



# PACTRANS

UNIVERSITY TRANSPORTATION CENTER NEWSLETTER

*Safe and Sustainable Solutions for the Diverse Transportation Needs of the Pacific Northwest*

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## PacTrans Hosts Transportation Safety Workshop on December 9, 2013

More than 40 attendees representing the PacTrans Consortium universities (OSU, UAF, UI, UW, and WSU) and state and private agencies from Alaska, Idaho, Oregon, and Washington, met on December 9 at the Talaris Conference Center near the University of Washington campus in Seattle. The program focused on safe road users, safe infrastructure, and safe operations. The goal was to gather input from all stakeholders to inform the direction of future PacTrans research and workforce development activities.



Top: Faculty, students, and local professionals listening to the presentations.

Left: Dr. Yinhai Wang, UW professor and director of PacTrans, welcomes attendees to the Safety Workshop.

Right: Dr. Kevin Chang, University of Idaho, and Dr. Balasingam Muhunthan, professor and chair of civil and environmental engineering at Washington State University, participate in discussions with attendees.

## About Pacific NW Transportation Consortium



The Pacific Northwest Transportation Consortium (PacTrans) is the new Region 10 University Transportation Center (UTC) established in January 2012 with a \$3.5 million grant from the US Department of Transportation (USDOT).

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

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 transportation 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 US Department of Transportation.

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 sustainable solutions for the diverse transportation needs of the Pacific Northwest.

The UW serves as the lead institution. The PacTrans Center is located at More 112 on the UW campus. Dr. Yinhai Wang, professor of transportation engineering in the Civil and Environmental Engineering Department, serves as director of PacTrans.

### News and Events

## PacTrans Welcomes New Faculty at UW and UAF

The University of Washington and University of Alaska Fairbanks are excited to welcome four new faculty members. They join their respective universities with a strong mix of research, teaching, and professional experience.

**Dr. Nathan Belz** joined the University of Alaska Fairbanks in August 2013 as an assistant professor in the Civil and Environmental Engineering Department. Dr. Belz has an MS degree in civil engineering from the University of Maine and earned his PhD in civil engineering at the University of Vermont. His dissertation focused on using video-based real-world data of traffic operations at roundabouts to identify types of driver behavior that are inconsistent with the traffic theories on which existing models are based. These observations informed the development of a new cellular automata model to assess how incorrect traffic negotiations affect the overall efficiency and performance of roundabouts. He also brings expertise in transportation applications of geographic information systems, transit planning and travel behavior studies, livability and transportation issues in small urban and rural communities, and analysis of driver behavior using GPS and in-vehicle instrumentation. Dr. Belz looks forward to continuing his work on roundabouts, further focusing on the problems inherent to transportation in rural and cold climates, and developing new partnerships and collaborations in the Pacific Northwest region.



For more information about his research, contact Dr. Belz ([npbelz@alaska.edu](mailto:npbelz@alaska.edu)).

Continued on page 3

## PacTrans Welcomes New Faculty (con't from page 2)



**Dr. Don MacKenzie** joined the Civil and Environmental Engineering Department at the UW as an assistant professor in 2013. His research focuses on the interactions of emerging transportation technologies and public policies, and their effects on energy consumption. He is working in three related areas: (1) modeling the charging decisions of electric vehicle drivers and implications for electric grid loads and generation emissions, (2) assessing prospective energy efficiency and travel demand implications of vehicle automation, and (3) evaluating the effects of services such as car sharing and online shopping on total travel demand.

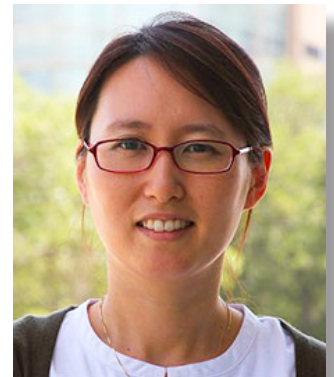
Dr. MacKenzie previously did research and advocacy work on clean vehicles for the Union of Concerned Scientists in Washington, D.C., and worked as a researcher on biofuel technologies at a startup in Vancouver, B.C., Canada. He holds a PhD in engineering systems and a master's degree in technology and policy, both from MIT. He also holds a bachelor of applied science in chemical and biological engineering (environmental option) from the University of British Columbia.

