NIATT

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Technovations in Transportation

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Smart Signals Debuts in Minnesota

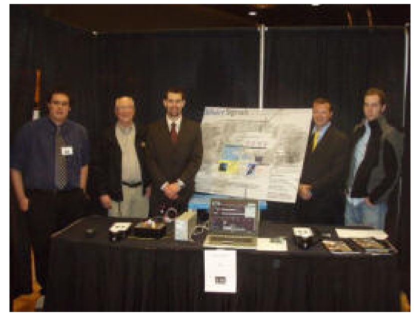
On February 16, 2010 at a temperature below 10 degrees, a new Smart Signals Technology design for Accessible Pedestrian Signals (APS) was installed at a public intersection in a suburb of St. Paul, MN. A team of researchers from the University of Idaho that have been involved in the development of the new system were on hand to observe technicians with the Minnesota Department of Transportation install the systems at two intersections. After the hardware installation, the students demonstrated how each signal can be customized using a laptop computer and a conventional web browser. To date, the Advanced Accessible Pedestrian Signals (AAPS) is "chirping" away. (The "chirp" is the locator tone that helps low vision pedestrians locate the pedestrian button.)

Smarts Signals is an enabling technology initially conceived by Professor Richard Wall in 2004 as a means to improve the capability and safety of controlling traffic signals at intersections using distributed microprocessor based controls that use safety critical network design methodologies. The focus has been placed on improving access and safety for low vision and mobility impaired pedestrians. A partnership was developed with Campbell Company of Boise, ID who manufactures the AAPS systems.

AAPS is different from conventional pedestrian buttons in that information is exchanged between the Advanced Pedestrian Controller (APC) in the traffic controller cabinet and each individual Advanced Pedestrian Button (APB) at the rate of four times a second. Power and communication is distributed through the APBs by employing Ethernet over power line technology on an 18VAC power system. The Minnesota installation demonstrated that the AAPS can be easily retrofitted in existing intersection controls using the pre-existing pedestrian button conductors. The internet connectivity allows traffic agency technicians to view the AAPS system operations remotely to determine the current status of individual pedestrian buttons. The operational data that is logged by the APC can also be viewed over the internet. This data includes hardware failures and the number of calls placed by individual APBs.

Feedback from the Minnesota installation has been very positive and constructive. Although the installed AAPS is fully functional, ideas for improvement were recorded and have already been integrated with the new design. Many ideas arise from the statement "Since we have network communications, can we now do …" Without a tight rein on our imaginations, "feature creep" would never allow us to get out of the laboratory. One of the ideas recently implemented is the ability to update the application program remotely, thus allowing Campbell Company to update existing systems over the internet. The web interface reduces hardware costs and physical size by eliminating displays and keypads.

The step of street deployment is important to the future of Smart Signals because it demonstrates that such systems are extensible by being capable of easily providing advanced features. The communications with the terminal devices (lights, detectors, pedestrian buttons, etc.) facilitates early failure detection. Future research will focus on further simplifying the system installation in order to make the system truly “plug and play."



The Smart Signals Team, (left to right: Cody Browne, Dr. Richard Wall, Craig Craviotto, Zane Sapp, Mat Stein, and Elizabeth Reese-not shown), received the Award for Excellence in Booth Presentations at the 2010 Engineering Expo.

For additional information on this project see

http://www.webpages.uidaho.edu/niatt/Project_Detail.asp?Project_ID=178.

Student of the Year - Howard Cooley

Howard Cooley (center) received the 2009 Student-of-the-Year Award at the 2010 Council of University Transportation Centers Awards Banquet in January. Howard is a civil engineering graduate student at the University of Idaho and has worked with NIATT on a number of research projects. Howard holds three degrees in science and engineering, A.A.S.O. Yakima Valley Community College 2002, BS Washington State University 2004, MS University of Idaho 2007, and is currently working on a PhD.

He is currently involved in a research project for the Federal Highways Administration to develop transportation educational materials for a diverse audience of students, ranging from senior level undergraduates to returning professionals wanting to advance their career. These educational materials are being developed to be delivered in a distance environment.

Howard served three years in the United States Army and worked seven years in private construction as a heavy equipment operator. His construction experience has led him to have broad interests in civil engineering as his course work involved geotechnical, pavements, and traffic elements. Howard is interested in teaching. He has experience as a full time tutor and has taught statics and surveying for the University of Idaho.

Kyte Receives Two Awards

Michael Kyte received the Distinguished Contribution to University Transportation Education & Research Award at the 2010 CUTC Awards Banquet in Washington, DC in January 2010. The award has been given annually since 1998 to honor individuals who have had a long history of outstanding contributions to university transportation education and research. Dr. Kyte served as the Director of NIATT for fifteen years.

While in Washington, DC, Region X (UTCs from University of Washington, University of Alaska-Fairbanks, Portland State University and University of Idaho) honored him by naming the Region X Student-of-the-Year Award after him. Region X selects one student from the four UTC's Student-of-the-Year recipients to be named the "Michael Kyte Region X Outstanding Student of the Year." Yegor Malinovskiy from the University of Washington is the first recipient of the award.

Annual Advisory Board Meeting

The Annual Advisory Board Meeting was held on Thursday, April 29, 2010, coinciding with the University of Idaho College of Engineering's annual Engineering Exposition (**http://www.uidaho.edu/engr/newsevents/events/expo2010.aspx**).

On Wednesday, April 28, 2010, a banquet was held to welcome the board members and other guests. Howard Cooley, NIATT's 2009 Student-of-the Year and PhD candidate in civil engineering, and Randy Maglinao, PhD candidate in biological and

agricultural engineering, made presentations on their experiences working in NIATT and their current project work.

