NEXTRANS Center Hosts Inaugural Summit

High-level stakeholders in the federal, state and local governments, industry, university and the non-profit sectors met on May 5 at Purdue University during the Inaugural Summit of the NEXTRANS Center. The Summit, titled “Exploring Partnerships for Innovative Transportation and Logistics Solutions”, examined holistic approaches for addressing the issues of congestion, mobility, safety, infrastructure addition, maintenance and renewal by leveraging technology, financing and public-private partnerships.

The plenary session of the day-long program opened with a presentation from NEXTRANS Center Director Professor Srinivas Peeta. Professor Peeta articulated the need for innovative and holistic solutions for the multidimensional challenges and triggers in the transportation sector and observed that an integrated approach may be the only sustainable option. His talk was followed by two presentations on National Transportation Vision and Challenges for the Future. Administrator Paul Brubaker of USDOT’s Research and Innovative Technology Administration (RITA) focused on the issue from the Federal Government perspective. Michael Walton, Ernest H. Cockrell Centennial Chair in Engineering at the University of Texas at Austin and the immediate past chairman of the American Road & Transportation Builders Association (ARTBA), focused on the issue from the industry perspective.

The plenary session was followed by a networking hour showcasing the collective expertise of the NEXTRANS Center’s partner institutions through display booths and student poster presentations. Administrator Brubaker interacted with NEXTRANS Center students from Purdue University, University of Illinois at Urbana-Champaign and Ohio State University as well as undergraduate students from Purdue’s Environmental Engineering program and high-school students from Crawfordsville, Indiana. He also visited display booths presented by Purdue’s Discovery Park, Research Park, and Technical Assistance Program, as well as the Illinois Center for Transportation, Ohio State University Transportation Research Labs, and Martin University.

Continued on Page 4
Welcome to the Inaugural Issue

On behalf of the NEXTRANS Center, I welcome you to the inaugural issue of the Center’s newsletter, The NEXTRANSporter. NEXTRANS is the U.S. Department of Transportation’s Regional University Transportation Center for Region V, covering the states of Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin.

Our vision is to seek integrated solutions to transportation and logistics problems that entail a holistic approach across multiple dimensions while leveraging technology to further innovation. While we seek to explore linkages across multiple challenges that arise in this context, we focus broadly on mobility, safety, and infrastructure renewal. We also aim to address regional needs related to efficient intermodal freight transportation and logistics systems.

The NEXTRANS Center is a multi-university consortium consisting of Purdue University, Ohio State University, University of Illinois at Urbana-Champaign, Martin University, Wayne State University, and the University of Wisconsin at Platteville. Resource sharing partners include the Illinois Institute of Technology and Indiana University-Purdue University at Indianapolis. The Center also receives key support from many public and private sector partners. A primary goal of the Center is to foster public-private-academia partnerships that leverage limited resources and acknowledge that partnerships involving multiple stakeholders are essential to address current and future transportation challenges.

Since starting our operation in Fall 2007, the NEXTRANS students, faculty, and staff have been involved in various research, education, and technology transfer programs. On the research side, the Center selected the first year projects after a formal external peer review process. These projects are currently underway, and address topics that span transportation, logistics, and related domains. Our second year research selection process commenced recently. Our education activities involve graduate, undergraduate, and high school students, and include research training, internships, course competitions, and focused transportation projects.

The outreach activities range from Center-conducted sessions in various transportation and logistics conferences to our Inaugural Summit on May 5, 2008. The Center’s Inaugural Summit brought together national and regional stakeholders from government, industry and academia to explore future challenges, vision for transportation and logistics, and the role of integrated solutions in addressing the associated problems. Another element of our outreach is the focus on seeking partnerships with the private sector.

I welcome you to browse through our website: 
http://www.purdue.edu/dp/nextrans, to obtain more detailed information on our programs and activities. We also welcome collaborations as we together seek the next generation of transportation solutions to multidimensional challenges that are sustainable and ultimately reflect on our quality of life.

- Srini, June 2008

Srinivas Peeta Delivers Opening Remarks at the Indiana Logistics Summit

September 25, 2007 – Professor Srinivas Peeta, director of Purdue’s NEXTRANS Center, delivered the opening remarks for the 5th annual Indiana Logistics Summit during its Networking Day. The two-day conference held at the Indianapolis Marriott Downtown focused on how to expand the competitive advantages of the state’s transportation, distribution and logistics industry.

In his presentation titled “NEXTRANS Center: Objectives and Mechanisms for Collaboration in Logistics,” Professor Peeta provided background, quick stats, vision, organization and theme of the new Center. He proceeded to outline its collaboration potential for logistics by leveraging the Center as a platform for focused and coordinated actions, a partner for research proposals and projects, a consultant for technical and strategic issues, and a venue for providing national visibility for transportation issues and opportunities.

Kumares Sinha Elected to National Academy of Engineering

February 9, 2008 - Kumares Sinha, the Edgar B. and Hedwig M. Olson Distinguished Professor of Civil Engineering, was among the 65 new members and nine foreign associates elected to the National Academy of Engineering this year.