*For more information about his research, contact Dr. MacKenzie ([dwhm@uw.edu](mailto:dwhm@uw.edu)).*

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**Dr. Amy Kim** joins the Civil and Environmental Engineering Department at the UW from Texas A&M University, where she earned her PhD. Earlier in her career she was a project engineer at Primera Engineers and an architect at DLA Architects, Ltd. Amy's research interests include investigating construction management issues for transportation projects. Her current research work investigates long-range strategic issues affecting preservation, maintenance, and renewal of highway infrastructure. Another research project involves developing a comprehensive and scalable scoping process to assist transportation agencies to improve on time and on budget delivery of highway projects.

*For more information about her research, contact Dr. Kim ([amykim@uw.edu](mailto:amykim@uw.edu)).*



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**Dr. Jessica Kaminsky** joined the Civil and Environmental Engineering Department at the UW in January 2014. After receiving her BS in civil engineering from Rice University, she spent six years working in private industry in Montgomery, Chicago, and Sydney. Her PhD is from the Department of Civil, Environmental, and Architectural Engineering at the University of Colorado Boulder. While there Jessica won an EPA STAR Graduate Fellowship, a Mortenson Center of Engineering for Developing Communities Fellowship, a departmental fellowship and a dean's fellowship. Jessica's research focuses on the social sustainability of constructed infrastructure systems in the context of developing or otherwise underserved communities.

*For more information about her research, contact Dr. Kaminsky ([jkaminsk@uw.edu](mailto:jkaminsk@uw.edu)).*

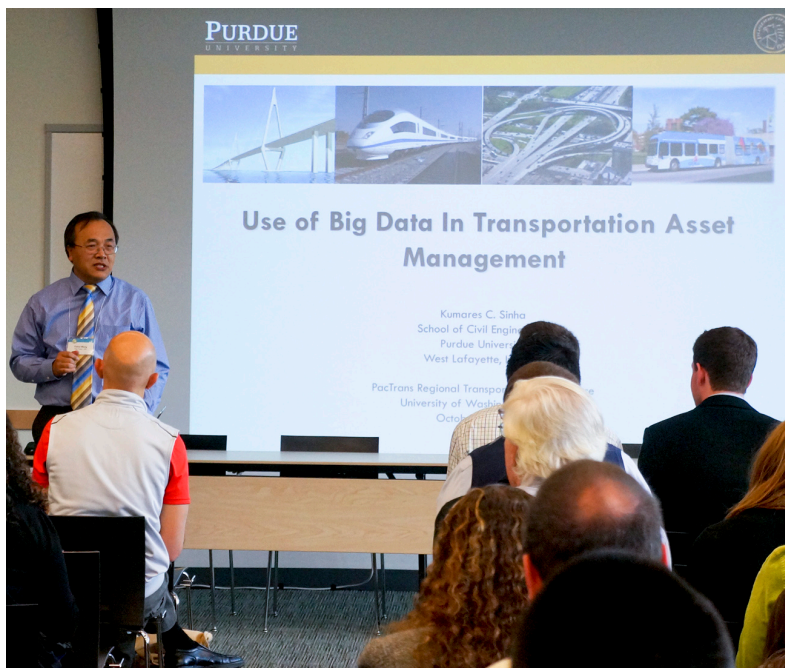




## PacTrans Region 10 Transportation Conference

### *Transportation Decision Making in the Big Data World*

October 18, 2013



Dr. Yinhai Wang, PacTrans director, welcomes conference attendees.

