

The Signal

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ATAC Researchers Embrace New Focus Areas

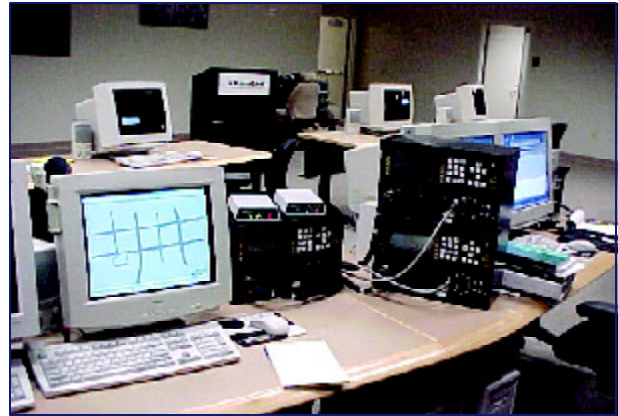
By ATAC Director Ayman Smadi

Welcome! It has been over six months since we sent out the first Signal, the newsletter for the Advanced Traffic Analysis Center. I would like to share with you some of our activities from the past months and update you on a couple of exciting projects.

First, I am happy to report that funding for the ATAC Work Program has been approved by the FHWA. This program will cover ATAC activities through late 2003. Our partners at the NDDOT provided the much needed support to match the ATAC program. In return, we are working with the NDDOT on several major projects, including facilitating the development of a Traffic Operation Center (TOC) in Fargo, as well as supporting other Intelligent Transportation Systems initiatives across the state.

We are extremely excited about our relationship with the NDDOT, as well as our local partners in the Fargo-Moorhead, Grand Forks, and Bismarck areas. These areas are making great strides toward modernizing their traffic control and traveler information systems. Video traffic detection, for instance, is being increasingly used in the three largest urban areas in the state and can provide tremendous opportunities for traffic information and management. In addition, freeway video monitoring is being tested in Fargo to provide the NDDOT and its customers with real-time information about system performance.

ATAC continued on back page



ATAC Works With TransLink® Research Center and Laboratory

ATAC undergraduate researcher Jason Gates spent part of the summer working at Texas Transportation Institute's TransLink® Research Center and Laboratory. ATAC researchers collaborated with TransLink® to sponsor the internship where Jason investigated low-priority preemption routines, a project that is closely related to his current work at ATAC.

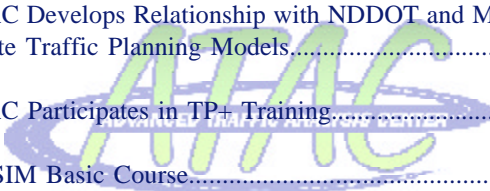
Gates has been studying hardware-in-the-loop traffic simulation, work that is also done at TransLink®. He has been investigating and creating an interface between real traffic signal controllers and a microscopic traffic simulation model, VISSIM.

At TransLink®, Gates worked on a project that investigated low-priority preemption for transit vehicles, a continuation of work performed by ATAC's Kiel Ova. The facilities at TransLink® were ideal to interface three NEMA TS2 traffic controllers. Gates said it was an excellent learning opportunity for him to meet and work with other engineers who share a common interest in applying advanced technology to traffic engineering.

This project expanded into other possibilities for Gates and is now part of his electrical engineering course work at North Dakota State University. Gates is working with a team of students and professors to design a device that interfaces the traffic controller and the simulation software in a PC. The team is taking the lessons learned at Translink® to address some of the shortcomings of current interface devices. They will develop a controller interface device using the most current technologies available for communications. In this process, a circulation of information between the PC and traffic controller is constant.

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ATAC IN THE NEWS

ATAC Expands Program for Transportation Planning

By Ayman Smadi

The Advanced Traffic Analysis Center recently entered into an agreement with the Bismarck-Mandan MPO, the Fargo-Moorhead Metro COG, the Grand Forks/East Grand Forks MPO, and the North Dakota Department of Transportation to support their transportation planning models.

One role of MPO's is to develop, maintain and update transportation plans to guide them in making transportation and land development decisions. Transportation planning is the key component of building a transportation system which supports the goals of the community--safety, mobility and quality of life. Economic development and environmental factors are also considered.

Due to a shortage of qualified staff able to develop and operate transportation models at the NDDOT and MPO's, ATAC has become involved in the process of transportation planning modeling. Within the next five years, North Dakota's MPO's are going to perform a major transportation planning model enhancement. The primary focus of the collaboration will be to support modeling needs in North Dakota utilizing the Fargo-Moorhead MPO as the starting point of the effort.

During the summer, ATAC held a stakeholder meeting where modeling issues and the partnership agreements were discussed. The program was endorsed by respective MPO Policy Boards and the agreement was finalized and signed in October.