"Election to membership in the National Academy of Engineering is one of the highest distinctions that can be bestowed on an engineer," said Leah Jamieson, Purdue’s John A. Edwardson Dean of Engineering and a 2005 academy inductee. "Professor Sinha was elected for his contributions to the advancement of highway infrastructure engineering and management and to the education of transportation professionals worldwide." Professor Sinha’s research on system performance, costing and network optimization have been adopted in pavement, bridge, and safety management systems developed by US Army Corps of Engineers, Federal Highway Administration, and National Research Council and are used worldwide.

"I am humbled by this honor because the recognition comes from my peers," Sinha said. "Purdue is known for its outstanding engineering programs and it’s gratifying to be part of this team." (Courtesy – Purdue News Service)
Open House Draws Wide Cross Section of Purdue Faculty

March 7, 2008 - The NEXTRANS Center hosted a Faculty Open House at its offices within the Purdue Research Park. A wide cross section of Purdue faculty representing civil engineering, industrial engineering, electrical and computer engineering, agricultural economics, computer science and management, visited the Center to meet with the center director and staff and learn about the research project selection process.

Attending faculty members were briefed about the upcoming call for Research Need Statement (RNS) and criteria for meeting the thematic and cost-share requirements for a fundable NEXTRANS project. A list of previously funded projects and information about other programs and initiatives of the Center were also provided. Faculty unable to attend due to prior commitments scheduled individual appointments and visited the Center separately to obtain information and discuss their project ideas with the NEXTRANS staff.

Kalafatas and Peeta Win Best Paper Award at the AATT 2008 Conference

May 30, 2008 - A paper co-authored by NEXTRANS Center Ph.D. student George Kalafatas and Director Srinivas Peeta won the best paper award at the 10th International Conference on Applications of Advanced Technologies in Transportation (AATT 2008) in Athens, Greece. It received the Best Paper Award in Traffic Engineering from among 800 papers from over 25 countries.

The paper, titled "A direct bridge between dynamic traffic assignment and graph theory," proposed an innovative modeling approach for dynamic traffic systems and operations. The contributions are twofold. From an applications standpoint, dynamic traffic systems can be simulated with significantly reduced computational times. This is an important step towards real-time route guidance in congested traffic networks, as crucial estimates for the network status can be provided faster to drivers. From a theoretical standpoint, dynamic traffic systems are modeled with an exact graph theoretic representation. This enables the elegant illustration of the synergy between transportation engineering and graph theory.

UIUC Sweeps FAA Design Challenge for Airport Operations and Maintenance

June 2, 2008 - The Federal Aviation Administration (FAA) Design Competition for universities has announced the award winners for the Airport Operation and Maintenance Design Challenge. Students from NEXTRANS' major partner, the University of Illinois at Urbana-Champaign (UIUC) won first, second, and third prizes in this category.

The selection was made by a panel of FAA, industry, and academic experts. The winners were:

- **First Place:** "Long-Lasting Pavement Structure Rehabilitation: Hot-Mix Asphalt Overlay with Steel Reinforcement Netting Interlayer System" by Hao Wang and Jonguen Baek. (Advisor: Imad Al-Qadi)
- **Second Place:** "Aircraft Wander Effects on Unbound Aggregate Layers" by Phillip Donovan. (Advisor: Erol Tutumluer)
- **Third Place:** "A Fast and Automated Approach for Monitoring Groove Deterioration at Airport Pavements" by Hasan Ozer. (Advisor: Imad Al-Qadi)

(Courtesy: Illinois Center for Transportation)

**EDUCATION**

**NEXTRANS Students Showcase Research Projects**

Graduate students from Purdue University, University of Illinois at Urbana-Champaign, and Ohio State University got an opportunity to showcase their research projects to RITA Administrator Paul Brubaker and other federal, state and private sector officials and faculty attending the NEXTRANS Summit on May 5, at Purdue University. In addition to describing the problem statement, methodology, goals and objectives, and significance and benefits of the project, students were asked to indicate which research dimensions of the Center were being addressed.

*Continued on Page 5*
“Transportation, Logistics, and Economic Development” was the title of a panel discussion that followed the networking hour. The discussion was moderated by Kumares Sinha, Olson Distinguished Professor of Civil Engineering at Purdue University. Panelists making presentations were INDOT Deputy Commissioner John Weaver, ODOT Deputy Director Howard Wood, IDOT Engineer of Material and Physical Research David Lippert, WisDOT Administrator for Transportation Investment Management Mark Wolfgram, and MDOT Bureau Director for Highway Delivery John Friend. They were joined by Rich Cooper and Randall Blankenhorn, executive directors respectively of the Ports of Indiana and the Chicago Metropolitan Agency for Planning.

