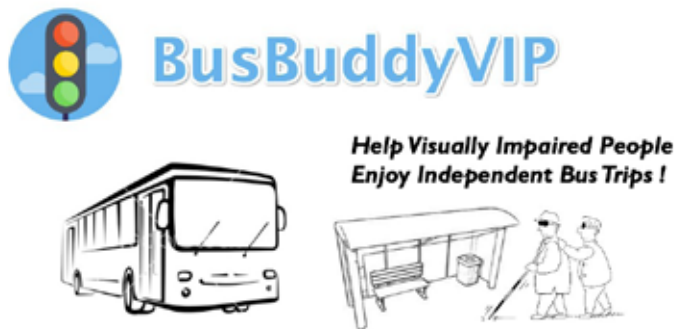
Boeing believes it has an idea that, if proven feasible, could be a win-win. They are sponsoring a study to test whether recycling its scrap carbon fiber to strengthen the permeable pavement is feasible. They are supporting the study through a \$212,000 research grant and donation of the necessary cured carbon fiber composite material for the project.

Researchers selected for the project include: PacTrans researchers, Dr. Haifang Wen, Dr. Liv Haselbach, and Dr. Somayeh Nassiri of Washington State University’s Department of Civil and Environmental Engineering; collaborating with Dr. Karl Englund of the Composite Material Engineering Center, and Dr. John Stark of the Washington Stormwater Center. Dr. Wen is currently in the spotlight of concrete researchers as one of his recent projects, “Evaluation of Recycled Concrete as Aggregate in New Concrete Pavements,” lead the Washington State Legislature to pass Bill 1695, which calls for the use of recycled concrete in future building project.



RESEARCH HIGHLIGHTS

PacTrans Researcher and UW Student Develops Second Version of App Geared Toward Helping the Visually Impaired use Public Transit



In 2013 we wrote an article about PacTrans inaugural summer interns and their development of an Android app called BusBuddy:

“The idea for Bus Buddy was born when Jinglan (one of the interns) continuously napped through her bus stop, much to Kevin’s amusement. They decided that many Seattleites likely faced a similar issue and set to work. The application they created allows users to set a GPS enabled alarm for their respective bus stops so that those who tend to miss their stop for various reasons will no longer worry about it.”

This application was meant to benefit all public transit users, especially those who are visually impaired. This spring, a UW graduate student and PacTrans Graduate Student Assistant, Meng (Summer) Xia created a second iteration of the app; BusBuddyVIP (visually impaired people). Her app works a lot like the OneBusAway app except with significant focus on voice controls and audio playback.

This app has significant potential implications for transportation safety, especially among the visually impaired. Once the user has planned a trip, the simple interface allows the user to speak a transit stop number, at which point the app will verbally relay each route that passes through that stop. Once the user chooses which of the routes they desire, the app will verbally communicate how long their wait is until the route arrives. It then subsequently gives updates every two minutes and a final update (or alarm) when the bus is

one minute away. The app has several other functions, such as setting stop and route favorites, and contacting the appropriate entities when the user is lost, in trouble, or stranded.

There are several other entities working on similar technologies. For example, iBeacon, in Bucharest, Romania, uses a cloud platform and mobile devices in very much the same way. The difference here is that iBeacon requires a specialized piece of equipment to be installed on each bus and trolley in the system. This is time and cost prohibitive. Summer’s Bus Buddy app uses GPS that is already installed on the vehicles for various other purposes.

While the app already exists for free download on Google Play Store, there is still some work to be done. This app needs refinement through testing and validation including experimenting with visually impaired people and getting feedback through questionnaires and interviews. The app currently operates its own voice controls; integrating it with android’s voice control would make it much more user friendly. There is a significant opportunity to coordinate/integrate this technology with other navigation apps. Finally, an iPhone compatible version of the app needs to be produced; which is a longer and more arduous process.

