

Research

Rural Beginnings; International Impact

Don't be fooled by WTI's modest origins. The University Transportation Center situated in a small, rural college town in the Rocky Mountains is leaving global footprints. Over the last several years WTI researchers have been making connections and forming relationships which have opened gates beyond our US Highways, resulting in our research and practices being implemented and conducted on international soil. From habitat connectivity in Bulgaria, to temperature effects on deep marine soft clays in Norway, to geosynthetics used for subgrade stabilization in Germany, WTI is sharing information and helping to make an impact beyond our region. The amount of research in Canada prompted the opening of WTI's field office outside of Banff National Park in Alberta in 2003 which now employs three staff and three additional staff work in the field office in Ellensburg, Washington. Students from Australia and Brazil spent their summer as interns for the WTI Road Ecology program – outcomes of researchers' interactions with other institutes over the years. And a growing relationship with organizations in China promises to keep WTI researchers pursuing innovative and collaborative solutions to evolving transportation issues in that country as well.

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China Transportation Delegation Visits WTI

In September 2010, WTI hosted 22 members of the China Transportation Delegation for a two day event as part of an international exchange of research ideas and practices between China and WTI's work in the United States. Led by Ping Cheng, the Deputy Administrator of the Highway Administration Department within China's Ministry of Transport, the delegation represented transportation departments, consulting firms, and research institutes from provinces and cities throughout China.

Xianming Shi, founding Director of WTI's Corrosion and Sustainable Infrastructure Laboratory and Program Lead for WTI's Winter Maintenance and Effects research area, served as host and translator for the visit which included a tour of WTI's laboratories and presentations by WTI investigators on structural health monitoring, bridge deck rehabilitation and accelerated testing, alternative construction materials, road ecology, and WTI's TRANSCEND field test facility. The delegation included a large number of engineers who showed particular interest in, and engaged in lively discussions of, bridge monitoring, testing, and performance issues. Scott Keller of the Montana Department of Transportation's MSU Design Unit was also on hand and provided valuable information about how MDT builds and maintains roads and bridges

CATS Invites WTI to Beijing

In October 2009, a four person delegation from the Chinese Academy of Transportation Sciences (CATS) visited WTI to learn about and discuss road ecology challenges and solutions. This trip led to the signing of a Memorandum of Understanding (MOU) in November 2009 between the two organizations. It establishes collaborative research, education, and professional opportunities as they relate to road ecology and allied transportation issues that impact the environment such as winter maintenance. As the next step in moving forward with specific research projects and collaborative activities with CATS, Mr. Jiding Chen, Director of the Research Center for Transportation, Environment and Safety at CATS invited WTI to visit Beijing for a first hand view of



WTI Researchers with CATS representatives in Beijing

the challenges they are facing and some of the solutions they have pursued.



Yunnan Tea Terraces

 ${\it Highway} \ arch \ vegetation \ retention \ practice$

In September of 2010, a WTI delegation made up of Steve Albert, Director, Tony Clevenger, Senior Wildlife Scientist, Marcel Huijser, Wildlife Ecologist, Xianming Shi, Senior Scientist (and interpreter), and Rob Ament, Road Ecology Program Manager, spent a week with their Chinese counterparts, exchanging ideas, visiting project sites, and developing specific project opportunities. The group visited both completed and ongoing field projects in Yunnan Province (southwest China) to exchange ideas, design methods, and best practices. They toured highway construction and vegetation projects, and remote roadways including the Simao-Xiao Mengyang highway, which includes crossings for wild Asian elephants. A full day of seminars provided opportunities for exchanging information, as each organization presented to the other their latest road ecology research findings and practices.



Elephant highway crossing sign

Photo Courtesy of Marcel Huijser/WTI

WTI researchers were able to see firsthand how they might apply their own research to similar challenges on Chinese roadways. The two partners are now developing proposals for joint areas of collaboration to include:

- Road Ecology Research projects
- A National Database for PDA/GPS data collection
- Training and Workshops
- Evaluation of Signage for Safety and Landscape Design
- Winter Maintenance

The MOU and WTI's resulting relationship with

CATS directly support the USDOT goal of sharing technology, data, and expertise across national boundaries to improve both our domestic and the international transportation system.