Indiana Department of Transportation Commissioner Karl Browning was the master of ceremony for the luncheon program, which featured a major address by Purdue's Vice Provost for Engagement Victor Lechtenberg. After describing some of the major initiatives through which Purdue was transforming itself as a 21st century research university, Lechtenberg elaborated on the vision of the NEXTRANS Center. He highlighted its quest for attaining sustainability by partnering with academia, industry and government and linking innovation with education and technology transfer. The Luncheon program was followed by a small award ceremony that recognized the achievements of high-school and undergraduate students and critical contributions to the Center start-up by its transitional team.
The afternoon portion of the program featured government-industry-university dialogue on integrated solutions focusing on four critical areas of the NEXTRANS Center: (1) Intermodalism; (2) Integration Across Goals; (3) Leveraging Technology; and (4) Public-Private Partnerships. Representing the government side in these four parallel sessions were Keith Bucklew (INDOT), Thea Graham (FAA), Don Foley (Indiana Economic Development Corporation) and Thomas Marchessault (RITA). Dave Semenuk (Walmart), Mike Tzamaloukas (DASH Navigation), Harry Voccola (NAVTEQ) and Fidel Saenz de Ormijana (Ferrovial Agroman) contributed the industry perspectives. The academic views were represented by Professors Laurence Rilett (University of Nebraska – Lincoln), Hani Mahmassani (Northwestern University), Ben Coifman (Ohio State University), and Michael Walton (University of Texas at Austin). Summary from each discussion were presented in the final session of the program by Laurence Rilett, Hani Mahmassani, Mark McCord (Ohio State University), and Robert Bernhard (University of Notre Dame).

More than 165 participants attended the Summit, which drew faculty and students from the major partner Universities as well as NEXTRANS Center’s educational partner Martin University. Representatives from four other UTCs, University of Nebraska – Lincoln, University of Wisconsin-Madison, University of Toledo and Northwestern University joined transportation faculty from other universities in the Midwest region to exchange views and discuss opportunities for collaboration. Attending the summit from the public sector were officials from USDOT’s RITA, FAA, and PHMSA, state DOT’s in Region V and various local and regional planning agencies. Summit Sponsors included Purdue Discovery Park, Bingham McHale, NAVTEQ, UPS and Hellman Logistics. Additional information including copies of presentations can be obtained by visiting the NEXTRANS website at www.purdue.edu/dp/nextrans.

NEXTRANS Students (Continued from Page 3)

In total eleven students participated: five from Purdue and three students each from the University of Illinois at Urbana-Champaign and Ohio State University. The posters highlighted the diverse project portfolio of the NEXTRANS Center showcasing the integration of goals, methodology, and technology, covering the issues of mobility, safety and infrastructure renewal, and addressing regional and national needs in transportation and logistics. Names of participating students, institutional affiliation and the title of the poster are provided in the Table below.

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<thead>
<tr>
<th>Name</th>
<th>Institution</th>
<th>Poster Title</th>
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<tr>
<td>Qiang Bai</td>
<td>Purdue</td>
<td>Analysis of Trade-offs in Highway Project Selection for Integrated Asset Management</td>
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<tr>
<td>Cheng Chen</td>
<td>OSU</td>
<td>Campus Transit Lab: Advanced Sensor Technology Applications</td>
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<tr>
<td>Eshan Dave</td>
<td>UIUC</td>
<td>Development of Cohesive Zone Based Thermal Cracking Prediction Model</td>
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<td>Salvador Hernandez</td>
<td>Purdue</td>
<td>Less-than-Truckload Carrier Collaborative Networks</td>
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<tr>
<td>George Kalafatas</td>
<td>Purdue</td>
<td>Network Models to Develop Innovative Transportation and Logistics Solutions</td>
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<td>Seoungbum Kim</td>
<td>OSU</td>
<td>Length-based Vehicle Classification on Freeways from Single Loop Detectors</td>
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<td>Xiaopeng Li</td>
<td>UIUC</td>
<td>Optimal Sensor Deployment for Traffic Monitoring in Large-scale Transportation Networks: A Preliminary Study</td>
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<td>Justin Quear</td>
<td>Purdue</td>
<td>Changes in Transportation Arising from Biofuels in Indiana</td>
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<td>Anuj Sharma</td>
<td>Purdue</td>
<td>Improving Signal Operations by Modeling the Driver's Mental Conflict on the onset of Yellow</td>
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<td>M. Wang</td>
<td>UIUC</td>
<td>Effects of Speed Photo Enforcement on Speeding in Work Zones</td>
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<tr>
<td>Fanyu Zhou</td>
<td>OSU</td>
<td>Incorporating Aerial Image-Based Information in AADT Estimation</td>
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Current NEXTRANS Center Graduate Students at Purdue University
Left to Right: Sal Hernandez, Yu-Ting Hsu, George Kalafatas, Maria Marchouk, Amit Singh, Silpa Yanduru, Craig Rissmiller

NEXTRANSporter Summer 2008
EDUCATION

Undergraduate Students Take on the “Last Mile” Challenge

Approximately fifty-five percent of the gasoline in the United States is consumed by passenger vehicles traveling "the last mile" in the global supply chain. There are many reasonable and feasible alternatives to meeting transportation needs of this "last mile" besides gasoline powered passenger vehicles – which historically are trending toward large inefficient SUVs carrying only a single person. Moreover, increased urbanization is significantly increasing the opportunities for replacing single passenger vehicles with alternative transportation powered by renewable energy.

Against this backdrop, Purdue undergraduate engineering students in Professor Larry Nies’ class were charged with developing a conceptual design for a transportation system for a large urban area that is exclusively powered by renewable energy collected locally (within 100km). The students were divided into fifteen teams with five teams each assigned to work on the Greater Metropolitan areas of Chicago, Houston and Seattle. The task was to analyze the current transportation system in these areas and provide a conceptual design for meeting the transportation and transportation energy needs for the year 2050.