The Pacific Northwest Transportation Consortium (PacTrans), USDOT University Transportation Center for Federal Region 10, uses advanced technologies to develop data-driven, safe, and sustainable solutions for the diverse transportation needs of the Pacific Northwest. The PacTrans Annual Conference on October 18th drew more than 160 participants representing Northwest transportation agencies, universities, and private-sector organizations from Alaska, Idaho, Oregon, and Washington.

In his welcome remarks, Dr. Yinhai Wang, director of PacTrans, highlighted the goal to use technology to collect and share data for developing better decision-making and planning tools for transportation professionals. The conference served as a solid step toward achieving this goal by providing a venue for researchers and planners to meet and exchange ideas. Throughout the day, private sector leaders explained how they can add value to the distribution and use of public data through technology innovations and applications.

PacTrans serves as a focal point within Region 10 to help coordinate UTC transportation research and education programs with regional needs and initiatives. It performs as a research engine for addressing transportation challenges across the region. Furthermore, PacTrans universities and transportation agencies work together synergistically to assess changing needs, showcase new technology, further innovation in research and education, and support workforce development.

## Keynote Speakers

PacTrans was excited to welcome two keynote speakers for the Region 10 conference. **Cam Gilmore**, deputy secretary for the Washington State Department of Transportation, discussed WSDOT's outlook on changes needed in regard to diminished resources, practical design considerations, traffic congestion, sustainability, and use of open data/big data. Goals are to share data, derive more meaning from current data, and use crowd-sourcing to extend knowledge.

**Dr. Kumares Sinha**, professor emeritus at Purdue University and Fellow of the National Academy of Engineering, spoke about big data in the context of the transportation asset life cycle of planning, design, construction, operations, and maintenance and preservation. Big data is rapidly changing the way asset management decisions are made, and analytic approaches are increasingly data driven. More research and institutional innovations are needed to realize the full potential of big data.



Cam Gilmore, deputy secretary, Washington State Department of Transportation



Dr. Kumares Sinha, professor emeritus, Purdue University

## PacTrans Region 10 Transportation Student Conference

### *Data-Based Research, Sustainability/Environment, Human Factors*

October 19, 2013

PacTrans and the UW Student Chapter of the Institute of Transportation Engineers (ITE) jointly sponsored the Region 10 Student Conference. This conference is organized by and for students from Region 10 (Alaska, Idaho, Oregon, and Washington) schools. This year the students chose three topic areas to focus on: data-based research, sustainability and the environment, and human factors in transportation.

#### Student Conference Sponsors

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**UW ITE  
Student Chapter**



**Thank You!**

Randy McCourt, the president of DKS Associates, delivered the keynote speech, challenging student attendees to find and focus on aspects of transportation where their passions lie. He also noted how transportation engineering has changed during his career. Tools of the trade have changed as technology has increasingly been applied to transportation infrastructure, and formerly disparate fields of transportation engineering have been integrated. As an example of the changes making their way through the industry, McCourt noted how studies of drivers' visual focus patterns may impact sign placement and needs for lighted and motion-activated signs. Another focus of his presentation was how human and environmental concerns are changing the focus of transportation engineering. McCourt closed his keynote speech with a look to the future challenges and opportunities students will face, including budgets, funding mechanisms, and electric vehicles.

After the keynote speech students gave presentations. Jonathan Corey of the University of Washington presented on data quality control for inductive loop detector data. Rachel Vogt of Oregon State University presented her work on predicting travel demand changes and modeling the impacts of new technologies and driver population changes on travel demand. Justin Neill of Oregon State University focused on drivers' behavior and responses in work zones.

The conference also included a poster session covering diverse topics. These ranged from a comparison of several travel time measurement technologies, such as Bluetooth-based systems and automatic license plate readers, to a modeling software platform for estimating the stress and level of service bicyclists will experience riding along the streets of a city. Additional topics included research into the effects of texting while driving and the impact of perceived safety on travel mode choice.



University of Idaho student snowmobile team demonstrates a low-pollution snowmobile.

University of Washington students demonstrate an electric and gas race car.