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International Interns

Following a year of global interaction and projects for WTI, the summer of 2010 brought an international flavor for our interns as well. A Western Transportation Institute graduate student traveled to the Far East, while interns from Brazil and Australia came to Montana and Washington to work with our Road Ecology experts.

Ben Dorsey, a WTI graduate student studying road ecology, was awarded a grant from the National Science Foundation (NSF) for an East Asia Graduate Fellowship to work with the China Academy of Transportation Sciences (CATS) during the 2010 summer. The Chinese Department of Transportation funded a project in the Yunnan region - the impact of roads on biodiversity and their countermeasures in the three rivers area - and CATS assisted with the project. Dorsey's research





WTI's Xianming Shi (far right) contributed

as researcher and served as interpreter



involved assessing likely impacts to China's rich biodiversity due to new road construction projects in the region. He focused primarily on the impact roads have on the Yunnan Snub Nosed Monkey, one of the most endangered animal species endemic to China, and he will offer countermeasures to protect them.



Ben Dorsey on the Great Wall of China

"Ben's award and research this summer in China is a great spring board for WTI and CATS to begin developing additional projects under the Memorandum of Understanding WTI signed with CATS last fall," says Rob Ament, WTI Road Ecology Program Manager. "The idea is to seek out collaborations to conduct new road ecology research projects that are mutually beneficial."



Lacang River Valley highway construction

Nujiang River Valley

The NSF East Asia Graduate Fellowship grant provided air travel, logistical support, and an eight week stipend while working in China. Dorsey will resume his work with WTI this fall, joining Dr. Tony Clevenger on the Banff Wildlife Crossings Project in Alberta, Canada.

Gayleen Bourke, of East Albury, New South Wales, Australia, spent three months interning with the WTI Road Ecology Program in Washington's North Cascades Mountains this summer. Bourke worked as a field biologist evaluating highway barriers to carnivore movement in the Cascade Mountains, a multi-partner project initiated by WTI in 2008. The Cascades provide a rare opportunity in the Lower 48 to host a full suite of native carnivores—including wolves, wolverines, and grizzly bears—but such wide-ranging species must be able to travel safely across large landscapes to survive. Bourke and her research partner, Ann Winters, hiked long distances through steep mountain terrain to collect noninvasive genetic samples (i.e., hair) from black bears, and to attempt to detect very rare grizzly bears as part of a broader recovery initiative.

"From day one, Gaye's can-do attitude was an asset to our project," says Paula MacKay, Research Associate for WTI. "She hikes like the Energizer Bunny, and her excellent field and organizational skills enabled us to gather an amazing quantity of data." Originally trained as a registered nurse, Bourke is currently enrolled in the Environmental Science Program at Charles Sturt University. Bourke's academic advisor, ecologist Peter Spooner, spent a portion of his sabbatical with WTI in 2009 to learn more about road ecology efforts in North America which led to efforts to set up a future internship. "We hope that our positive experience with Gaye might catalyze other creative collaborations with Peter's program," concludes



Gayleen Bourke (right) and research partner Ann Winters in the North Cascades.

MacKay.



Pat Basting, MDT, Fernanda Abra (center) and Dr. Marcel Huijser

Fernanda Abra, a Brazilian student at the University of Sao Paulo, Brazil, participated in an eight day internship under WTI Road Ecologist, Dr. Marcel Huijser. Abra learned about methodologies and research and assisted with field work. In addition to working with WTI personnel. Abra worked with Whisper Camel of the Confederated Salish and Kootenai Tribes and interviewed tribal members regarding their perspective on mitigation measures for transportation infrastructure along US Hwy 93 on the Flathead Reservation in western Montana. Abra also interviewed Pat Basting of the Montana Department of Transportation on policies and maintenance activities related to highways and wildlife. As a result of Abra's visit, Dr. Huijser has been invited to be a guest lecturer at the University of Sao Paulo in 2011.

