



Vol. 7 No. 1 September 2013

Technovations in Transportation

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Transportation Technology Center Receives National Grant for Research

by Tara Roberts

Whether investigating vehicle crash risks, making streets safer for pedestrians, or engineering low-emission snowmobiles, researchers in the University of Idaho's National Institute for Advanced Transportation Technology design the transportation systems of the future.

NIATT received a boost this month with a \$570,000 grant from the U.S. Department of Transportation. The award is part of a \$3.4 million grant to the Northwest's USDOT-funded Regional University Transportation Center led by the University of Washington.

The grant allows the two-year-old regional center, which brings together five universities in Idaho, Washington, Alaska and Oregon, to continue addressing the needs of state transportation departments, cities and citizens across the Northwest, said NIATT director Karen Den Braven, a UI mechanical engineering professor.

"The work we are doing has been recognized as important," Den Braven said. "This will strengthen our collaboration and the relationship among the universities and the state departments of transportation."

One new project seeks to help cities better collect data about how bicyclists and pedestrians use city streets and sidewalks.

"The point of the project is to help engineers and planners do better transportation planning for walking and bicycling so that citizens can have more viable transportation choices," said Mike Lowry, an assistant professor of civil engineering at UI, who leads a team of UI and University of Washington researchers on the project.

The team is testing new ways of counting bicyclists and pedestrians, including a pressure tube that can distinguish whether a car, bike or person crossed it and a Bluetooth sensor that can count passersby if they have Bluetooth-enabled devices.

A third technology uses Kinect, designed for Microsoft's Xbox gaming system, to detect people's movement.

"We are adapting Kinect to detect direction, speed, and approximate size, child or adult, of a group

of people walking or biking.” Lowry said. “Existing bicycle and pedestrian video technology cannot do that.”

Continuing NIATT projects supported by the grant include adapting traffic signals for physically impaired pedestrians, investigating methods to reduce crash risks on rural highways and educating teen drivers about the dangers of distracted driving. The grant also helps fund the internationally competitive Clean Snowmobile Challenge Team, which brings together UI engineering students to build quieter, lower-emission snowmobiles.

The grant helps NIATT continue its emphasis on working across state borders.

“The regional transportation center gives the Northwest access to the best of multiple institutions,” Den Braven said. “Chances are, we have the expertise somewhere.”

NIATT also leads a USDOT Tier 1 University Transportation Center, one of only 10 nationwide. For more information about NIATT, visit www.webpages.uidaho.edu/niatt/.

Faculty at a Glance

by **Heloise Abtahi**

Richard Wall, Ph.D., P.E., Professor, Electrical & Computer Engineering



Dr. Richard Wall has been with the University of Idaho since 1990. Now beginning a phased retirement, Professor Wall is enjoying the reduced pressure of teaching half-time. His work with NIATT is also beginning to taper off, though the research he began continues to be developed and improved upon today.

In 2004, Wall began a project based around the simple idea of considering the safety of pedestrians while crossing intersections. The main focus of the project was on helping disabled persons cross safely, especially the visually impaired. Today, the results of that research can be seen around the country in the form of the Advanced Accessible Pedestrian System. Currently under commercial production at Campbell Company in Boise, an example of the system, which uses audio and tactile means to assist disabled pedestrians, can be seen at one of U of I's own campus intersections, 6th & Deakin. The system there was installed and maintained by Wall and his students after an initial installation in Minneapolis, Minnesota yielded positive results. Currently, the project is moving towards further securing the safety of disabled pedestrians while in the crosswalk through the potential use of hailing.

Student involvement with Professor Wall's project has been impressive. Many students praise NIATT's consideration for its students and its ability to offer real-world experience, and the pedestrian guidance project has been no different. Of the initial budget for the project, 80% was dedicated to students. Of the seven graduate students involved since 2004, three have gone on to excellent positions in this field at Campbell Company and Econolite. Numerous interns have gone into graduate programs focused on the development of pedestrian buttons and traffic control. Professor Wall's dedication to student involvement and invaluable research have made and continue to make him an impressive and treasured presence at NIATT and U of I. For additional information on Dr. Wall you can view his profile at <http://www.ee.uidaho.edu/ee/digital/rwall/index.html>.