The designs were entered into a poster competition on March 3rd which was on display at the Purdue Memorial Union. Posters were evaluated, among other things, for the quality of the analysis and assessment of the transportation needs, clarity of the presentation, feasibility of the design, and knowledge of the team. The teams with the best posters in each group were invited to present at the NEXTRANS Inaugural Summit on May 5 and receive "Achievement in Sustainable Design" awards and certificates from Administrator Paul Brubaker.

The winning teams were:

Seattle: Group 4 (Engstrom, Coffey, Eaton, Burch, Cox, Stanish and Walker);
Houston: Group 9 (Stark, Gaspar, Hubacek, Jarrett, Liechty, Wojcicki, and Dracheva);
Chicago: Group 5 (Johnston, Hubbard, Conrad, Carnes, Feeley, Deremer, and Steiner); and
Group 11 (Haghighi, Kixmiller, Long, Matson, Peterson, and Quig).

National Merit Scholar Begins Internship at the NEXTRANS Center

NEXTRANS is pleased to announce its first high school intern Jim Caraher. Jim graduated this Spring from Crawfordsville High School, where he was salutatorian of his class. At Crawfordsville, he was involved in the National Honor Society, Math and Science Teams, Tech Club, Libro Club, French Club, and Chess Club. He played soccer and track, and advanced to the state finals this year in the 800m run. Jim is a National Merit scholar and has also been awarded an Elks State Scholarship, the David Wells Science Award, and Purdue’s prestigious Stephen C. Beering Scholarship.

The Beering Scholarship is named after Purdue University’s president from 1983 through August 2000. A distinguishing feature of this invitation only scholarship is the fact that in addition to paying for undergraduate studies, it also pays all expenses if a student decides to stay at Purdue to pursue a master's degree or a doctoral degree.

Jim will begin his undergraduate studies at Purdue this Fall majoring in engineering. He is assisting NEXTRANS student Sal Hernández, a Ph.D. Candidate in Purdue’s Civil Engineering Program, in conducting research to identify innovative new approaches to improve capacity utilization that lessen the impacts of rising fuel prices within the less-than-truckload (LTL) freight carrier industry. The research will involve the dissemination of a survey that will be used to develop new operational models that enhance capacity utilization and/or net revenue for LTL carriers.
Problem Based Learning (PBL) Project Links Students to Transit Challenge

A few years ago in 2005, it came to the attention of Crawfordsville High School (CHS) students and Helen Hudson, their English teacher, that the local train station, which few seemed to know about, was abysmally run-down even though an Amtrak train passed through each morning (to Chicago) and each evening (en route to NYC). The students, whose laptop computer grant mandated them to take on a problem-based learning project, saw their opportunity. During the first Spring, the students cleared off scores of bags of trash and planted a garden where the junky trash, weeds and scrub trees had been. They made plans to repaint the station and brought the opportunity to use public transportation to the community’s notice. Subsequent classes have pitched in by putting up a welcome sign, cultivating a garden on the site, and replacing the station’s floor.

The students and their teacher, Hudson, received several local and regional awards for their work. In 2006, a group of students traveled to Washington D.C. to present their projects for the national association of rail passengers. While there, they received NARP’s Youth Leadership Award, an award only given twice in 40 years, and also spent time lobbying for legislation that would provide much-needed funding to Amtrak. During the Fall of 2006, they were honored with Amtrak’s Champion of the Rails award. The students have written editorials, organized Crawfordsville Rides the Train, is a weekend trip to Chicago to encourage rail travel closer to home. Their most recent effort, “C’ville Rides the Train,” is a weekend trip to Chicago to encourage Crawfordsville residents to take the train more often. Since the beginning of the project, the number of people riding the train from Crawfordsville has gone up by as much as 33 percent in some quarters.

At the NEXTRANS Inaugural Summit, students from Hudson’s class participated by presenting a poster about the history of the project, setting up a display booth featuring their awards and honors, and attending the day’s sessions on transportation challenges and solutions. Their booth and presentations drew keen interest and broad attention from the Summit participants. Chelsea DeLarm, a member of the group, was singled out to receive special recognition from RITA Administrator Paul Brubaker for her work going above and beyond the call of duty.

RESEARCH

2007-2008 Research Projects

A Decision Support Tool for Vehicle Infrastructure Integration: Understanding Information Effects and Advancing Data Fusion

Algorithms for Traffic Management Applications
(PI: Srinivas Peeta, Purdue University)

Description: This research seeks to explore vehicle-to-vehicle information networks to understand the interplay between the information communicated and traffic conditions on the network. A longer-term goal is to develop a decision support tool for processing and storage of large amount of real-time (probe) data for advancing the state-of-the-art in Vehicle Infrastructure Integration (VII).

Analysis of Travel Time Reliability on Indiana Interstates
(PI: Fred Mannering, Purdue University)

Description: In this study, extensive amounts of data will be gathered from interstates in Indiana (specifically Indianapolis-area interstates where extensive real-time data are collected). These data will be used to develop statistical models to estimate travel-time reliability based on explanatory variables as well as time-varying elements associated with recurrent congestion.