The overall goal of the team is to develop a resource for transportation planning modeling suited for small-to-medium size cities. ATAC will support the MPO transportation planning model improvements and ensure consistency across North Dakota in travel demand modeling. It will explore potential applications of new modeling tools or systems and facilitate greater institutional cooperation by providing a neutral source for modeling expertise. The agreement will also provide training opportunities to develop and improve transportation planning models and increase the number of qualified civil engineering students to fill transportation planning positions in North Dakota.

Birst Elected to TCFM Board



Shawn Birst has been elected as a board member for the Transportation Club of Fargo-Moorhead. He will serve as the industry service and education representative for a three-year term.

"I enjoy being involved with the Transportation Club since its members are from a variety of transportation backgrounds, thus broadening my knowledge of transportation," Birst said.

For over 60 years, the Transportation Club has been serving the F-M community with a forum to discuss current transportation issues, gather and socialize with business associates throughout the transportation field. Each year, the group sponsors scholarships for local college students who are pursuing degrees in the area of transportation.

Monthly meetings are held where speakers discuss transportation topics of interest. Birst believes meeting with the club is a great way to network and gain exposure for organizations.

Birst is an associate research fellow who has been with UGPTI/ATAC since 1996.



Dr. Ayman Smadi
Shawn Birst
Kiel Ova
Mary Marquart
Mohammad Smadi
Matthew Martimo
Khaled Shouman
Md. Ahsan Habib
Sonya Nelson
Maria Barnhardt
Dave Bennett
Ryan Erickson
Jason Gates
Renu Jyoti
Matt Kidd, Jr.
Ross Lagasse

Director
Associate Research Fellow
Associate Research Fellow
Administrative Assistant
GraduateAssistant
GraduateAssistant
Graduate Assistant
Graduate Assistant
GraduateAssistant
ResearchAssistant
ResearchAssistant
ResearchAssistant
ResearchAssistant
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ResearchAssistant
ResearchAssistant

This newsletter is published by the Advanced Traffic Analysis Center to provide information about its research and services. For more information, or to be added to the mailing list, contact Sonya Nelson at ATAC, UGPTI, North Dakota State University, P.O. Box 5074, Fargo, ND 58105, by e-mail at sonya@atacenter.org, or by phone at 701-231-8058.

Traffic Adaptive Signal Control

By Mohammad Smadi

The continuous dependence on the automobile as the primary means of mobility has resulted in sharp increases in traffic. Since these increases were not matched by transportation infrastructure enhancements, most urban roadways have inadequate capacities. Even after increasing funding for transportation, environmental restrictions and the difficulty of obtaining lands for right-of-way prohibit any substantial increase in infrastructure capacity. A new approach which emphasizes efficient traffic operations on existing infrastructure may be the optimal alternative.

Delay at signalized intersections contributes heavily to traffic congestion. Traffic signal operations often result in unintended traffic delays, even when they are properly designed. However, traffic signals are often neglected after the initial installation, leaving outdated timing plans that fail to meet current traffic patterns. Traffic Adaptive Signal Control offers great opportunities to enhance signal operations without the costly maintenance and updates of traditional signal control systems. The ATAC is currently looking at using Artificial Intelligence (AI) systems to develop effective traffic adaptive control systems. This research, focusing on responding to significant surges in traffic volumes, is best suited for managing incidents and special events. Early results from the research conducted with Computer Science at NDSU are promising. Look for a complete description of research findings in upcoming Signals.



The Sunsetters pose for a team photo with their car before the race.

Gates Basks in Sun in Solar Car

Undergraduate Research Assistant Jason Gates, a senior from Mohall, N.D., was part of a team of electrical engineering students at NDSU who collaborated to build and race a solar-powered car.

They traveled from Chicago, Illinois to Claremont, California on July 15-25, 2001. The Sunsetters solicited producers of the materials, such as 3M and Optima Batteries which impacted the design aspects before production. The group collected \$50,000 in cash and donated materials.

The Sunsetters team received the best performing award for the overall rookie team, second place for the Barstow to Claremont leg of the race and fourth place overall in the stock class. They also received the team safety award.



ATAC Continues to Offer VISSIM Training

The Advanced Traffic Analysis Center continues to offer training in VISSIM, a powerful traffic simulation tool that supports decisions for traffic operations, transit operations, planning, ITS deployment, and traffic impact assessment.

The VISSIM Basic Course was held in Bloomington, Minnesota and Chicago, Illinois in 2001 and received excellent evaluations from participants. The next VISSIM Basic Course will be held in conjunction with the 3rd Annual North American VISSIM User's Group meeting in Corvallis, Oregon in June.