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Outreach

5th Annual Western States Rural Transportation Technology Implementers Forum



2010 WSRTTIF convenes in Yreka, CA

The 2010 Western States Rural Transportation Technology Implementers Forum (WSRTTIF) gathered for its fifth annual meeting in Yreka, California last June. This year's 38 attendees hailed from six western states - California, Montana, Nevada, Oregon, Washington, and newcomer Alaska - and represented seven California Department of Transportation (Caltrans) districts, four Caltrans divisions, and four universities (UC Davis, UC Berkley, the University of Washington, and Montana State University).

Established by Caltrans and WTI, the goal of the Western States Forum is to create an educational and training event that assists field engineers, maintenance staff, systems engineers, and communications technicians with the hands-on deployment of Intelligent Transportation Systems (ITS) in rural areas. For rural transportation agencies, technology advancements are often considered out of reach due to limited fiscal and human resources. ITS deployment can also be more difficult in rural locations than in urban areas, due to unique challenges such as lack of

infrastructure, gaps in communication coverage, or lack of access to equipment or technical support. As a result, rural transportation agencies may be reluctant to embark on ITS deployments. The Forum seeks to help them select and successfully deploy technologies that address their most critical transportation challenges by examining what worked and what didn't work for other practitioners in similar deployments.

"Doing ITS in a rural environment is fundamentally different from urban ITS. Rural areas have a bunch of additional constraints and difficulties that urban implementers don't usually have to deal with."

Ian Turnbull, Chief, Caltrans Office of ITS Engineering & Support

Led by a permanent steering committee - Sean Campbell, Caltrans Division of Research and Innovation; Ian Turnbull, Caltrans District 2; Doug Galarus, Program Manager, WTI Systems Engineering Development and Integration group; and Leann Koon, WTI Systems group Research Associate – this year's Forum included six highly interactive technical presentations with in-depth equipment demonstrations. Presenters included, Ian Turnbull and Ken Beals, Caltrans District 2, Loren Turner - Caltrans Division of Research and Innovation, Jason Shaddix - Oregon Department of Transportation (ODOT), Mike Pannone and Laura Edwards - Alaska Department of Transportation & Public Facilities, Yegor Malinovskiy - University of Washington (UW), and WTI's Kelvin Bateman and Dan Richter.

The demonstrations are a valuable feature of the two day event. To illustrate rural challenges and applicability of their travel time field experiments using Bluetooth sensors, UW conducted two experiments near Yreka during the Forum (Anderson Grade, Walters Road) and the results were presented to the group. The devices were set up and collected data during the demonstration. WTI presented their proof of concept for the Automated Safety Warning Controller, a standardized system that interfaces with roadside devices such as sensors and signs. Participants were able to see how things work right in real-time and could evaluate how applicable the product might be to their individual practices. The



WIT's Dan Richter demonstrates the Automated Safety Warning Controller

smaller group setting (Forum is capped at 50 participants) is more conducive for open, honest discussions, allowing state and local transportation professionals to have direct access to ITS technical experts where they can learn about the latest technologies and ask in-depth questions about their specific situations.

The Western States Forum was designed to reach out to state and local transportation professionals, targeting those who implement, operate and maintain ITS technologies, particularly the hands-on practitioners. The Forum embodies the importance and value of learning from real, hands-on experience getting the lessons learned from that experience into the hands of the people who can use it and giving them the tools they need to implement it successfully.

For more details on the 2010 technical presentations and general WSRTTIF information, please visit: <u>www.westernstatesforum.org</u>.

National Summit for Rural Traffic Safety Culture

The second annual National Summit for Rural Traffic Safety Culture was held July 11-13, 2010 in Big Sky, Montana. The Summit was hosted by the AAA Foundation for Traffic Safety and the Western Transportation Institute and sponsored in part by American Traffic Safety Service Association, Centers for Disease Control and Prevention, Federal Highway Administration, and the National Highway Traffic Safety Administration. Similar to the first Summit, this year's gathering continued to strive for increased understanding amongst traffic safety researchers, practitioners, and policy makers about the role of traffic safety culture on behavioral factors that increase rural (and national) traffic crash risk; attitudinal barriers to public and political acceptance of traffic safety interventions; and organizational resistance to safety program change or implementation. The 1 ½ day Summit was comprised of presentations, small group discussions and larger question/answer sessions which generated substantial and lively debate.