RESEARCH HIGHLIGHTS

PacTrans assisting WSTIP with TRB IDEA Grant to Evaluate Collision Avoidance Technology on Transit

You may not know this but over the last two decades, technology has been developed with the intent of adding a secondary level of vehicle accident prevention. Collision avoidance systems, as they are called, use radar (all-weather) and sometimes laser and camera (both sensor types are ineffective during bad weather) to detect an imminent crash. Once the detection is done, these systems either provide a warning to the driver when there is an imminent collision or take action autonomously without any driver input (by braking or steering or both).

This technology has been so successful that three years ago the National Transportation Safety Board urged the U.S. government to require automakers to include it as standard equipment on all new cars and trucks. But it doesn't, and shouldn't, stop there. If collision avoidance technology can work on passenger vehicles, why wouldn't it work on transit buses? The Washington State Transit Insurance Pool just received a \$100,000 IDEA grant from the Transportation Research Board (TRB) to help them find out.

Dr. Yin Hai Wang, Director of the Pacific Northwest Transportation Consortium at the University of Washington and Dr. Jerome Lutin will be the principal investigators of this WSTIP study where 35 buses distributed throughout seven transit providers in Washington State will be retrofitted with collision avoidance systems.

Utilizing transit liability loss data (2004 to 2014) from Washington State, the Ohio Transit Risk Pool and the California Transit Indemnity Pool, Munich Re was able to determine that these seven transit entities incurred \$191 million in losses during this 10 year time frame due to accidents; that's over \$19 million a year. According to WSTIP, almost 90 percent of the large (over \$100,000) collision-related transit losses that it tracks are forward-motion accidents or collisions with pedestrians, bikers and motorcycle riders. The premise of this study is that most of these accidents could be preventable if collision avoidance technology was available on buses. These systems will alert transit drivers in time for them to take corrective action on their own.



RESEARCH HIGHLIGHTS

UW Recipient of Four Electric Vehicles for Internet of Things' Sustainable Research Projects

With the leadership of Dr. Yin Hai Wang, the PacTrans University Transportation Center will be aiding Transportation Services and the University of Washington in a series of research projects using University Electric Vehicles (UEVs).

“...a group of UW researchers is planning to use these vehicles for a variety of research projects, with subjects that could range from automatic collision avoidance to birds on campus,” says Matt, from the University of Washington Transportation Services. Internet2 and Innova UEV LLC, manufacturer of an all-electric micro vehicle—the Innova Dash have created these UEVs, which are essentially “big data on wheels.” UW was one of four universities selected to take part in research involving these vehicles. As



well as receiving four loaned UEVs, the project also included \$10,000 in research funding.

With a funds match from PacTrans, UW Postdoctoral Scholar Zhibin Li and WSU Assistant Professor Ali Hajbabaie will be utilizing this vehicle in a project whose objective is to use connected vehicles (CVs; the UEVs are CVs) data and technologies to improve traffic safety on roadway networks (e.g., freeways



and intersections). Connected vehicle technology provides invaluable information such as vehicles location, speed, and acceleration rate to other vehicles and the infrastructure. Such information can be used to inform other road users (drivers, bicyclists, and pedestrians) of potential hazards on a transportation network and increase driver awareness about their surroundings.

The City of Bellevue Teams Up with PacTrans and Microsoft to Predict Bike Accidents

“We were asking ‘how can we get out ahead of these?’” says Bellevue senior transportation planner Franz Loewenherz acknowledging our country’s reactionary mentality to transportation safety. That is why the City has recently teamed up with researchers from Microsoft and the University of Washington (Dr. Yin Hai Wang and PacTrans), and engineers from Toole Design Group in Seattle to design a program that will allow them to use traffic cameras that are already in place to identify potentially dangerous situations.

This project is in conjunction with the city’s pedestrian and bicycle safety

initiative that launched in 2009, and the “Mayors’ Challenge for Safer People and Safer Streets,” a yearlong campaign led by the U.S. Department of Transportation that aims to reduce traffic-related injuries and death.