Integrating Supply and Demand Aspects of Transportation for Mass Evacuation Under Disasters
(PI: Srinivas Peeta, Purdue University)

Description: This study seeks to address real-time operational needs in the context of the evacuation response problem by providing a capability to dynamically route vehicles under evacuation, thereby being responsive to the actual conditions unfolding in real-time in the traffic network, both in terms of the evolving traffic patterns (demand-side) and the available road infrastructure in the aftermath of the disaster (supply-side).

Network Origin-Destination Demand Estimation using Limited Link Traffic Counts; Strategic Deployment of Vehicle Detectors through an Integrated Corridor Management Framework
(PI: Srinivas Peeta, Purdue University; Co-PI: Shou-Ren Hu, National Cheng Kung University)

Description: This research seeks to develop a mechanism to strategically deploy vehicle detectors to infer network origin-destination (OD) demands using limited link traffic count data. It leads to the problem of the identification of “optimal” locations for installing detectors so that maximum system observability is achieved with a limited monetary budget.

Transportation Infrastructure Implications of Changing Grain, Ethanol and DDGS Transportation Flows for Indiana
(PI: Wallace Tyner, Purdue University; Co-PI: Frank Dooley, Purdue University)

Description: In this research project, we will estimate the transport system impacts of different levels of cellulosic production in Indiana. A scenario approach will be used for the transport of cellulosic materials to central plants. We will use an integer programming model to locate and size cellulosic plants in Indiana.

Uncertainty-Based Tradeoff Analysis Methodology for Integrated Transportation Investment Decision-Making
(PI: Samuel Labi, Purdue University)

Description: The research project will develop a methodology for multi-program selection and trade-offs analysis of alternative sets of transportation projects, based on the benefits and costs of each alternative in terms of the various performance measures. The project will involve the uncertainty perspective, a variety of new analytical tools from the literature, and an algorithm for the developed methodology.
RESEARCH
2007-2008 Research Projects

Traffic Flow Characteristic and Capacity in Intelligent Work Zones
(PI: Rahim F. Benekohal, University of Illinois, Urbana-Champaign)
Description: This study would investigate the traffic flow characteristics in intelligent work zones (ZW) and will determine methods for computing delay, speed, capacity, and user’s cost. A theoretical relationship will be developed based on understanding the complexity of traffic flow characteristics in breakdown/recovery mode in WZ bottlenecks, and field data will be collected and used to examine the validity of the theory.

Sensor Network Design for Multimodal Freight Transportation Systems
(PI: Yanfeng Ouyang, University of Illinois, Urbana-Champaign)
Description: With increasing demand for freight transportation infrastructure, ensuring efficiency and sustainability of transportation networks becomes a major challenge. This project will (1) investigate the possibility of combining various off-the-shelf sensors to improve granularity and accuracy of traffic data; (2) develop an analytical framework to quantify the benefits and costs of deploying (multiple types of) sensors major freight transportation modes; and (3) develop discrete network optimization models to select optimal sensor locations and communication configuration.

Pavement Damage Due to Different Tire and Loading Configurations on Secondary Roads
(PI: Imad Al-Qadi, University of Illinois, Urbana-Champaign)
Description: The main objective of the proposed research is to evaluate the mechanism of load distribution for dual and wide-base tires on secondary road pavements. The research team will simulate vehicle loading and predict pavement response utilizing the finite element (FE) method. The research project will develop the necessary finite element models to simulate secondary roads using a three-dimensional (3D) approach.

Development of a Finite Element Based Thermal Cracking Performance Prediction Model
(PI: William Buttlar, University of Illinois, Urbana-Champaign; Co-PI: Glaucio H. Paulino, University of Illinois, Urbana-Champaign)
Description: The proposed supplemental study will extend the scope of the existing pooled fund study to more explicitly capture the interactions between vehicles and the infrastructure (Pillar 7 of NEXTRANS). The main deliverable of this project would be a user-friendly, computationally efficient program which could be used to analyze and to design against thermal cracking in asphalt pavements.

Nondestructive Pavement Evaluation using Finite Element Analysis Based Soft Computing Models
(PI: Erol Tutumluer, University of Illinois, Urbana-Champaign)
Description: The objectives of the proposed NEXTRANS research are to: (1) develop the framework for an innovative methodology called Soft Computing Based Pavement and Geomaternal System Analyzer (SOFTSYS) for evaluating nonintrusive flexible pavements; (2) compare and verify SOFTSYS results with those of the nonlinear ILLI-PAVE Finite Element (FE) solutions; and, (3) validate SOFTSYS for determining pavement thicknesses and layer properties with actual field data.

Research and Education from a Smart Campus Transit Laboratory
(PI: Rabi Mishalani, Ohio State University; Co-PIs: Mark McCord, Ohio State University and Prem Goel, Ohio State University)
Description: Ohio State University (OSU) campus transit service is being equipped with an advanced, commercial-grade information system. In addition to serving its operational purpose, the new “smart” transit system offers a technological infrastructure that can be used as a campus transit lab (CTL) for research and educational activities. The project is planning two general categories of research studies: one based on analyzing the Automated Vehicle Location (AVL) data that will be available from the system, and another based on assessing passenger satisfaction with the transit information system.

