UTC Spotlight

University Transportation Centers Program

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This month: University of Idaho National Institute for Advanced Transportation Technology

NIATT

This monthly report from the University Transportation Centers Program highlights some of the recent accomplishments and products from one of the University Transportation Centers (UTCs). The UTC Program is administered by the U.S. Department of Transportation's Research and Innovative Technology Administration.

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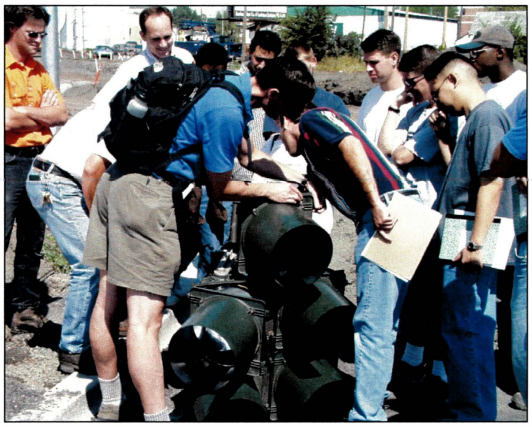
U.S. Department of Transportation
Research and Innovative Technology Administration

Transferring New Technology to Our Students: Integrating Technology Development and Transportation Education

The University of Idaho's National Institute for Advanced Transportation Technology (NIATT) has been transferring technology that it developed to students in the classroom and to practitioners in the field for over 10 years, thanks to a closely integrated program of technology development and transportation education. NIATT and its partners developed and marketed two technologies fundamental to creating more realistic traffic simulation environments: hardware-in-the-loop and software-in-the-loop simulation. The technologies have been integrated into NIATT's Traffic Signal Summer Workshop and Mobile Signal Timing Training course (MOST).



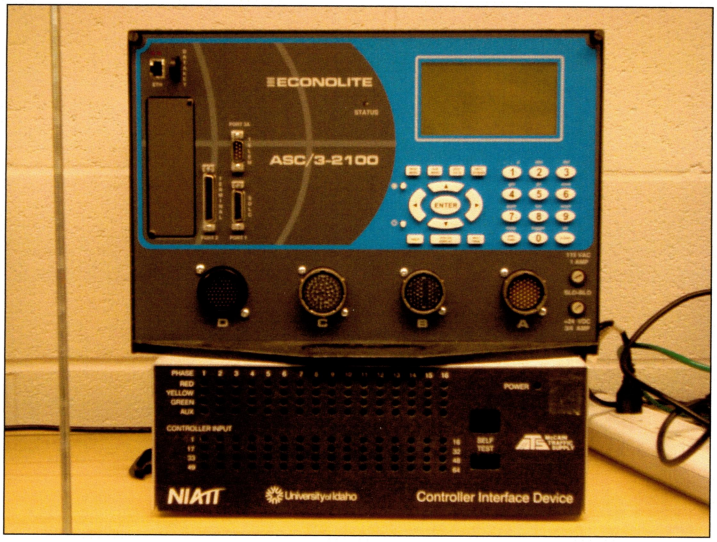
NIATT

Students looking at traffic signal heads in field with instructor Joseph Marek during NIATT's Traffic Signal Summer Workshop

The Controller Interface Device

In 1998, NIATT asked the Federal Highway Administration (FHWA) to identify high priority federal research needs that could be met through a strategic investment of NIATT's University Transportation Center program funds. One result was the challenge from the FHWA to develop a device that could bring real technology to the simulation process, known as hardware in the loop simulation or HILS. NIATT responded to the challenge by developing a Controller Interface Device, or CID. The concept is this: a model simulates traffic flow and sends the traffic flow information directly to a real traffic signal controller, which then provides the signal display status (red, yellow, or green) back to the simulation model. The CID serves as the communications device between the model and the controller.

In the mid-1990s, Tom Urbanik (now of the University of Tennessee) and Darcy Bullock (now of Purdue University) developed a laboratory version of the CID. To make the device more widely available, NIATT assembled a multidisciplinary team of civil, electrical, computer, and mechanical engineering students and faculty, and developed a commercial CID that could connect commonly used traffic simulation models with the most widely used traffic controllers.



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Econolite ASC/3 traffic controller atop NIATT controller interface device (CID)

Over the past 8 years, the CID technology has been transferred to students and to practitioners in the field. More than 130 CIDs have been sold to more than 40 universities, private firms, and government agencies to enable realistic testing of traffic signal timing plans before the plans are implemented in the field.

But one of the real values of the CID is the learning environment that it has helped create. Universities can finally give students the chance to use real technology (in this case, the traffic controller) in a realistic simulation environment to learn an important task: signal timing.

Traffic Signal Summer Workshop

NIATT included an early version of the CID in its first Traffic Signal Summer Workshop in 2000. The purpose of the workshop is to introduce university engineering students to traffic systems technology. The workshop is based on a hands-on approach, with laboratory and field experiences, as the primary learning paradigm. Students participate in a 5-day immersion with traffic signal control technology.

Since 2000, NIATT has served more than 80 students from over 40 universities from across the United States and Canada. The CID is an integral part of the summer workshop, a successful development of a technology that has been integrated into NIATT's educational program.

Mobile Signal Timing Training (MOST)

The success of the summer workshop generated interest in making it more widely available. NIATT responded with the development of software-in-the-loop simulation or SILS, a process that makes realistic traffic simulation more portable. The setting was MOST, for Mobile Signal Timing Training, a new project that NIATT initiated in partnership with the FHWA in 2005. A software version of the CID and the hardware-in-the-loop simulation process was needed to preserve the realism of using a real traffic controller while eliminating the need to transport a van full of equipment to workshop locations. NIATT worked with PTV America (makers of the VISSIM model) and Econolite Traffic Control Products to develop this new simulation environment.

In addition to the simulation environment, NIATT spent 3 years developing and testing a curriculum that could be used in this new, more portable version of the summer workshop. NIATT, and its partners Purdue University and the University of Tennessee, delivered a final version of MOST to the FHWA in March 2009. MOST includes 47 individual experiments, each geared to a specific learning objective about traffic signal timing.

Educational research shows that putting students in an active learning environment produces far better and longer lasting results than the more traditional lecture approach. The MOST laboratories and experiments do just that: short lectures followed by a set of hands-on tasks or observations using the MOST simulation environment.

The Institute of Transportation Engineers has recognized both the Traffic Signal Summer Workshop and the MOST course with its "Innovations in Education" award presented to NIATT at ITE's annual meeting in August 2009.

Where to From Here?

NIATT continues to look for ways to integrate new technology that it develops into the classroom. The CID and the MOST simulation environment are just two examples. Students continue to drive the application of these technologies as they learn about traffic signal operations in a realistic simulation environment, and they continue to apply these technologies in practice after their graduation.

About This Project

Karen DenBraven (kdenb@uidaho.edu) is the new director of the National Institute for Advanced Transportation Technology (www.niatt.org) at the University of Idaho. Rick Wells, Brian Johnson, Ahmed Abdel-Rahim, Michael Dixon, and Michael Kyte contributed to the CID project. Ahmed Abdel-Rahim, Michael Dixon, Darcy Bullock, Tom Urbanik, Enas Amin, Milan Sekulic, and Michael Kyte contributed to the MOST project. The MOST project web site: http://www.webs1.uidaho.edu/most/