“If we nail it, this is huge,” said Victor Bahl, director of Microsoft Research’s Mobility and Networking Research. “Once we get the basic problems solved and get everybody excited, we open up the floodgates” to tackling more safety and infrastructure problems and “creating a next-generation traffic management system.”

The goal would be for a program to be able to distinguish between

pedestrians, bicyclists, vehicles, etc. and identify when incidents occur and when near incidents occur (i.e. when a vehicle needed to come to a rapid stop almost hitting a bicyclist). This then would enable the city to make smart infrastructure decisions before serious accident and injury occurs.

The University of Washington and PacTrans role will be to first define what a near incident is and then develop the technical modelling so that the program can decipher between different modes and between different situations (i.e. incident, near incident, or none).



STUDENTS

Traffic Bowl Competition – UW ITE Student Chapter, First Place Winner

The Institute of Transportation Engineers (ITE) Student Chapter at the University of Washington was honored to attend the 8th Annual Bill Kloos Traffic Bowl in Portland, Oregon. The team of graduate students of the STAR lab who attended the event were Salvatore Antonio Biancardo, Kai Kuo, Luka Ukrainczyk, Ruimin Ke, Xinqiang Chen, and Wenbo Zhu. Four members of the UW ITE team (Salvatore, Kai, Luka, and Wenbo) joined the Traffic Bowl competition, which was modeled after the Jeopardy TV show. The UW team competed against teams from the University of Portland, Portland State University, the University of Oregon, Oregon State University, and the Oregon Institute of Technology. The question topics ranged from transportation modeling and the Highway Capacity Manual to transportation-related Video Games, and actual Jeopardy questions from the show. The UW team took home first place, with UP and PSU winning second and third place, respectively. After some rousing celebration later that night, the UW team joined the rest of the contestants for a tour of the Kittelson & Associates and HDR offices, as



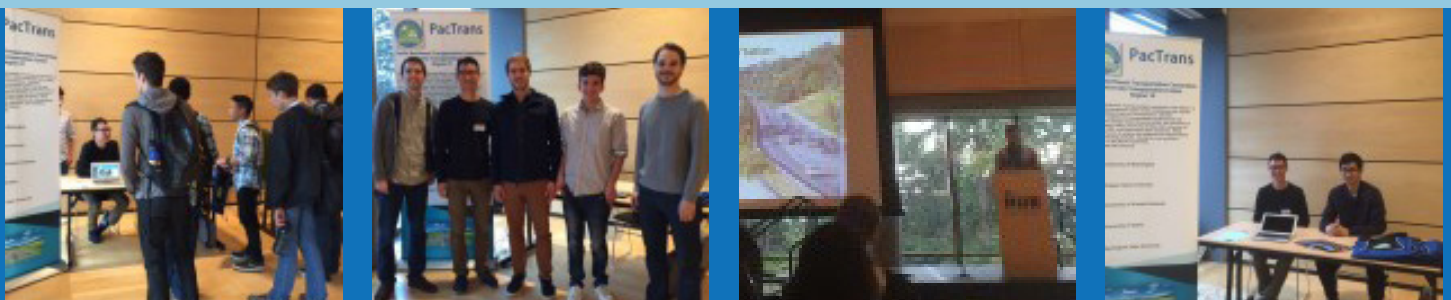
UW PacTrans students, Wenbo Zhu, Salvatore A. Biancardo, Kai Kuo, and Luka Ukrainczyk, won first place during the Traffic Bowl Competition in Portland, OR.

well as the Oregon DOT traffic management center. The team was also lucky to stay at the house of PSU ITE President Nicholas Stoll, who offered his hospitality to the UW team for the second year in a row.

EDUCATION

PacTrans Fellows at the CEE Undergrad Orientation

This October 7, 2015, the University of Washington's College of Civil and Environmental Engineering hosted its undergraduate orientation. PacTrans Fellows Luke Peters, Rich Lee, Riley Kimball, Thomas Steckel, and Jeffrey Connor were there promoting the transportation focus area to the students in attendance! PacTrans offers opportunities for fellowships, research, workshops, and seminars.