ATAC staff are also working on an Advanced Course to be held this fall, possibly at ATAC's training facility in Fargo. Topics for this course will include dynamic assignment, transit operations, hardware-in-the-loop, and TEAPAC interfacing.

For more information about how you can attend one of our training sessions, please visit our web site at www.atacenter.org/training.

ATAC Implements New Planning Software

ATAC hosted a training course on the TP+ Software Model in Fargo in October. Participants learned to use the TP+ transportation planning software from Michael Clarke of Citilabs (the developer of TP+).

Members from the North Dakota Department of Transportation, the Fargo-Moorhead Council of Governments and the Grand Forks and East Grand Forks Metropolitan Planning Organization all participated.

ATAC will be using TP+ as part of the new travel demand modeling support program. For more information about this project, please see the article on page 2.

Transit Signal Priority in Small-Medium Size Cities



with headways greater than 30 minutes. During peak periods, traffic congestion causes missed connections at transfer points and can increase the transit rider's total trip time by as much as one hour. TSP could be used in small-medium size cities to alleviate missed connections, enhance service, and possibly attract more transit riders.

This study provides a theoretical evaluation of TSP strategies in a small-medium size city. Several scenarios are evaluated, involving two TSP strategies (early green and extended green), existing and reduced bus headways, and two traffic peak periods. The study findings could give practitioners information on TSP implementation in a similar small-medium size city.

ATAC's researchers recently completed a study using a microscopic traffic simulation model, VISSIM, to model transit signal priority algorithms in the downtown region of Fargo, North Dakota.

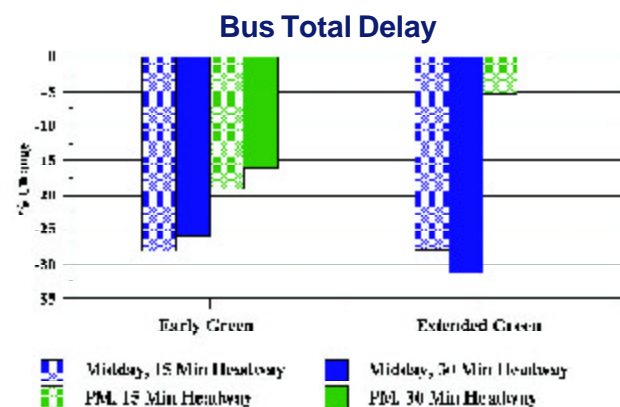
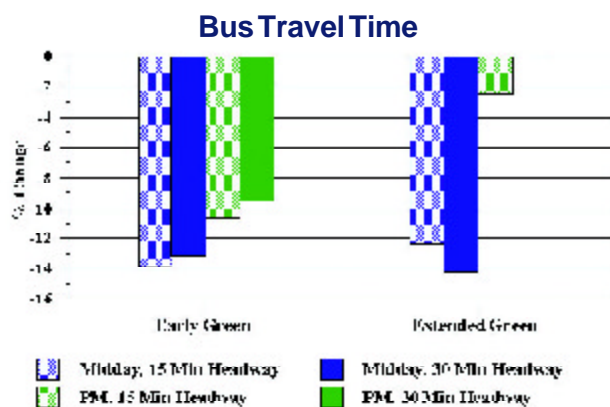
This study is unique since Transit Signal Priority (TSP) has mainly been applied in larger metropolitan areas where demand for transit service is moderate to high and bus headways are less than 15 minutes.

TSP in larger metropolitan areas is implemented to expedite the movement of buses with high occupancy, thus justifying any negative impacts on other traffic and lowering the overall person-delay at intersections. Transit agencies in small-medium size cities on the other hand, have fewer users and operate at less frequency,

Results of the study indicated potential bus travel time savings as high as 14 percent, with a decrease in bus stopped delay as high as 38 percent. Impacts to the local system were investigated as well. Side-street person-delay increased as much as 14 percent during the afternoon peak. More information about this project is available at www.atacenter.org.

TRB PRESENTATION

Kiel Ova presented this research at TRB's 81st Annual Meeting Session 369--Issues in Transit Priority on January 15, 2002 in Washington, D.C.



Meet the NDDOT District 8 Engineer



District 8 Engineer Bob Walton

Of the many challenges a district engineer faces, keeping travelers happy tops the list for Bob Walton. District 8, which encompasses Fargo and the surrounding communities, is heavily populated and has experienced the most growth among North Dakota areas, according to the last census. Due to the large amount of traffic and business commuters, the city requires better maintained roads and Walton believes this is top priority.

"We have the population," he said. "The roads greatly support our local economy and jobs."