On Thursday, the meeting was in full swing with presentations throughout the day by NIATT researchers seeking funding for the 2010 academic year. The board members interacted with presenters and made recommendations for funding for the next fiscal year.

Virtual Technology and Design Boosts Traffic Signal Systems Education - Written by Joni Kirk

How many cars can make it through an intersection before the light turns yellow? Why did that green light only last 10 seconds? And why do people sometimes hit every red light on the way home?

Traffic system engineers have asked many of the same questions. And educators have struggled to help engineering students visualize the complex systems for managing traffic flow and safety.

"The industry has been struggling with how to train students to have one eye on traffic and one eye on the traffic controller," said Michael Kyte, professor of civil engineering at the University of Idaho. "Traffic engineers need to see – to visualize – complex processes to understand the myriad components and design a system more effectively."

Kyte is principal investigator on MOST, a project to develop curriculum materials and a simulation environment for traffic signal timing, which is funded by the Federal Highway Administration and administered by the National Institute for Advanced Transportation Technology. MOST enables engineering students to directly observe how the signal timing parameters that they select affect the quality of traffic operations at a signalized intersection. While the simulation is helpful, it was missing a key component: more direct visualization of the processes that go on in the traffic controller itself.

"We can't just take our students to an intersection and allow them to change traffic signals for practice," said Kyte. "We needed something that allows us to get as close as we can to the real world environment without screwing things up."

Kyte raised the issue with John Anderson, assistant professor of virtual technology and design (VTD) in the College of Art and Architecture. Anderson's junior-level design class agreed to create an enhanced simulation environment that would work Kyte's existing simulation program, but create scalable complexity.

"Virtual Technology and Design emphasizes the use of visual environments to help solve real world problems," said Bryan Foutch, a junior in VTD from Spokane, Wash. "For our particular project, we wanted to create interactive technologies aimed at education. Traditional teaching mediums are static and good for basic information, but when you factor in complex, simultaneous systems, you need interactive tools."

The VTD students worked with graduate-level civil engineering students, who have questions associated with the beginning learning process.

"It's difficult to take years of experience and give that information to someone else. The current tools don't allow that experience to be transferred," said Foutch. "The engineering grad students understand the issues facing people new to the discipline. They're the ones with trouble understanding the current simulation, so their feedback helps us make this tool more effective."

Working together, the designers and engineers were able to address basic issues.

Kyte is pleased with the progress this year. "The Virtual Technology and Design students developed a tool that takes some of the data from the initial simulation tool and adds in a cool and informative look at timing process. It allows engineers to make connections between looking at traffic and looking at the timing process," he noted.

Another bonus is that the virtual tool is scalable. In the works is the ability to add in a railway, pedestrians, multiple intersections or other factors to make the system more complex. "Observing these factors at work at the same time helps our engineering students understand it better," said Kyte.

Foutch noted that the tool doesn't replace the expert educators, but complements their teaching. "It's a flexible tool that allows the expert to expand on a concept and show significance. At the same time, it allows the expert to pick apart the layers, addressing one thing at a time," he said.

In July, the VTD and engineering team will present the simulation to the Traffic Signal Systems Committee from the Transportation Research Board, a part of the National Academy of Engineering.

"We're excited to receive feedback from experts in the industry," said Kyte. "This is a simulation we hope to provide to educators across the nation. Anything we can do to improve the learning experience is valuable."

Kyte is seeking funding to continue the simulation development next year. "We want to be able to work on a traffic system in real time," he said. "We're just scratching the surface of what we can do."

Traffic Signal Systems Committee Meeting

Join us this summer for the Transportation Research Board (TRB) Traffic Signal Systems Committee meetings to be held on the University of Idaho campus July 18 through July 20, 2010. One full day of the meeting will be devoted to current best practices and innovations in traffic signal education and training, including:

What do university students, engineers and technicians in practice need to know and understand about traffic signal systems,

What resources are available or needed to improve the skills and competencies of engineers and technicians in practice, of university faculty, and of university students, and

How can the Traffic Signal Systems Committee encourage the development of new educational materials, curriculum, tools, supporting research, and other activities to improve education and training in traffic signal systems?

For more information or to register for the meetings - see **http://www.uidaho.edu/tsscmeeting**.

2010 Clean Snowmobile Challenge

NIATT's Clean Snowmobile Team finished in third place over all at the SAE Clean Snowmobile Challenge (CSC) 2010 held March 15 through March 20, 2010 at the Keweenaw Research Center in Houghton, MI. The team didn't let the lack of snow hold them back. In addition to the Third Place Overall victory, the sled team won the following awards: Best Ride, Best Acceleration, Best Handling, and the Cold Start Award. Dylan Dixon, undergraduate team, (pictured left) wins Best Acceleration. Pictured on the right are team members Cole Bode, Dylan Dixon, Neil Miller, Ian Lootens, Drew Hooper, Ty Lord, Austin Welch, Sam Smith, Peter Britanyak and Alex Fuhrman. Team members not pictured are Ryle Amberg, Josh Bartlow, Ben Birch, Eric Buddrius, Jared Denton, Christapher Hill, Giselle Veach and Parley Wilson.

The competition is designed to encourage the development of a snowmobile that will meet or exceed specific required pollution and noise control measures, while maintaining or improving the snowmobile's performance. The 2010 CSC required the snowmobiles be able to use a fuel with a higher percentage ethanol blend. NIATT's snowmobile has a modified stock chassis with a drivetrain designed to minimize sound production and maximize power transmission. The power plant has a smaller stock direct injected two-stroke engine.

For more information on this project see
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