



Technovations in Transportation

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Smart Signals: Enabling Traffic Controller Technology

Discover new traffic signal technologies for improved pedestrian access and safety. Plan now to attend this one day workshop, Thursday, November 2, 2006 on the campus of the University of Idaho. Learn how researchers plan to apply state-of-the-art plug-and-play distributed sensor technology to tap into the power of the modern traffic controller and help identify solutions to assist blind and mobility disabled pedestrians.



Existing traffic signal designs grew out of 1920s technology that was based on electric motor timers and electro-mechanical relays. Individual wires from the relay switches controlled each signal light. Currently, timing plans are switched using solid-state electronics. But the method using a plethora of conductors for distributing the signal and detector state around the intersection has changed little, leading to high installation and maintenance costs.

Regardless of how smart detectors are, existing technology does not enable a traffic controller to differentiate between a truck carrying hazardous material and a camper pulling a boat or a logging truck. There is no way for a blind or mobility impaired pedestrian to inform the traffic controller that he or she needs additional time to cross the intersection. There is no way to selectively assist pedestrians like children of school age. With current technology, detectors can be no more sophisticated than a light switch; signals can be no smarter than a light bulb.



Senior design team accepts award at 2006 Engineering ExpoNIATT researcher **Richard Wall**, professor of electrical and computer engineering, with his team of graduate and undergraduate students, have developed a revolutionary technology to unshackle the power of modern traffic controllers. [Picture at left shows the undergraduate team accepting an award at UI's 2006 Engineering Expo.] The result is safer access for all intersection users by providing better information for pedestrians and drivers. Based on plug-and-play smart sensor technology,

intersections can be renovated to accommodate this new technology with minimal cost and disruption to traffic.

A new countdown pedestrian signal was demonstrated by this **research group** that displays the correct remaining crossing time by providing real-time, direct communications with the microprocessor inside the traffic controller. The smart pedestrian button includes remote activation for low vision or mobility impaired pedestrians.

Register today. It's time to put the intelligence of advanced algorithms available in the powerful microprocessors outside the controller cabinet to work! We can do better at safety, accessibility, cost of construction, and cost of maintenance. We have developed an unbounded scalable technology to unleash that intelligence to work with new and, as yet, unconsidered new sensors and signals that will make our intersections flow smoothly and safely for all classes of traffic. We need your expertise to help us solve the right problems and develop the correct solutions.

For more information on what has been done, visit the NIATT [research database](#) and search for plug in the project titles.

No cost for conference. Lunch and snacks provided. Lodging available at Best Western, Moscow, ID. Transportation to and from the conference provided.

Conference speakers include

- **Tom Urbanik**, University of Tennessee
- **Gary Duncan**, Econolite Control Products, Inc.
- **Carol Baron** and **Jeanne Marie Kopecky**, Idaho School for the Deaf and Blind
- **Paul Olson**, Federal Highway Administration

Region X Workshop – Improving Collaboration in the Northwest

On October 19 and 20, 2006, the four Region X University Transportation Centers, the state Departments of Transportation in the Pacific Northwest, and the U.S. DOT will meet in Portland, Oregon, to continue discussions on how we can more effectively collaborate on transportation research. The idea for the workshops came from discussions that this group has held during the past year on research and education collaboration opportunities. For more information on the conference, please contact NIATT director Michael Kyte.

More information on the last workshop, held in June 2006 in Seattle, Washington, can be found at http://www.webpages.uidaho.edu/mkyte/region10-June_2006/home01.htm

Maintaining Idaho's Rural Roads Using Best Management Practices

Idaho is a state that boasts scenic splendor, especially when one ventures down its numerous rural roadways. Building and maintaining these roads requires adherence to several environmental laws and regulations aimed at reducing soil erosion, minimizing sediment, dust, and chemical pollution, protecting water quality, and preventing damage to fish and wildlife habitat.

One means of reducing negative impacts on the environment is by using environmental protection practices called "Best Management Practices" (BMPs). Best management practices for rural road building have been in use for quite some time; however, until recently none had been developed for road maintenance.

Several years ago, individuals from Custer County, Idaho, the Bureau of Land Management (BLM), the United States Forest Service (USFS), and the Idaho Department of Environmental Quality (DEQ) recognized the need to develop BMPs for rural road maintenance Stacy Smith in Idaho. They believed that collaboration between agencies could help prevent and address environmental problems and help all highway jurisdictions and agencies comply with the laws and regulations at a low cost.

With the help of Doug Moore, director of the Idaho Technology Transfer (T2) Center, and University of Idaho graduate student Stacy Smith (right), the BMP Handbook: Best Management Practices for Idaho Rural Road Maintenance was published in August 2005.



Development of BMPs

Moore was able to secure additional funding for the project from the Federal Highway Administration's Environmental Streamlining Grant and the DEQ's 319 Grant. Smith, as project leader, was responsible for organizing numerous meetings of individuals representing both state of Idaho and federal regulatory and land management agencies. At these meetings, attendees identified specific environmental problems and issues associated with rural road maintenance and successful methods of minimizing them.

A focus group of road foremen and highway supervisors from around the state was formed to assure that the handbook included relevant practices for the maintenance needs of rural Idaho roadways.