Length Based Vehicle Classification on Freeways from Single Loop Detectors
(PI: Benjamin Coifman, Ohio State University)
Description: This research seeks to develop reliable length based vehicle classification algorithm for single loop detectors (and for non-invasive detectors that emulate single loop detectors) in which traffic would be sorted into three (or more) bins based on length. Single loop detectors promise to be an inexpensive alternative to spread classification coverage through the existing count stations and through mixed use of existing traffic operations detector stations.

Optimal Condition Sampling of Infrastructure Networks
(PI: Rabi Mishalani, Ohio State University; Co-PI: Prem Goel, Ohio State University)
Description: In response to the developments in pavement inspection technologies, the optimization problem for condition sampling for a single facility was addressed recently. This project involves addressing the condition sampling optimization problem for a network of facilities, under budgetary constraints.

Estimating AADT from Combined Air Photos and Ground-Based Data: System Design, Prototyping, and Testing
(PI: Mark R. McCord, Ohio State University; Prem Goel, Ohio State University)
Description: This project developed a method that combines traditional ground-based traffic data with traffic information contained in recent air photos in a statistically justified manner to produce more accurate estimates of Annual Average Daily Traffic (AADT). To enable the implementation of this promising method, this project will (a) develop an efficient way to use it on a widespread, repeated basis in an operational setting; (b) demonstrate the improved accuracy in AADT estimates in a large-scale, controlled study; and (c) evaluate the performance of this method to produce AADT estimates for cars and trucks separately.

Investigation of Emergency Vehicle Crashes in the State of Michigan
(PI: Peter Savolainen, Wayne State University)
Description: An evaluation of an emergency vehicle alert system (EVAS) has recently been completed. This project supplements the previous research by providing a comprehensive investigation of emergency vehicle crashes in the state of Michigan to identify other factors contributing to crash occurrence and resultant injuries. The purpose of this research is to conduct an evaluation of emergency vehicle crashes and to identify driver, vehicle, and environmental characteristics affecting both emergency vehicle crash frequency and resultant injury severity.
NEXTRANS Center Seminar Series Brings Scholars to Purdue and OSU

On April 1, 2008, Professor Shinya Kikuchi, Charles E. Via Jr. Professor of Civil and Environmental Engineering, Virginia Tech, delivered the inaugural lecture of the NEXTRANS Seminar Series at Purdue’s School of Civil Engineering. In a talk titled “Making Decision, Judgment, and Adjustment under Unclear Circumstances in Transportation Analysis,” he spoke to a standing room only crowd of students from the transportation engineering program and faculty from the Schools of Civil Engineering, Industrial Engineering and Computer Science Department. Kikuchi spent time with students, faculty and staff after the presentation for a question and answer session.

On April 22, 2008, Professor Hani Mahmassani, William A. Patterson Distinguished Chair in Transportation at Northwestern University, visited Purdue to give a talk on “Regime Change: Uncongesting Traffic Flow through Dynamic Pricing and Real-Time Information.” His talk highlighted the role of pricing and real-time information in the management of transportation networks and delivery of transportation services. Mahmassani discussed methodological implications and approaches for both off-line evaluations of these strategies as well as real-time operational decision-making in this context. Following the talk Professor Mahmassani interacted with faculty and students to exchange views and provide further elaboration.

On June 5, 2008, Professor Yoram Shiftan, Technion, Israel Institute of Technology, visited with faculty and students at Ohio State University to deliver a lecture titled, “The Use of Activity-Based Modeling to Analyze the Effect of Land-Use and Public Transport Policies on Travel Behavior.” Advances in the study of travel behavior have led to the development of activity-based models that treat travel as a derivation of the demand for personal activities. In Professor Shiftan’s talk, improved activity-based approach was illustrated through a case study based on the Portland activity-based model combined with a stated-preference residential choice model. It indicated that the use of utility-based accessibility measures to integrate models of residential choice, workplace, and auto ownership with a full activity-based model has the potential to further improve our understanding of the impact of land-use policies on travel behavior and the effectiveness of such policies.

Electronic copies of the past presentations can be downloaded by visiting the seminar page on the NEXTRANS website: http://www.purdue.edu/dp/nextrans/tech_seminar.php

Integrated Solutions Case Studies Presented at Purdue Road School

Held at Purdue since 1914, the Purdue Road School consistently attracts well over 1,000 Indiana local and state officials, consultants, and suppliers each year. During the 94th annual conference held this year during March 24-26, an all-time record of 1,730 attendees was set. NEXTRANS Center participated in the conference by setting up a display booth featuring its research and programmatic activities while disseminating information about its upcoming events.

The Center also organized a concurrent session titled, "Integrated Solutions for Transportation: Perspectives and Practice.” Presided by the Center’s Managing Director Mahmud Farooque, the session began with a conceptual overview from NEXTRANS Director Srinivas Peeta highlighting how integrated perspectives can lead to better transportation decision-making. His presentation was followed by case studies in the areas of on-demand air transportation and portfolio analysis, presented respectively by Purdue Professors Daniel DeLaurentis (aeronautics and astronautics engineering) and Samuel Labi (civil engineering). An interactive dialogue between the presenters and the audience followed, focusing on additional examples and other potential applications.
Meet NEXTRANS Executive Committee

Srinivas Peeta is a professor of civil engineering at Purdue University and the director of the NEXTRANS Center. He chairs the TRB’s Transportation Network Modeling Committee, and is a member of TRB’s Section on Travel Analysis Methods and the International Federation of Automatic Control’s Technical Committee on Transportation Systems. Peeta also chairs Purdue’s System of Systems Signature Area. He received his M.S. and Ph.D. in Civil Engineering from Caltech and The University of Texas at Austin, respectively.