## Research Highlights

# Seismic Performance of Concrete Bridge Columns Made with High-Strength Reinforcement

David Trejo, Andre Barbosa, and Tim Link

School of Civil and Construction Engineering, University of Oregon

Although high-strength steel (HSS) reinforcement is commercially available, its use in transportation infrastructure systems, specifically bridges, is limited. Current bridge design codes in the West and Pacific Northwest (PNW) allow the use of HSS reinforcement in bridge decks, girders, and bents but do not allow HSS in members designed to develop a plastic hinge (i.e., bridge columns). In general, higher steel strengths lead to lower ductility values and this causes concern. Some reports have found that HSS reinforcement (ASTM A706 Grade 80) exhibits ductile properties similar to conventional reinforcement, but the American Association of State Highway and Transportation Officials (AASHTO) has concerns with the ductility in structural elements and other design challenges. Ductility concerns relate to lack of data on steel performance. Design challenges include lack of data for characterizing the reinforcing steel stress-strain models, lack of models for predicting low-cycle fatigue of the materials, and lack of confined concrete models, all of which are important issues in seismic regions in the West and PNW. Ground motions resulting from seismic events can have catastrophic consequences for transportation infrastructure systems. Of particular concern is the possible effect of future seismic ground motions (e.g., the Cascadia Subduction Zone). Subduction zone ground motions (i.e., long-duration motions) increase the probability that structures will be subjected to more inelastic cycles, which may in turn be subjected to low-cycle fatigue and early failures.

The current research is investigating the performance of six (6) reinforced concrete columns made with conventional and HSS reinforcement (3 each) subjected to cyclic loading simulating seismic events. The researchers are comparing the performance of these when subjected to cyclic loading. Figure 1 shows a concrete column reinforced with HSS and subjected to cyclic lateral loads—note that the column is exhibiting significant drift. Figure 2 shows the applied force versus drift of a column made

with conventional reinforcement (C1) and a column made with HSS reinforcement (C2). Preliminary results indicate that columns containing HSS reinforcement exhibit similar structural capacity, a larger drift ratio before reinforcement fracture, and overall similar performance when compared to columns containing conventional reinforcement. HSS may be an effective alternative to conventional steel reinforcement for design of columns located in seismic regions.



Figure 1: Reinforced concrete column with HSS subjected to lateral loads.

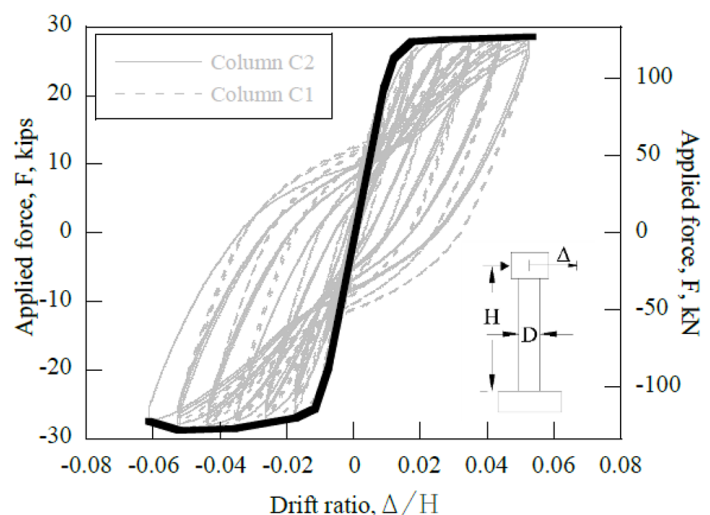


Figure 2: Applied force versus drift ratio for reinforced concrete columns containing conventional reinforcement (C1) and HSS reinforcement (C2).

For more information about this research project, please contact Dr. David Trujo ([David.Trejo@oregonstate.edu](mailto:David.Trejo@oregonstate.edu)).