Congratulations to our First Graduating Class for the Masters of Supply Chain Transportation & Logistics Program

This summer the online Master of Supply Chain Transportation & Logistics at the University of Washington graduated its inaugural class of 28 students. Known as “The Originals”, this impressive group spent two years balancing the demands of part-time school with full-time employment at companies like Boeing, Zulily, REI, and Tesla. Our students not only reside throughout WA State, but also across the nation and globe!

The SCTL program combines engineering and business principles with industry best practices to provide students with the knowledge needed to successfully design, implement, and manage complex supply chain transportation and logistics strategies. The curriculum focuses on cross-functional areas—such as operations, inventory management, and IT systems—to develop skills in the end-to-end management of transportation in a global supply chain. Students then apply what they’ve learned to a real-world problem during a two-quarter practicum project.

We were thrilled that so many Originals attended the Civil & Environmental Engineering graduation celebration in June. We look forward to seeing everything these outstanding students will accomplish!



New Construction Degree

PacTrans and the University of Washington are excited to announce a new educational opportunity for transportation interested students. The Master of Science in Construction Management degree will now be offering a Construction Management Occupational Safety and Health track.

For more information, [click here](#).

MIDAS-CPS – The Possible Future of Proactive Traffic Management Systems



“While driving on your favorite route to your destination,” Dr. Pitu Mirchandani said, “have you ever wondered why the technology you are seeing, as far as traffic management is concerned, is so antiquated?”

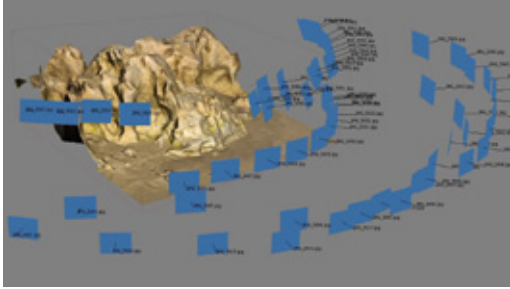
Dr. Mirchandani is Professor of Computing, Informatics, and Decision Systems Engineering at Arizona State University. On his most recent PacTrans-sponsored seminar, he emphasized that the people and organization that manage the traffic are not “cyber-physicists” nor “real-time optimizers.”

The MIDAS-CPS, is a system developed using cyber-physical infrastructure composed of smart-phone devices, cloud computing, wireless communication, and intelligent transportation systems to manage vehicles in the complex urban network. MIDAS-CPS means, **M**anages the **I**nteracting **T**raffic **D**emand and the **A**vailable transportation **S**upply. Dr. Mirchandani said that the key element of MIDAS-CPS is the real-time streaming data collection and data analysis and the subsequent traffic management through proactive traffic controls and advisories, through visualizations of predicted queues ahead, effective road prices/rewards, and route advisories. Although drivers will not be forced to use recommended routes, it is anticipated that MIDAS-CPS would lead to lesser drive stress and improved road safety, besides the designed benefits on the environment, energy consumption, congestion mitigation, and driver mobility.



TECHNOLOGY TRANSFER

In July and August of 2015, PacTrans made a call to its principal investigators (PIs) for “success stories.” The intent was to identify research projects that had significant results and made major findings, developments or conclusions. These PIs were asked to submit a proposal for additional PacTrans funds to execute a predetermined technology transfer plan. PacTrans then selected seven such activities and products. These technology transfer components are still ongoing but the following list outlines the funded tech transfer projects underway:



SUCCESS STORY #1: Cunningham, Unmanned Aircraft System Assessments of Landslide Safety for Transportation Corridors

Investigators: PI Keith Cunningham (UAF), Co-PI Michael Olsen (OSU), Co-PI Joe Wartman (UW)

Project Type: Multi-Institution Project

Title of Original Research: Unmanned Aircraft System Assessments of Landslide Safety for Transportation Corridors

Research Description: Over the last year this team has been using drones to collect optical imagery of several unstable slopes located in Alaska, using digital cameras to characterize and model slope stability and to forecast their dynamics.