Peeta has received funding of more than $16 million as PI or co-PI from the NSF, USDOT, U.S. Department of Energy, NASA, U.S. Department of Education, FHWA, and INDOT. Peeta’s primary interests are in the area of dynamic traffic/transportation networks, and focus on a broad range of problems in the transportation/infrastructure domains characterized by the need for a systems perspective. He is on the editorial boards of the journals Transportation Research (Part B), Networks and Spatial Economics, and Journal of Intelligent Transportation Systems.

Peeta has authored more than 125 technical publications, and has made over 180 invited and/or international conference presentations. His Ph.D. dissertation received the 1994 Best International Dissertation Award from the Institute of Operations Research and Management Science. He received the NSF CAREER award in 1997, and the 2004 Wanskik Excellence in Research Award at Purdue University. A paper co-authored by Peeta received the 2007 Exceptional Paper Award from TRB’s Traffic Signal Systems Committee, and another received the Best Paper Award (2008) at the 10th International Conference on the Applications of Advanced Technologies in Transportation in Athens, Greece. He was an invited speaker at the 2008 Indo-American Frontiers of Engineering Symposium of the National Academy of Engineering. He received the Seed for Success Award from Purdue University in 2008.

Rabi Mishalani, NEXTRANS Center co-director, is an associate professor at Ohio State University (OSU) with the Department of Civil and Environmental Engineering and Geodetic Science. Prior to his joining the faculty at OSU in September 1997, he was a research scientist at MIT’s Center for Transportation and Logistics. His main areas of expertise include the application of probability modeling and statistical methods to the planning and managing of transportation infrastructure systems and the flow operations they support.

Mishalani is or has been principal investigator or co-principle investigator on other research projects funded by national agencies including NSF, US DOT’s RITA, US DOT’s FTA, and NASA. He has been an associate editor of ASCE’s Journal of Infrastructure Systems since January 1998. He won the National Science Foundation CAREER award in September 2001. Rabi Mishalani received his PhD and SM degrees (in CEE and Transportation Systems, respectively) from MIT.

Ray Benekohal, NEXTRANS Center co-director, is a professor of civil and environmental engineering at the University of Illinois, Urbana-Champaign, where he has been a faculty since 1987. He holds M.S. and Ph.D. degrees in civil engineering from Ohio State University. From 1986-1987, Benekohal worked for the consulting firm RKA, Inc.

Benekohal teaches undergraduate and graduate courses and conducts research in traffic flow modeling and simulation, traffic flow theory, intelligent transportation systems, traffic operations, and traffic safety. He has conducted numerous studies for state and federal governments on development, evaluation and analysis of transportation systems. He has written over 120 journal articles, conference papers, and technical reports. He is editor of a book on “Traffic Congestion and Traffic Safety in the 21st Century: Challenges, Innovations, and Opportunities,” published by the American Society of Engineers.

Benekohal is the director of the Traffic Operations Lab (TOL). He is also the director of the annual Illinois Traffic Engineering and Safety Conference. Benekohal is actively involved in Transportation Research Board, ITS Midwest, the American Society of Civil Engineers, and the Institute of Transportation Engineers. He is the faculty advisor to the Student Chapter of ITE.

Benekohal’s awards and honors include the following: the American Society of Engineers 1993 Arthur M. Wellington Prize; Honorary Professor in Traffic Engineering, Harbin University of Civil Engineering and Architecture, People’s Republic of China, in 1996; and the Illinois Section of Institute of Transportation Engineers’ prestigious Past President’s Award, in 1998.

Mark McCord, NEXTRANS Center executive committee member, is a professor of civil engineering and of City and Regional Planning at Ohio State University, where he has been on the faculty since 1983. He teaches and conducts research in transportation systems analysis, planning, and engineering. His primary research interests center on the use of remotely sensed data for transportation applications and on transportation applications of applied multi-attribute decision theory.

McCord serves on the Board of Directors of the Tier II Ohio Transportation Consortium University Transportation Center. He is presently the principal investigator of a USDOT funded multi-university consortium devoted to using advanced technologies to document and model truck crossing times at the Canadian and Mexican borders and of a USDOT funded project seeking to exploit automatically sensed data for improved transit performance. He was the research director for the USDOT funded multi-university National Consortium for Remote Sensing of Transportation-Flows.

McCord received a Ph.D. in transportation systems/civil engineering from MIT and a masters’ in industrial engineering from Stanford University, and has had visiting appointments or research leaves at the Universite de Paris – Dauphine and at University College-Dublin, Ireland.
Imad Al-Qadi, NEXTRANS Center Executive Committee Member, is the Founder Professor of Engineering at the University of Illinois at Urbana-Champaign. He is also the director of the Illinois Center for Transportation and the director of the Advanced Transportation Research and Engineering Laboratory. Prior to joining UIUC, he served as the Charles E. Via, Jr. Professor of Civil and Environmental Engineering at Virginia Tech and the Group Leader of The Roadway Infrastructure Group. Professor Al-Qadi holds M.Eng. and Ph.D. degrees from Penn State. His research interests focus primarily on pavements, nondestructive testing, and pavement interlayer system mechanisms, modeling, and fracture mechanics. A Fellow of the American Society of Civil Engineers, Al-Qadi has authored/co-authored more than 300 publications and has delivered more than 300 presentations. He has also delivered several keynote lectures at several international conferences. Professor Al-Qadi received numerous awards including, the Limoges Medal of Merit from France in 2004, the 2002 International Geosynthetic Society Award, the 2001 Dean’s Award for Research Excellence, and the National Science Foundation Young Investigator Award in 1994.