The 67 Summit attendees came from 22 states plus Canada and the United Kingdom. Proceedings can be viewed at <u>www.ruraltscsummit.org/10proceedings.html</u> and interested parties can join the <u>discussion group on LinkedIn</u>.

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Montana Summer Institute

The Center for Health and Safety Culture is an integral part of WTI. An inter-disciplinary team of researchers and practitioners dedicated to using science to improve health and safety and transforming cultures.

- Leadership: Leaders transform cultures.
- Communications: Communications define our cultures.
- Integration: Integration strategically aligns multiple strategies and resources

The Center is led by Director Jeff Linkenbach and recently hosted the 2010 Montana Summer Institute on the Positive Community Norms Model. This annual event offers an interactive, skill-building experience focused on the Positive Community Norms Model. Over



Jeff Linkenbach addresses participants at the 2010 Montana Institute

115 participants from across North America practiced applying all seven steps of the Positive Community Norms Model as well as learned about the theory on which the PCN process was built: The Science of the Positive™. Over half of the participants this year attended the pre-Institute session on July 13th which was highly recommended for individuals who are new to the field or want an overview of the theory and practice of the Positive Community Norms model. For more information please visit <u>www.mostofus.org</u>.

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The 2010 National Rural Intelligent Transportation Systems (NRITS) Conference was hosted by the Nick J. Rahall Appalachian Transportation Institute August 1-4, 2010 in Huntington, West Virginia. This year's conference, The Bridge to Success: Engineering the Future of Rural ITS, was attended by over 250 participants and 50 guests from 38 states and Canada who had the opportunity to visit over 34 vendor displays and participate in a wide variety of sessions, professional tours, and activities.

Keynotes for the Opening Session included Congressman Nick J Rahall II, US House of Representatives, a video message from US Senator Jay Rockefeller, and Peter Appel, Administrator, Research and Innovative Technology Administration, USDOT.

The US DOT ITS Joint Program Office hosted the first annual NRITS student paper competition which provided registration and a travel stipend for winners. Undergraduate and graduate students were invited to submit an original written paper on rural intelligent transportation systems. Each winner was required to present their paper at the Conference. Congratulations to the 2010 Student Paper Winners:

- Vijay Kumar Sabawat Krishna, University of Wyoming (1st place), "Variable Speed Limit System on I-80 in Southeastern Wyoming"
- Joseph Staszcuk, Montana State University (2nd place), "Deploying Portable and Advanced Traveler Information Systems: Redding Deployment Evaluation"
- Jessica Mueller, Montana State University (3rd place), "Naturalistic Data Collection in Rural Emergency Medical Services"

This year' conference was sponsored in part by Bayliss & Ramey, Inc., Federal Highway Administration, ITS America, ITS Canada, ITS Joint Program Office, Research and Innovative Technology Administration (RITA), Marshall University, M.H. Corbin, Inc., Open Roads Consulting, Inc., RGA, Inc., Rahall Transportation Institute, Vaisala, West Virginia Division of Highways, and the Western Transportation Institute.

Proceedings can be viewed at <u>www.nritsconference.org/Proceedings2010.html</u>

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Responder System Wins NRITS Award

Developed jointly by WTI and the California Department of Transportation (Caltrans), the Responder System is a communication tool for first responders designed to be used anytime, anywhere – particularly in remote locations. Enclosed in a rugged protective briefcase, it includes a tablet PC, camera, GPS, Wi-Fi, and cellular and satellite modems and provides an easy-to-use means to collect and share



accurate incident information among emergency responders. Examples of uses include earthquakes, plane crashes on highways, bridge failures, major slides, explosions, major traffic accidents and hazmat incidents, fires that effect traffic, and floods. The award was presented during the Opening



Responder System awarded Best New Innovative Product in the 2010 Best of Rural ITS Awards

Session of the 2010 National Rural ITS Conference, held in Huntington, West Virginia, August 2010. Key project team members include principal investigator, Doug Galarus from WTI, Caltrans project manager, Mandy Chu from the Caltrans Division of Research and Innovation, and Caltrans project champion, Ian Turnbull from Caltrans District 2. Doug accepted the award on behalf of the project team. Doug is Program Manager for the Systems Engineering, Development and Integration Program at WTI.