## PacTrans Seminar Series

### What Is the Level of Volatility in Instantaneous Driving Decisions?

November 13, 2013

Asad Khattak, University of Tennessee, Knoxville

*Dr. Asad J. Khattak is the Beaman Professor of Civil & Environmental Engineering and director of Safety Programs, Center for Transportation Research, at the University of Tennessee Knoxville, where he teaches and conducts research in transportation.*

PacTrans hosted Dr. Asad Khattak on November 13<sup>th</sup> for his lecture on volatility in instantaneous driving decisions. Attendees included University of Washington students, faculty, alumni, and local practitioners. Instantaneous driving decisions are part of incessant human behavior during driving, and strongly affect safety outcomes, energy consumption, and tailpipe emissions. To accommodate changes in surrounding environment, drivers make instantaneous decisions, such as maintaining speed, accelerating, braking, maintaining acceleration or deceleration, or increasing the rate of acceleration or deceleration (referred to as jerk, which is the decision to change the marginal rate of acceleration and deceleration). This lecture examined a framework for understanding instantaneous decisions and explored volatility with the aim of developing a fundamental understanding of decisions. Empirical analysis was based on a large-scale (big data) travel behavior survey database, with 51,337 trips and their associated second-by-second (total 33 million seconds) global positioning system (GPS) data collected in 2011 in Atlanta. Statistical analysis revealed that volatility in instantaneous decisions varies significantly between groups of drivers based on gender, age, trips of varying lengths, and peak hours.



## 2013 Freight Transportation Institute Seminars at WSU



B. Starr McMullen, OSU

Washington State University's Freight Policy Transportation Institute (FPTI) in the Transportation Research Group of the School of Economic Sciences, and PacTrans at the University of Washington, sponsored two seminars at WSU in 2013.

In August, **B. Starr McMullen** from Oregon State University presented a talk on the relationship between vehicle miles traveled and economic activity as measured by gross domestic product. Dr. McMullen received her masters and doctoral degrees from University of California Berkeley. She has served as chair of the Department of Economics at Oregon State University and has been extremely active in state and national associations and committees. Dr. McMullen is widely published in the specialty of applied econometrics in the areas of transportation economics and policy. Of note is her work on the Committee on the Status of Women in the Economics Profession, and service as president of the American Economics Transportation and Public Utilities Group and, recently, as president of the National Transportation Research Forum.



Wesley Wilson, UO

In mid-November, **Wesley Wilson**, professor of economics at the University of Oregon, spoke on coal demand and transportation with a focus on estimating many alternatives in the demand system. A model developed for coal shipments in the Ohio River Basin found important effects related to Clean Air Amendments of 1990. An applied microeconomist, Dr. Wilson specializes in the economics of transportation, industrial organization, and regulation. He has broad interests in the economics of networks, trade, labor, agriculture, and applied econometrics. He earned his doctorate in economics at a Washington State University and was an assistant professor of agricultural economics at WSU before moving to the University of Oregon in 1989. He is also the editor of *Economic Inquiry*.

## Upcoming Events

### PacTrans Seminar Series: Dr. Ruth Steiner

Professor and Director, Center for Health and Built Environment  
Department of Urban and Regional Planning, University of Florida

**February 5, 2014 • 10:15 – 11:30 am**

Husky Union Building, Room 334  
University of Washington, Seattle

*Organized by:*

Pacific Northwest Transportation Consortium (PacTrans)  
University of Washington Department of Urban Planning and Design



Dr. Steiner's areas of expertise span growth management and land use, safety, health and environment, sustainability, and transportation. Her research interests include transportation policy planning, land use interactions, pedestrian and bicycle facility design, travel behavior, travel demand management, and environmental impact assessment. She earned her doctorate in city and regional planning at the University of California Berkeley and an MBA in business administration from the University of Wisconsin Milwaukee.