Technology Transfer: “With this recent success,” says Dr. Cunningham, “we can demonstrate this emerging survey technology that promises faster and more efficient data collection of slopes along transportation corridors.” Thus they have applied for, and received, additional PacTrans funding for Technology Transfer. Their transfer will include the creation of a short promotional video of the research to showcase the effectiveness of drone imaging collection.



SUCCESS STORY #2: Muench, Greenroads Bootcamp

Investigators: PI Stephen Muench (UW), Jeralee Anderson (UW)

Title of Original Research: Greenroads: A sustainability performance metric for roadway design and construction

Research Description: Out of this research came a green roadway design and construction certification system (much like Leadership in Energy and Environmental Design (or LEED) works for building) and also the Greenroads Foundation, a 501(c)(3) that is meant to support and cultivate the mission and certification system.

Technology Transfer: PacTrans is teaming up with the University of Washington’s American Public Works Association (APWA) Student Chapter to fund a Technology Transfer opportunity called, “Greenroads Bootcamp.” It is a full-day training event that involves: (1) a 1-hour general audience lecture about roadway sustainability and Greenroads, (2) a 2-hour in-depth training session on how to use the Greenroads Rating System to rate roadway projects, (3) a 1-hour information session with interested students, and (4) free passes for any in attendance wishing to take the Greenroads professional accreditation exam (STP Exam).

TECHNOLOGY TRANSFER

SUCCESS STORY #4: Babbar-Sebens, How Green is your Green Infrastructure?

Investigators: PI Meghna Babbar-Sebens (OSU), Arturo Leon (OSU)

Project Type: Small Project

Title of Original Research: Improving Sustainability of Urban Streets via Rain Gardens – How Effective Are These Practices in the Pacific Northwest?

Research Description: Many small and large urban communities in the U.S. have undertaken efforts towards transforming their existing street systems into “sustainable streets” or “green streets” that incorporate multiple ecological, community, and mobility functions. Implementation of natural drainage systems have become popular roadside green infrastructure solutions aimed at improving environmental sustainability of streets, because of their ability to treat roadway runoff, filter out roadway pollutants, and prevent sewer overflows after heavy storm events. However, there is lack of data and understanding on the effectiveness of these practices in capturing and treating roadway runoff, especially during the establishment period and during the different seasons.

Using PacTrans funds, this project collaborated with the Benton County, City of Corvallis, Oregon Water Resources Department, and Oregon-BEST, and multiple other partners to construct, instrument, monitor, model, and evaluate the effectiveness of bioretention practices during their establishment phase. Thus they constructed the OSU-Benton County Green Stormwater Infrastructure Research Facility. This facility is an instrumented, semi-controlled, and three celled testing facility for green infrastructure that captures runoff from the Benton County Public Works transportation yard. Each cell enables field-scale testing of a roadside stormwater (natural or artificial) technology, and provides opportunities for near real-time monitoring and comparison with other technologies.



Technology Transfer: This unique facility provides excellent opportunities for education and outreach, which is why PacTrans has selected this work to receive additional funding for technology transfer. Multiple stakeholders have contacted administrators of the facility inquiring about whether it can be used for programs focussed on K-12 and local community, and for field testing of new stormwater technologies. However, a well-developed long term plan is needed to address these opportunities. This additional funding will go to the following tasks:

Development of education materials, and collaborate with University of Washington to collect initial data and apply for the facility to be Technology Assessment Protocol – Ecology (TAPE) certified.

Development of a web-based monitoring portal that will be made available to the community for monitoring these rain gardens in real-time and measure their performance via an embedded modeling framework.