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Education

Undergraduate Research Highlights

The WTI Education Program seeks to enhance student experiential learning by increasing the number of students involved in real world transportation research at the center. At the undergraduate level, the Undergraduate Research Experience (URE) program competitively selects four undergraduates each year to participate in a unique academic year-long research opportunity. The program provides a one-on-one mentoring relationship with a professional researcher at WTI, paid hands-on research experience, assistance in developing invaluable skills in data collection, analysis, and interpretation and in communicating research results to a broader audience. The goal is to foster interest in graduate school and research careers in the transportation field. The students produce a research work plan, submit a final research report, and present their research to WTI staff and students at the end of the program. Three undergraduate students from Civil Engineering and one Chemical Engineering undergraduate participated in the 2009-10 URE program. Project topics encompassed recycled infrastructure materials, self-healing concrete, and deer-vehicle collisions.

As in past years, the URE program continues to produce highly successful products. Two URE students, Brett Larabee and David Schroeder, will present their research entitled "Building Green: Development and Evaluation of an Environmentally Friendly Concrete" at the American Concrete Institute (ACI) Fall 2010 Convention in Pittsburgh, Pennsylvania. Civil Engineering undergraduate Neil DeZort's URE research paper "Development of a Crash Prediction Model for Deer-Vehicle Collisions (DVCs)," was selected for the Institute of Transportation Engineers (ITE) Intermountain Section best student paper award. The work of two former URE participants was recently featured in Discoveries and Breakthroughs Inside Science

(<u>www.ivanhoe.com/science/story/2010/09/760a.html</u>). The students designed and tested a prototype cyclist sensing device using low power radios combined with GPS units to share location information between cyclists and motor vehicles. The prototype was designed by Electrical Engineering undergraduate Gordon Nelson. Penny Atkins, Industrial Engineering undergraduate, then tested the usability and acceptance of the system interface using WTI's driving simulator. The program is supported by US Department of Transportation University Transportation Center funds.

WTI Graduate Researchers Move into the Professional Sphere

The Western Transportation Institute Graduate Transportation Award provides tuition support and a monthly stipend to students pursuing advanced degrees on a transportation topic. Eight graduate students from three different academic departments were supported by Transportation Awards and three recipients completed their graduate degrees this year. All three students have moved onto careers in private consulting, industry, or government. Tiffany Rochelle received her MS in Civil Engineering after successfully defending her thesis entitled "Establishing Best Practices of Removing Snow and Ice from California Roadways." Rochelle now works for 609 Consulting in Sheridan, Wyoming. Shaun Durkee received his MS in Industrial Engineering and accepted a position with Boeing in Pennsylvania. Durkee's thesis studied "The Effect of Simulation Attributes on Driver Perception and Behavior." Zachary Freedman completed requirements for his Masters degree in Civil Engineering. He completed his thesis entitled "Analyzing the Operational Effects of Passing Lanes on Two-Lane Highways" under the mentorship of Dr. Ahmed Al-Kaisy. A portion of Zachary's thesis on "Estimating the appropriateness of a new performance measure: PI," was presented at a poster session during the 2010 Transportation Research Board (TRB) annual meeting in Washington, DC. Freedman currently works as a Research Engineer for the South Dakota Department of Transportation.

WTI Graduate Research Assistant, Joey Staszcuk, completed his transportation-focused Masters degree in Civil Engineering under the mentorship of Dr. Pat McGowen this summer. Staszcuk defended his thesis "Analyzing the Use of Portable Advanced Traveler Information Systems" and also presented his graduate research during the 2010 National Rural ITS Conference (NRITS) in West Virginia this August. He now works as a transportation consultant with Sanderson Stewart in Billings, Montana.