## Region 10 Transportation Consortium Reception

*The Pacific Northwest Transportation Consortium, in partnership with AUTC and TranLIVE, invite you to a reception for friends and alumni during the 93rd Annual Meeting of the Transportation Research Board (TRB) in Washington, D.C.*



University of Idaho



For more information, please contact:  
[pactrans@uw.edu](mailto:pactrans@uw.edu)  
206.685.6648

Monday, January 13, 2014  
5:30 - 7:30pm  
Marriott Wardman Park Hotel, Washington, D.C.  
Stone's Throw Restaurant and Bar - Chef's Table



## Education

### Oregon ITE 22nd Annual William C. Kloos Traffic Bowl



Above: Students from the six ITE chapters accepting their awards.

Right: OSU student Jennifer Warner accepts the William C. Kloos Scholarship Award.

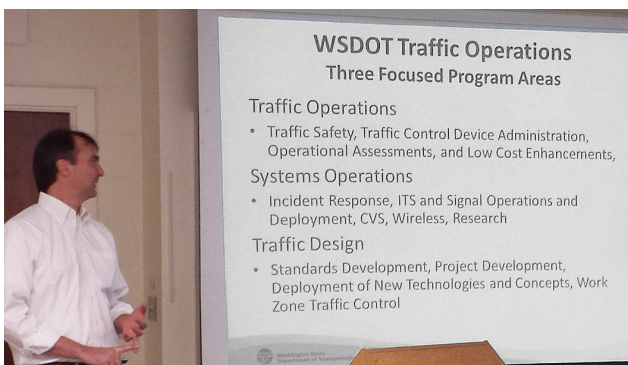
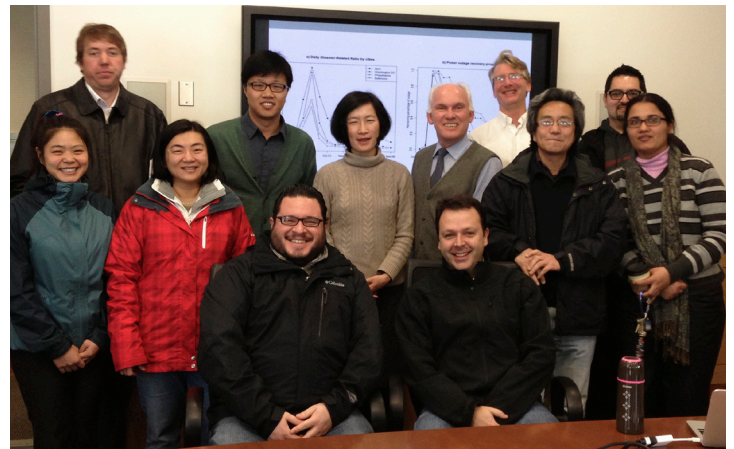


The 22<sup>nd</sup> Annual William C. Kloos Traffic Bowl was held November 21 at McMenamins in Edgefield. Traffic Bowl is a jeopardy style competition with questions founded in transportation engineering knowledge. Six ITE student chapters from Oregon State University, the University of Oregon, Portland State University, Oregon Tech, the University of Portland, and the University of Washington participated.

Jennifer Warner of Oregon State University won the Annual William C. Kloos Scholarship Award for her video focused on distracted pedestrians and the implications for traffic operations and safety. She is a first-year master's student working with Dr. David Hurwitz's research group. Scholarship applications were submitted in the form of an essay, presentation/poster, PowerPoint, or video on topics in transportation traffic engineering, and encouraged students to showcase their communication skills.

### Cynthia Chen Speaks on Using Social Media to Understand Disasters

Cynthia Chen, associate professor of civil and environmental engineering at the University of Washington, gave a December 12th seminar at Oregon State University. Her research represents one of the first steps to analyze social media in the context of disasters. The key argument is that human activity data can be used to help us understand disasters and assess infrastructure performance. Using Hurricane Sandy as the backdrop, Dr. Chen's research group collected Twitter data, developed a DRR measure, and showed that Twitter data can be used to quantify the evolution of disasters. Following the presentation, attendees from several of OSU's engineering programs (photo at right) identified and discussed potential opportunities for collaboration in such research.