Professor Al-Qadi has chaired/co-chaired several international conferences and is a member of more than 20 technical committees and boards. He is the Chair of the TRB Maintenance Section and the ASCE Pavement Committee, among others. He is also Editor-in-Chief of the International Journal of Pavement Engineering, Associate Editor of Research on Nondestructive Evaluation and served as the North American Editor of the Construction and Building Materials Journal.

John Schneider, NEXTRANS Center Executive Committee Member, assumed his current position with the Purdue University in 1994 after spending twenty-seven years with the Dow Chemical Company. As Assistant Vice President of Industry Research, Schneider assists faculty in developing industry contacts and partnerships. His office links Purdue University faculty members with industry and encourages corporate sponsorship of research. He provides a point of contact for companies that are interested in collaborative research programs with Purdue, and can facilitate contact with the departments and/or faculty, which are most appropriate. In addition, he is active in Purdue's economic development initiatives and carries out special projects for the Office of the President and the Office of the Provost.

While with Dow, he had a varied management career with assignments in research, development, marketing, technical services, sales (District Sales Manager for New York area), marketing research, business profit/loss (Dow Brazil) and New Ventures.

Schneider is a member of the following boards/committees: Great Lakes and Mid-Atlantic Center for Hazardous Substance Research (University of Michigan) Training and Technology Transfer Advisory Board; Access Technology Across Indiana (ATAIN) Board (President); Lafayette Venture Capital Club Steering Committee; Ecologistics Advisory Board; Indiana Space Grant Consortium Advisory Board; Department of Speech, Language and Hearing Sciences at Purdue Advisory Board; Crane Technology Inc. Advisory Board; Indiana Defense and Homeland Security Working Group; the Indiana Region IV Workforce Development Board (Secretary) and Great Lakes Manufacturing Council Board (Vice President).

Kumares C. Sinha, NEXTRANS Center Executive Committee Member, is the Edgar B. & Hedwig M. Olson Distinguished Professor of Civil Engineering and director of the Joint Transportation Research Program of Purdue University and the Indiana Department of Transportation. His research interest is in the areas of transportation engineering and infrastructure management. He has authored or co-authored over 350 journal articles and other publications including a recent book, Transportation Decision Making: Principles of Project Evaluation and Programming. He has mentored numerous graduate and post-doctoral students worldwide. He advises governments at all levels and consults for the World Bank on transportation and infrastructure issues. He is a registered Professional Engineer and Fellow of the Institute of Transportation Engineers (ITE).

Sinha has served as the President of the Transportation & Development Institute of the American Society of Civil Engineers (ASCE), President of the Research and Education Division of the American Road and Transportation Builders Association (ARTBA), President of the Council of University Transportation Centers (CUTC), and as a member of the Federal Advisory Council on Transportation Statistics. He is currently the Editor-in-Chief Emeritus of the Journal of Transportation Engineering.

Sinha has received numerous honors, including the Award for Distinguished Contribution to University Transportation Education and Research given by the CUTC (2005), Wilbur S. Smith Distinguished Transportation Educator Award (2002) given jointly by the ITE and several other professional organizations, ASCE Francis C. Turner Lecture Award (2001), ARTBA Steinberg Award (2000), ASCE Harland Bartholomew Award (1996), Engineering Alumni Award of the University of Connecticut (1995), ASCE Arthur Wellington Prize (1992), ASCE Frank M. Masters Award (1986) and Fred Burgraf Award of the Transportation Research Board (TRB) of the National Research Council (1974). He is an Honorary Member of the ASCE and a National Associate of the U.S. National Academies. He was elected to the National Academy of Engineering in 2008.

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- Srinivas Peeta, Ph.D., Director
- Mahmud Farooque, Ph.D., Managing Director
- Nancy Smigiel, Administrative Assistant
THE THEME OF THE NEXTRANS CENTER IS TO DEVELOP INTEGRATED SOLUTIONS TO TRANSPORTATION PROBLEMS BY EXPLICITLY CAPTURING THE INTERACTIONS BETWEEN THE VEHICLE, DRIVER/TRAVELER, AND THE INFRASTRUCTURE. IT SEeks TO FOSTER A NEW GENERATION OF PARADIGMS AND A HIGHLY QUALIFIED WORKFORCE THAT CAN DEVELOP INNOVATIVE AND INTEGRATED SOLUTIONS FOR MOBILITY, SAFETY, AND INFRASTRUCTURE RENEWAL WITH SOME EMPHASIS ON INTERMODAL FREIGHT TRANSPORTATION TO ADDRESS REGIONAL NEEDS AND ECONOMIC OPPORTUNITIES.