Suat Ay, Ph.D., Assistant Professor, Electrical & Computer Engineering



Dr. Suat Ay has been with University of Idaho since August 2007, and is currently working on his first project with NIATT and TranLIVE. Starting this fall, Dr. Ay and his team are working to develop a new type of CMOS camera sensor and system. The aim of the project is to reduce complex video processing on the digital signal processor (DSP) while reducing the need for wide bandwidth communication channel load that is typical for camera sensors used for intersection signaling. Currently, the group is working to finish designing the new image sensor integrated circuit. In spring 2014, they plan to build the camera system and move on to lab and field testing.

As with so many NIATT and TranLIVE projects, there is significant student involvement in the project; a Ph.D. student will be working on designing the new image sensor while a team of senior electrical engineering undergraduate students, led by a Master's student in the same field, will help develop the camera system as a part of their senior design class. The team, aptly named "New Perspectives," is at present made up of three electrical engineering students, but Dr. Ay plans to seek out a computer engineer to assist with software development in the spring. The group plans to showcase their work on the project at the 2014 Expo in May. With such an impressive degree of student involvement, Dr. Ay's TranLIVE project seems well-set to aid another generation of NIATT students in succeeding and gaining invaluable real-world experience. For additional information on Dr. Ay, you can view his profile at <http://www.uidaho.edu/engr/ece/faculty/ay>.

Highlights of May 2013 Graduates

by Heloise Abtahi

NIATT has both undergraduate and graduate students working on various projects, approximately 55 different students during a calendar year. We are highlighting some of the graduating class of May 2013 that have received both their undergraduate and graduate degrees from U of I.

Maria Tribelhorn (MSCE '13, BSCE '10)



Maria Tribelhorn earned her Master of Science degree in Civil Engineering with an emphasis in transportation/traffic. Her thesis, titled "Evidence-based Approach to Curriculum Development for the Signalized Intersection Module of the Introductory Transportation Engineering Course," consisted of developing intersection operations curriculum for the introductory transportation engineering course at U of I, which allowed her to develop a deeper understanding of presenting concepts for a more thorough student comprehension. Maria says that her experience with NIATT gave her valuable practice with solving real-world, open-ended types of problems, a skill which helped her impress potential employers. For her, exposure to real issues that allowed students to engage with a complex and well-rounded problem-solving process was one of the most helpful aspects of her experience with NIATT and U of I. Maria accepted a position with DKS Associates in California.

Stephen McDaniel (MSCE '13, BSCE '11)



Stephen McDaniel is a University of Idaho student through-and-through; he got his undergraduate degree in Civil Engineering in 2011 as well as his graduate degree in the same field with an emphasis on the field of transportation here at U of I in May. Now graduated, Stephen enjoyed the emphasis on building up independence as well as the willingness of faculty

and students to help each other out. The learning community at NIATT allowed Stephen to gain a lot of skills that he says he found gave him a definite advantage when interviewing for potential jobs. Successful in his search, Stephen is moving to Missoula, MT with his wife, Kalynn, and their two sons, Roger (age 2) and Theo (1 month). He will be working as an Entry Level Transportation Engineer for WGM Group, Inc. Stephen's thesis title is "Using Origin Destination Centrality to Estimate Directional Bicycle Volumes."

Amanda Battles (MSME '13, BSME '11)



Amanda Battles came to the University of Idaho to study mechanical engineering. She received her Bachelor's from UI in 2011 and has now graduated with her Master's in mechanical engineering. She is an Idaho native, growing up the oldest of three girls on a farm in Squirrel, a small community in southeastern Idaho. Currently, Amanda is a project engineer for Clearwater Paper in Lewiston, ID, where she has been working full-time since February. For her, doing research for the National Institute of Advanced Transportation Technology was an especially valuable experience because it went far above and beyond the typical experience available to a university student and gave her the chance to work hands-on with real people to see how they collaborated in order to reach a common goal. During her collegiate years, Amanda had the opportunity to intern with the U of I at their combustion laboratory in Boise, at BP's Cherry Point Refinery in Bellingham, Washington, with BP Pipelines and Logistics in Naperville, Illinois, and at Clearwater Paper. Amanda is married to Zach Battles, who is currently a third year student at the University of Idaho Law School. They plan to settle down and raise a family in Lewiston. Amanda's thesis title is "Development of an Evaluation Method for Ecodriving Skills."