Walton believes construction projects are challenging for all districts since the main concern is safety. Another concern is traffic delays during construction. This makes design a crucial part of the process. Design for major projects usually takes place at the NDDOT main office in Bismarck. According to Walton, District 8 is unique since it maintains the Department of Transportation Support Center at North Dakota State University which operates year-round with assistance from college students.

"We try to develop and drive a lot of what happens in the Fargo-Wahpeton area right here," he said.

During the I-29 construction this past summer, Walton received many comments about driving conditions. However, he believes a lot of negative feedback was alleviated due to information that was shared through a public relations campaign.

"It's all about letting the public know what we have, so they can make better decisions," he said. "Of course, what we're always shooting for is safety."

Live cameras were used on www.I29Fargo.com to evaluate and understand what was happening to the traveling public to better suit their needs.

In the future, the NDDOT is looking forward to Intelligent Transportation Systems.

"We're not getting any more employees so we're trying to meet expectations through technology and better equipment," Walton said.

With ITS technology, District 8 could be better outfitted with coordinated signal timing, traffic sensors, effective

communications and dynamic message signs (electronic message boards). Pavement surface and environmental sensors have been installed in three locations in District 8 and have been extremely helpful already.

"Those devices help us a lot more to get to trouble areas ahead of time," he said. "As quickly as weather changes, it helps us make decisions."

Walton said the NDDOT works with ATAC to facilitate traffic flow. He thinks ATAC is a great resource for identifying and analyzing trouble spots, developing effective traffic signal plans across jurisdictional lines, and gathering traffic data to monitor flow during construction. Walton said it is helpful for the NDDOT to have a source for seasonal and daily tracking. ATAC has supported the NDDOT through several completed studies over the past two years.

Walton's experiences in the field lead him to his job at the NDDOT. He graduated from North Dakota State University in 1981 with a degree in civil engineering. He then went to work in oil fields in the southern part of the U.S. Soon after, he went back for five months of military education as a member of the Army Reserve and then moved back to Fargo-Moorhead. He earned a master's degree in business administration from Minnesota State University Moorhead in 1994. While in graduate school, he was activated for Desert Storm with a unit in Bismarck. This was where he developed a relationship with people at the NDDOT and led to a job in 1991 in program and project development. He wrote environmental documents for rural road construction projects for three years and accepted a position as urban engineer for the NDDOT. He then served as assistant planning and programming engineer where he worked to schedule projects in North Dakota based on funding constraints. In April 1999, he became the District 8 engineer.

Walton believes the best part of working for the NDDOT is that his job is never boring.

"We've always met the challenge in this district and that's so satisfying," he said.

DID YOU KNOW. . .

North Dakota has more miles of road per capita than any state in the nation.

North Dakota has the second smallest department of transportation, in terms of employees, in the nation.

NDDOT maintains more lane-miles of roads per maintenance employee than any other state in the nation.

In North Dakota there are more vehicles registered than there are residents of the state.

(Information available at: <http://www.state.nd.us/dot/>)

Address Correction Requested

The Advanced Traffic Analysis Center
Upper Great Plains Transportation Institute
North Dakota State University
430 IACC Building, PO Box 5074
Fargo, ND 58105
www.atacenter.org



ATAC continued from front page

By working on the development of the TOC in Fargo, the ATAC will share gained knowledge and experiences with other locations in the state.

By late Spring 2001, we began working with our state and local partners on establishing a new focus area at the ATAC to provide travel demand modeling support for the NDDOT and North Dakota MPO's. Through a series of discussions and meetings, we were able to outline goals and objectives of the program, a time-line for implementation, as well as a funding mechanism. This pilot program was officially endorsed by various partners consummating in a legal agreement signed in October. Please refer to a special article about this program on page 2.

Another major initiative is the ATAC move to Hastings Hall. Our needs have outgrown current lab facilities and office space. Therefore, work is underway for remodeling the eastern half of the lower level of Hastings Hall. The new space will provide us with a more integrated space, including a spacious training room with state-of-the-art equipment, a more open Traffic Lab with increased work areas, as well as office space for ATAC research staff. The move could

not have come at a better time as we prepare to host even more training programs.

Our student numbers continue to grow, and so do their contributions. Our students, who are very active in the ITE Student Chapter at North Dakota State University, attended the Annual ITE Meeting in Chicago last August and had an opportunity to learn and interact with their peers. Recognizing the interdisciplinary approach to transportation problems, we pride ourselves on having students from such diverse backgrounds as civil engineering, electrical engineering, computer science, business, and communications. Electrical engineering students are working to develop a cost-effective controller-interface-device as part of their senior design project.

I encourage you to become more familiar with our program and take advantage of our resources. In the next few months, we will be developing a library of selected reports, studies, and links pertaining to small-to-medium size cities. Please visit www.atacenter.org often and make sure you let us know what you think.