### UW Students in Traffic Systems Operations Class Learn from Washington State Traffic Engineer

John Nisbet, director for traffic operations at Washington State DOT, came to campus on December 4 to talk with students in a graduate level class on traffic systems operations. He spoke about the system challenges at DOT and his oversight for statewide programs in intelligent transportation systems. Students benefited from Nisbet's depth of knowledge and 25 years of experience in traffic operations, transportation design, and maintenance.

## Chairman of Israel Association for Intelligent Transport Systems Visited PacTrans and the UW STAR Lab in November



Ur Omry, chair of ITS Israel, with Yinhai Wang, director of PacTrans, and Meghan MacKrell, assistant director.

For more information about ITS Israel, please contact Mr. Ur Omry ([ur@itsisrael.org](mailto:ur@itsisrael.org)).

During a recent visit to Seattle, Ur Omry, chair of the Israel Association for Intelligent Transport Systems, visited the UW campus and met with PacTrans director Dr. Yinhai Wang and assistant director Meghan MacKrell. ITS Israel is a nonprofit organization with a goal to improve road safety, road efficiency, and the environment. Established in 2008 by a group of volunteers, its members include highway management organizations, road and traffic engineers, automotive systems companies, municipalities, and academic institutions. ITS operates in concert with the Israeli DOT, Israel National Road Safety Authority, the Standards Institution of Israel, other major key players, and with ITS stakeholders worldwide.

Now a consultant, Omry previously was CTO at Derech Eretz Highways Management Corporation, the operator of Israel's Highway 6, a fully automated, free-flow toll road. Earlier he was CEO of several high-tech companies, and prior to that, worked in systems capacities in the US airline industry. Omry earned a BSc in civil engineering from the Technion, Israel Institute of Technology, an MS in industrial and management engineering from Stanford, and an MA in philosophy from Tel Aviv University.

## Workforce Development

### Harold R. Wirch Is a STAR Volunteer and Much More

It's difficult to choose highlights among projects in a 40-year career, but some of Harold R. Wirch's lasting contributions are yet to come through his work with future engineers in the Department of Civil and Environmental Engineering at the University of Washington. He has logged countless hours as a volunteer working with transportation graduate students, and he recently mentored a group of 9- to 16-year olds competing in the FIRST® LEGO® League robotics program. Their project, providing elderly and disabled pedestrians additional time to cross at signaled crosswalks, won the most innovative project award in local competition—thanks in part to Wirch's expert advice.

Wirch began his career in transportation and traffic engineering with a mechanical drafting diploma from Seattle Central Community College. He completed his undergraduate studies at the UW and later earned his BS in civil engineering at WSU. He is well versed in geometric design of freeways, city and county arterials, local streets, driveways and parking lots. Wirch just as clearly accounts for pedestrian needs, safety, and performance in traffic signal design. He follows up data analysis with well thought-out recommendations including sketch options.

A PE and retired signal engineer from Snohomish County, Wirch counts his contributions to CEE first among many volunteer efforts. Since retiring in 2010 he has volunteered on Sound Transit's Citizens Oversight Panel, the Brier Washington City Planning Committee, and Snohomish County ADA Review Committee for Facilities in the Public Right-of-Way. He is an invaluable resource for transportation engineering at CEE, and PacTrans is fortunate to have him working with students in the Smart Applications and Research (STAR) Lab.



Harold Wirch works with UW transportation graduate students on traffic signal timing projects.



## Meet the PacTrans Board of Directors



**Yinhai Wang, Ph.D.**  
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University of Washington



**Chris A. Bell, Ph.D.**  
*Associate Director*  
Oregon State University



**Anne Vernez-Moudon, Ph.D.**  
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**Kenneth L. Casavant, Ph.D.**  
*Associate Director*  
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**Linda Boyle, Ph.D.**  
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**Billy Connor**  
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University of Alaska Fairbanks



**Mark Hallenbeck, M.S.**  
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University of Washington



**Karen R. Den Braven, Ph.D.**  
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**Ned Parrish**  
*Manager*  
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