Smith says that the feedback she received from the focus group and those who participated in the meetings was crucial to the development of a finished product that everyone could agree upon. "The most challenging aspect of the project was . . . trying to get everyone's buy-in. The road supervisors were happy with most of the content from the beginning. Some of the state representatives on the committee would have liked to see some more strict standards put in place." Smith believes that overall the group worked well together and was passionate about bringing the idea of a handbook into reality.

The Handbook

The completed handbook is divided into six sections. Because every maintenance project is different, it includes a checklist to help maintenance personnel evaluate the site conditions and choose effective BMPs for the specific area in which they are working. Chapter 1 describes ways of conducting routine road maintenance activities to help reduce erosion and sedimentation and have less impact on the environment. Chapter 2 covers maintenance considerations for drainage systems and stream crossings and Chapter 3 describes numerous solutions for controlling erosion resulting from rural road maintenance or other natural disturbances. Included here are ways of slowing the runoff on roads and slopes, maintaining properly-functioning drainage systems, and installing erosion control devices. The small, durable handbook also contains sections with definitions of terms important to road maintenance, agency contact information, a list of permits and local, state, and federal regulations, and grants and funding opportunities.

Smith's greatest hope is that, in time, the practices within the handbook will lead to a standard for the maintenance of Idaho's rural roads and effectively lessen impacts that can occur with the normal maintenance activities of local highway jurisdictions and other agencies that maintain the rural roads in Idaho.

Training Programs

With the completion of the BMP manual, Moore plans to travel throughout Idaho beginning in 2007 to

train road supervisors and their crews how to use of the handbook and to speak about rural road maintenance BMPs. He believes the main benefits of the training program are that maintenance personnel will learn the best ways to comply with environmental laws, improve the environment, and maintain rural roadways so that they are safe, scenic, and effective transportation routes.

The BMP Handbook is available for purchase or download.

Biographies:

Doug Moore is a professional engineer and land surveyor, having enjoyed a long career since graduating with a degree in Civil Engineering from Oregon State University in 1968. The first twenty years of his career were in private industry working in the construction of industrial plants and for both the Florida and Idaho Departments of Transportation. He came to NIATT five years ago as the Director of the Idaho Technology Transfer Center.

Doug, his wife and their dog Woogie live in the Lewis-Clark Valley. They spend their free time at their cabin in Dixie, Idaho. When not enjoying the mountains, they can be found dancing the Clarkston Moose Hall.

Stacy Smith earned her B.S. (Environment Science), B.A. (Spanish) and M.S. (Environmental Science) degrees from the University of Idaho. She now works as a Project Manager for Clear Water Compliance Services in Seattle, Washington, a company that provides storm water treatment services in western Washington, California, and British Columbia.

Research Reports

Use the [research database](#) on NIATT's website to read our most recent research reports. Among them is the final report for the University Transportation Centers Grant-supported project, "Application of Plug-and-Play Distributed Signal Technology" prepared by Richard Wall (professor of Electrical and Computer Engineering at the UI), Darcy Bullock (Purdue University) and graduate student Andrew Huska. Published in January 2006, the report describes the building of a demonstration system to explore the applicability of plug-and-play distributed sensor technology to traffic signals. The paper discusses an open architecture prototype based on 10baseT Ethernet communications connecting a simulated traffic controller to four nodes (a single traffic signal and eight countdown pedestrian signals). Included in the paper are electronic datasheets that describe signals and sensors that adhere to the IEEE 1451 standard and demonstrate the plug-and-play capability.

Wall and Huska presented a paper based on this research at the 2006 Annual Transportation Research Board meeting in Washington, DC. Another paper, "Design Platform for Plug-and-Play IEEE 1451 Traffic Signal" was presented at the 31st Annual IEEE Industrial Electronics Conference in Raleigh, North Carolina (Paper RD-011973).

UI Undergraduates: Apply Now for an Internship

Each year, University of Idaho undergraduate students receive internships to work with faculty members on current research projects. Interns received up to \$1000 per academic year in hourly wages. Besides gaining practical engineering experience, interns put classroom theory into practice.

A yearly symposium provides the opportunity for the interns to present the results of their work to

their peers.

Applications, available [online](#), are due September 30, 2006.

Visit NIATT's Redesigned Website

Over the summer, we worked to redesign [NIATT's website](#) not only to make it not only more user-friendly, but also to provide easier access to our research reports. Thanks to Jenine and Kari in UI's Center for Teaching Innovation for their invaluable assistance!

As we continue to develop our website, we will be creating a library of the work of others and a research repository for our three research focus areas" arterial traffic operations, biofuels, and clean and safe vehicles.

We welcome your comments and suggestions!

From Yuri Mereszczak, 2005 NIATT Student-of-the-Year, to Prospective Students

Prospective Students

Please keep in mind that I'm writing from the perspective of a University of Idaho undergraduate student who went on to do graduate work in Civil Engineering at the University of Idaho.

Graduate school afforded me the opportunity to mature both personally and professionally. Personally, I had more time to assess potential career paths and strengthen my character through knowledge and experiences. Professionally, I could focus on a discipline that I enjoyed. I was able to study in-depth academically, apply my knowledge to real-world situations, and gain contacts with other professionals. I began to realize that I was part of a very large team--transportation professionals around the world--who are collectively working towards a better way to move people. What a motivating thought!

Yuri Mereszczak
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