Delivery of presentations to local stormwater utilities and water managers about the facility and research conducted at the facility.

TECHNOLOGY TRANSFER

SUCCESS STORY #5: Hurwitz, Interactive Tourist Information Sign Website

Investigators: PI David Hurwitz (OSU),
Co-PI Michael Olsen (OSU)

Project Type: Small Project

Title of Original Research: Alternative Information Signs:
An Evaluation of Driver Comprehension and Visual
Attention

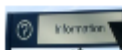
Research Description: Studied the evaluation of traf-
fic sign understandability. By using a variety of online
survey question approaches and driving simulation
tasks they have been assessing the understandability of
alternative Tourist Information signs in Oregon.

Technology Transfer: To communicate these exciting
results to a broader range of traffic engineers, public
agencies, and the general public at large, PacTrans has
allocated additional funding to the research team for

the development and dissemination of an interactive
website. The aims of the website are to provide a mecha-
nism for sharing the literature review, experimental
methods, results, and findings of the project

to provide an interactive interface that will enable users
from around the world to populate a geospatial database
with images and descriptions of information signs in
different contexts.

The research team has already created the beginnings
of such a database as a part of the original project.
However, there is significant interest from organizations
like the United Nations and Travel Oregon, to continue
to consider how these signs can be standardized interna-
tionally as well as how international travelers compre-
hend these alternative sign designs. This Tech Transfer
activity will contribute to that understanding.

Alternative Applications		
Airport:	Roadway:	Other:
 Christchurch Airport, Christchurch, New Zealand	 Road sign, New Zealand	 Public Library, Washington, D.C.
 Portland International Airport, Portland, OR	 Tourist Information Center, Oxford, UK	 Siri Onscreen Guide, iPhone User Guide
 Sydney International Airport, Sydney, Australia	 Tourist Information Hokitika, New Zealand	 Store Map Ikea, Portland, OR
 Hawaii International Airport	 Author's Pass National Park, New Zealand	 In-Page Analytics, Google Analytics

TECHNOLOGY TRANSFER



Success Story #6: Lowry, We are Here to Help: Enhancing Public Support for Wireless MAC Address Sensing in Transport Data Collection

Investigators: PI Michael Lowry (UI), Yin Hai Wang (UW), Mike Dixon (UI), Ahmed-Abdel Rahim (UI), Mark Hallenbeck (UW)

Project Type: Multi-Institution Project

Title of Original Research: Data Collection and Spatial Interpolation of Bicycle and Pedestrian Data

Research Description: Public transit and nonmotorized travel modes represent convenient, affordable, and sustainable alternatives to personal motor vehicles for many travelers. However, understanding travel patterns and mode choice behavior is crucial to making well-informed planning and operations decisions that will optimize the allocation of limited resources and increase participation in these modes. Thus, PacTrans and the Washington State Department of Transportation jointly funded research focused on leveraging current data collection efforts to obtain more complete travel demand information, and introducing new methods that have the potential to reduce cost and improve the quality and coverage of transportation data.

Technology Transfer: The methods developed in this work have a great deal of potential for practical application in non-motorized mode and transit data collection. However, the issue of public acceptance and cooperation was identified as a possible barrier to large-scale implementation of wireless MAC address sensing. Therefore PacTrans has allocated additional funding to an outreach project that will develop a short film explaining this unique data collection paradigm to the non-engineering public, with the aim of addressing common complaints regarding privacy and safety. The benefits offered by this method of data collection will be presented, including but not limited to the financial savings to transportation agencies and quality of service improvements associated with more accurate and complete traveler OD and demand information. The film created in this project will be released publicly via popular video streaming services, and emphasis will be placed on clarity, simplicity, and entertainment value.