Chris Eacker (MSME '13, BSME '11)



Chris Eacker's thesis was title "Computational Optimization of Laminate Composites for the Prediction of Performance Metrics Using Finite Element Simulation." During his time at University of Idaho, he conducted research on advanced composite materials and was a member of Idaho Engineering Works for two years as well as the Formula SAE and Formula Hybrid SAE for five years. U of I provided Chris with the opportunity to conduct research on the vehicle designing nontraditional suspension geometries throughout his entire undergraduate career. Chris says that the Formula race car is one of the main projects that attracted him to the U of I and kept him around for his graduate education. Being part of the team gave him the chance to work with very diverse teams of all educational backgrounds and talents, and he believes that the projects and research funded by NIATT provide students with the opportunity to work on projects that offer true career-building experiences early on in their educational career. Post-graduation, Chris has gone to work for BowTech in Eugene, Oregon.

Clean Snowmobile Team Has Banner Year

by Tara Roberts

The University of Idaho's Clean Snowmobile Challenge Team won a record number of awards – nearly half of those possible – at an international competition earlier this year that challenges engineering students to build quieter, lower-emission snowmobiles.

The 13-member team took third place overall at the 2013 Society of Automotive Engineers Clean

Snowmobile Challenge in Houghton, Mich. They also won 10 of 21 possible awards, earning recognitions for snowmobile design, project display, safety, value and innovation, and winning \$1,000 in prize money. The team also was one of only six to complete the competition's 85-mile endurance run.

The team's snowmobile met its goals for emissions and achieved a higher fuel mileage than expected, said Karen DenBraven, director of U-Idaho's National Institute for Advanced Transportation Technology, which sponsors the snowmobile team.

"Everything performed as it was designed to perform the whole time," said DenBraven.

The Clean Snowmobile Challenge presents teams with different criteria each year. This year, the engineers had to design a snowmobile that would run on flex fuel, which can be anywhere from 40 to 70 percent ethanol. They also had to create two modes for the sled, so it could switch between running at optimum power and running more cleanly and quietly.

"We looked at the emissions, the power and the fuel conservation and we tried to get a nice, even balance," explained Drew Hooper, a mechanical engineering graduate student.

The team's snowmobile uses a two-stroke engine like traditional snowmobiles, but runs about 20 times cleaner than the machines commonly in production 10 years ago.

U-Idaho teams have competed for 13 of the Clean Snowmobile Challenge's 14 years. The standards set at the challenge over the years have shaped the snowmobile industry, which has begun producing sleds that have a lower impact on the environment and the people who live near snowmobile trails.

"This competition has shown what is possible," said DenBraven. "They can no longer say it can't be done."

The competition also offers students valuable experience not only in design and project management, but also in writing about and presenting their work.

Dillon Savage, a sophomore mechanical engineering student, said being part of the team has allowed him to learn from mentors and given him a step up in applying for internships.

Hooper, who has been on the team for five years, said the project has introduced him to all facets of the motorsports industry, which he plans to enter after graduation, as well as helped him develop flexibility, goal-setting and engineering skills.

"It's not a two-week project. It's a five-year project," said Hooper. "It's a very big career-opportunity maker for a student."

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Photo courtesy of KRC/MTU – Students attending the competition are picture left-to-right: Alex Fuhrman; Amos Bartlow; Tony Keys; Dillon Quenzer; Trevor Lutz; Chris Farnetti; Alex Wright; Tygh Weyand; Crystal Green; Dillon Savage; Joel Long; and Andrew Hooper.

Funding for the team is provided by a PacTrans UTC USDOT Region 10 award.

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