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Advancing Women in Transportation

The Western Transportation Institute regularly supports activities that promote diversity in transportation professions, expose students to the wide array of multidisciplinary opportunities in transportation, and advance students' potential as future professionals. This year, WTI sponsored Janelle Booth's attendance at the WTS Advancing Women in Transportation Annual Conference, held in Washington D.C. in May. Janelle is a graduate student in Public Administration at MSU and a graduate research assistant at WTI. The conference provided networking opportunities with other students and women in the transportation field and facilitated discussion on issues shaping the future of the transportation industry. Janelle had the opportunity to join other student attendees onstage for a photo opportunity with Transportation Secretary Ray LaHood during the opening session. Technical session topics ranged from improving highway safety (led by the Administrator of the Federal Motor Carrier Safety Administration) to Capitol Hill viewpoints on surface transportation legislation featuring a panel of key Congressional staff. Janelle gained a better understanding of the impact of transportation policy and the wide variety of jobs and leadership positions that exist for women in this field.

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MSU Student Chapter Visits Transportation Sites in Salt Lake City, Utah

WTI sponsored the MSU Intelligent Transportation Society-Rocky Mountain Student Chapter (ITS-RM) technical field trip to Salt Lake City, Utah. Graduate and undergraduate students representing various academic disciplines traveled over their spring break to tour a number of transportation sites of interest. The trip was designed to demonstrate the diversity of transportation career opportunities for students in computer science, electrical engineering, and civil engineering. The students visited the Utah Department of Transportation's Traffic Operations Center where they were able to view signal control mechanisms, weather and deicing operations, traffic cameras and the video board room. The Department of



MSU ITS America Student Chapter tours UDOT Traffic Operation Center in Salt Lake City

Computer Science at the University of Utah provided a presentation and demonstration of an autonomous vehicle faculty and students designed and developed for research purposes. UDOT staff provided an overview of Utah's first Continuous Flow Intersection (CFI). The intersection is unique as it allows four unimpeded movements at a time instead of the conventional two. The intersection has resulted in improved safety and more are planned in the corridor as a result.

Transportation consultants from Fehr and Peers provided the student chapter with an overview of a number of recent projects, including new light rail systems, as well as unique software they are using for planning and public presentation purposes. The Utah Transit Authority provided a tour of the Traxx light-rail control center and a rail extension construction site. The students also visited the FrontRunner commuter rail operation center. Ten student chapter members participated in the trip accompanied by faculty advisor Pat McGowen.



MSU ITS America Student Chapter tours light rail construction site in Salt Lake City, UT

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MSU Students and Alumni Sweep the Competition at Regional ITE Events



MSU Institute of Transportation Engineers (ITE) student chapter at Regional ITE Event

Over the years, WTI's Education Program has provided considerable support to student chapter activities that expose students to transportation and provide professional development and networking opportunities. In particular, WTI has supported the activities of the MSU Institute of Transportation Engineers (ITE) student chapter, which continues to distinguish itself at the regional level. This year alone:

- MSU won the ITE Western District Student Chapter Award and the Student Website Award.
- MSU alumnus, Brian J. Walsh, won the Individual Achievement Award.
- MSU alumnus, Danielle Scharf, won the Young Professional Achievement Award.
- MSU alumni served as Western District President (Michael Sanderson) and Secretary Treasurer (Alyssa Reynolds).
- MSU placed 2nd in the student traffic bowl out of 12 teams.
- MSU teams won first and fourth in the inaugural MiteY race during the Western District Conference.
- MSU was a 2010 Western District Data Collection Fund winner.
- MSU student, Brian Church, won the\$2000 Annual Ellis Mathes Scholarship of the Intermountain Section of ITE.
- MSU students, Neil DeZort and Brian Church, won first and second place respectively in the Best Student Paper Competition for the Intermountain ITE Section.

MSU transportation students' ongoing success in the professional sector is a testament to the experiences and skills they gained at the institution.