SUCCESS STORY #7: A Digital Platform for Sharing Transportation Education Materials

Investigators: PI Kevin Chang (UI), Co-PI Shane Brown (OSU), Co-PI Robert Perkins (UAF), Co-PI Linda Boyle (UW), Co-PI William Cofer (WSU)

Project Type: Multi-Institution Project

Title of Original Research: Refinement and Dissemination of a digital platform for sharing transportation education materials

Research Description: There are approximately two hundred Introduction to Transportation Engineering courses taught annually in the United States but little evidence to suggest that teaching materials (other than textbooks) are being shared between the instructors of these courses. The National Science Foundation (NSF) spends millions of dollars annually through the Transforming Undergraduate Education in STEM (TUES) program on the development and testing of teaching methods and materials. Conversations with NSF program managers indicate that they are disappointed with the rate of return on this investment, and would like to see much less development and much more sharing and dissemination of best practices. New NSF programs are emerging specifically on utilizing best practices and understanding the adoption process.

Several years ago PacTrans funded a two-year, Multi-Institutional project, bringing together researchers from each of the five Universities in the PacTrans Consortium to address this issue. During the initial phase of this project, the research team developed a framework for a prototype website, the PacTrans Transportation Education Resource Center (pTERC), for sharing transportation curriculum and best practices.

Technology Transfer: PacTrans has since awarded additional funds to this group of researchers to complete the technology transfer process. This process will include the creation of the website explored in the research.

Welcome New PacTrans Staff

Please Welcome our New Communications and Research Manager, Cole Kopca



Cole Kopca joins the PacTrans team as our new Communications and Research Manager. Cole will serve PacTrans by furthering our UTCs visibility to the outside world and by building our name within the industry as one of the premier University Transportation Centers (UTCs) in the country. He will market all of

the great ways PacTrans invests in: students, education, research, workforce development, and technology transfer; and he will assist us in building stronger partnerships and ascertaining how we can utilize our strengths and expertise to assist industry professionals in furthering our region's transportation systems.

Cole has a Bachelor's Degree in Civil Engineering from the University of Iowa and a Master's Degree in Urban Planning from the University of Washington. While in school Cole conducted research for the Runstad Center for Real Estate Studies, and since had been working with Alta Planning and Design, a national bike/ped transportation planning consultant.

A self-proclaimed urbanist, Cole and his wife Emily manage the apartment building that they live in in Fremont. They both volunteer with Young Life, enjoy traveling, skiing, and exploring cities. Cole is an avid homebrewer, enjoys hiking and mountaineering, and wants to change the world by providing all people with a multitude of reliable and healthy transportation options.

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 coalition of transportation professionals and educators from Oregon State University (OSU), the University of Alaska Fairbanks (UAF), University of Idaho (UI), University of Washington (UW), and Washington State University (WSU). With dual themes of safety and sustainability, 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 solutions that we develop will meet the needs of the region and provide direction for the five strategic goals of the U.S. Department of Transportation.

- Safety
- State of good repair
- Livable communities
- Environmental sustainability
- Economic competitiveness

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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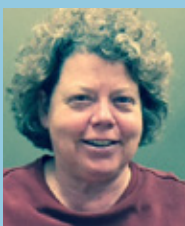


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SAVE THE DATE: UPCOMING PACTRANS EVENTS

PacTrans is now soliciting Multi-institutional project proposals under the theme:

“Developing Data Driven Solutions and Decision-Making for Safe Transport”

Abstract Deadline: Feb. 16, 2016 | Full Proposal Deadline: April 18, 2016

For more information go to: <http://depts.washington.edu/pactrans/RegionalFull/>

PacTrans is now soliciting Small Project proposals under the theme:

“Developing Data Driven Solutions and Decision-Making for Safe Transport”

Full Proposal Deadline: April 18, 2016

For more information go to: http://depts.washington.edu/pactrans/UW_Small2016Apr/

Regional Transportation Seminar Series

We will have an installment of this quarterly seminar this winter – Keep a lookout for the announcement

Engineering Discovery Day

UW Student and Faculty Engineers share their work with peers, teachers, and community

Friday April 22 & Saturday April 23, 2016

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