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Best Student Paper Awards

The number of awards received by students this year is evidence of the quality and productivity of WTI's undergraduate and graduate research assistants. In addition to Neil DeZort and Brian Church's ITE Best Student Paper awards, Janelle Booth also won the best student paper competition on the topic "The Role of School Buses in Rural Evacuations" for the 19th National Conference on Rural Public and Intercity Bus Transportation. Janelle is currently completing her Master of Public Administration degree. She has been working with the Mobility and Public Transportation group at WTI since August 2009. Janelle also recently attended and presented "Rural Transportation Infrastructure Assessment for Evacuation" at the TRB Tools of the Trade Transportation Planning in Small and Medium Sized Communities conference in Williamsburg, Virginia.

News from the Lab

TRANSCEND Lab Update



- A wireless communication system for TRANSCEND has been designed, the hub of which is a 30-ft steel tower located near the shop. The tower will be erected in early October and will allow communications to TRANSCEND's weather station located 2,000-ft from the shop and other data collection and storage hardware on site. Mobile data trailers will be assembled this fall/winter to provide data acquisition and communication needs for projects located anywhere at TRANSCEND.
- Bids to construct a large storage shed were collected late September and the contract will be awarded and a notice to proceed will be issued in mid October. Construction should take approximately 60 days, depending on weather.
- The TRANSCEND Advisory Committee met at Western Transportation Institute on August 23-24, 2010. After touring the TRANSCEND facility in Lewistown, MT and WTI's labs at Montana State University in Bozeman, the committee met with the project team to discuss TRANSCEND's future, areas of potential research and infrastructure needs.

For more information on the research conducted at the facility, please contact Eli Cuelho (406) 994-7886, <u>elic@coe.montana.edu</u>. Visit our website at <u>www.Transcendlab.org</u>.

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Driving Simulator

WTI's Driving Simulator has a new feature. The new Smart Eye tracking system in the Impala will provide 170 degrees of eye tracking capability for the driver. The system captures a three camera panoramic view and is capable of overlaying the driver's gaze attention region onto the video. Additional software allows setting regions of interest within the captured video and will generate statistics on the percentage of time the driver's gaze was focused in the defined regions. The system is also capable of returning the driver's gaze within regions defined in a static world model.



This allows monitoring the driver's gaze in relation to cab instrumentation and the center console.

The system is able to collect data on the driver's eyes, such as eyelid closure, blink rate, and pupil diameter. Parameters such as these can be potential indicators of driver drowsiness and attention. The system can work in a great range of lighting conditions and is generally non-intrusive to the driver.

The eye tracking system gives WTI researchers the ability to study areas of driver behavior such as visual search patterns and driver distraction, which can include factors both internal and external to the automobile cab, drowsy driving, distracted driving, and many more. The system can be coupled with additional psycho-physiological instrumentation to study the driver's reaction in complex scenarios in the real driving world.

For more information on the research conducted at the facility, please visit <u>www.westerntransportationinstitute.org/laboratories/driving/</u> or contact Nicholas Ward, PhD (406) 994-5942.

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New Projects

Feasibility of Reclaimed Asphalt Pavement as Aggregate in Portland Cement Concrete Pavements

Project Objective: The objective of this project is to develop and characterize an environmentally friendly concrete suitable for transportation-related applications in which a portion of the conventional aggregate has been replaced with reclaimed asphalt pavement. <u>Find out more »</u>

Coordinated Speed Management Systems to Reduce Speed-Related Crashes on Rural Roadways: Augmented Speed Enforcement (aSE)

Project Objective - The long-term goal of this project is to develop and evaluate system concepts that can be implemented across the rural road network to reduce speed related crashes. As a first step, the immediate objective if this first phase of research is to deploy a system to reduce speed violations (citations) and the number of speed related incidents at work zones on rural highways. <u>Find out more »</u>

An Assessment of Highway Effects on Flying Squirrel Movement and Population Genetics, at I-90 Snoqualmie Pass East, WA

Project Objective: The goal of this study is to collect baseline genetic and movement information for flying squirrels, and to assess the extent to which I-90 currently represents a barrier to the movement of individuals and the genetic connectivity of the population. <u>Find out more »</u>

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Montana State University College of Engineering PO Box 174250 Bozeman, MT 59717 Tel: (406) 994-6114 www.westerntransportationinstitute.org

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