This publication is a report of transportation research, education, and technology transfer activities of the NEXTRANS Center from Oct 1, 2008 through September 30, 2009.

Written and Designed by Jessica Mehr
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MESSAGE FROM THE DIRECTOR

It has been an exciting year in the field of transportation. The American Recovery and Reinvestment Act has brought our nation’s infrastructure challenges to the forefront of public attention, and highlighted the link between the global economy and efficient transportation systems for the movement of people and goods. At the same time, the NEXTRANS Center has completed its second year of operation; taken on two new staff members; and made great strides in its research, educational, and technology transfer activities.

In the area of research, the Center recently funded 18 new projects, selected holistically after a formal external peer review process (see page 20). These projects further the Center’s mission of developing integrated solutions that address multiple goals, exploit multiple modes, leverage technology and limited resources, and explore new models for partnerships. They also aim to support the U.S. Department of Transportation’s (USDOT) commitment to economic recovery, infrastructure investment, sustainability, livability, and safety.

As part of its efforts to develop a 21st Century transportation workforce, our Center funded a number of graduate students, continued its partnerships with Crawfordsville High School and Martin University, and participated in professional development efforts for transportation professionals (see page 18). The Center’s educational program also expanded in 2009 through the launch of the NEXTRANS Undergraduate Summer Internship in Transportation and the Indiana High School Essay Contest.

Technology transfer continues to be a priority at the local, regional, national, and international level. Since October 2008, the Center has sponsored three lectures as part of its ongoing Seminar Series, hosted two Visiting Scholars, and developed partnerships throughout the globe (see page 16). Faculty and students participated in a wide range of conferences, meetings, and workshops on topics including bearing capacity, solar-powered lighting, logistics, traffic monitoring, and safety.

It is with great pride that I witness the continued growth of our Center. The accomplishments contained in this report were made possible through the hard work and dedication of NEXTRANS students, faculty, and staff, as well as the support of our partners from government, academia, and the private sector. We are always seeking new collaborative partners, and welcome your ideas and participation.

Srinivas Peeta, Ph.D.
NEXTRANS Center Director
Professor of Civil Engineering, Purdue University
As the new Chairman of the NEXTRANS Center’s Advisory Council, I am honored to be involved with such an important and prestigious group of transportation leaders and experts.

NEXTRANS was created as a result of many forward-thinking individuals and recognition by the U.S. Department of Transportation of the region’s importance to freight, mobility and the national economy. With the approval by the USDOT came initial funding for the center, and subsequently additional funding from state, local, and private sector sources. It is incumbent upon us to provide tax payers and the private sector a reasonable return on their investments.

This year, in addition to continuing the development of on-going research collaborations, NEXTRANS had the opportunity to partner with INDOT on a number of new activities including a Solar Power Initiative Exploratory Meeting to examine the use of solar power to light Indiana intersections, and a two-day Travel Demand Modeling Course for transportation professionals.

As the next highway reauthorization act is being debated at the national level we must promote not only the successes of NEXTRANS but also the importance of renewing the NEXTRANS Center’s charter as one of ten Regional University Transportation Centers.

The growth of our economy is driven largely by the efficient movement of goods and services. We can make a difference!”

Joseph Gustin  
Deputy Commissioner, Planning, Indiana Dept. of Transportation  
Chair, NEXTRANS Advisory Council
The NEXTRANS Center is one of ten Regional University Transportation Centers selected competitively by the U.S. Department of Transportation to serve as leaders in meeting the nation’s need for safe, efficient, and environmentally-sound transportation systems. Headquartered at Purdue University in West Lafayette, Indiana, the Center represents Region V, which includes the states of Indiana, Illinois, Ohio, Michigan, Wisconsin and Minnesota. NEXTRANS was established in 2007 based on an award from USDOT’s Research and Innovative Technology Administration (RITA), in order to implement a multidisciplinary program of transportation research, education, and technology transfer.

The NEXTRANS Center is led by Purdue University, and administered by Purdue University’s Discovery Park. Its major university partners are University of Illinois at Urbana-Champaign (UIUC) and The Ohio State University (OSU). The Center’s strategic partners are Martin University (MU), Wayne State University (WSU) and University of Wisconsin – Platteville (UWP). Illinois Institute of Technology (IIT) and Indiana University-Purdue University Indianapolis (IUPUI) are the Center’s institutional resource partners. Programmatic partners include the Mid-American Transportation Center (Region VII Regional University Transportation Center), National Cheng Kung University’s Department of Transportation and Communication Management Science (Taiwan), Koc-IBM Supply Chain Research Center at Koc University (Turkey), and National Dong Hwa University’s Graduate Institute of Global Operations Strategy and Logistics Management (Taiwan).

Non-university partners of the Center include the Indiana DOT (INDOT), Illinois DOT (IDOT), Illinois State Toll Highway Authority, Chicago DOT, Ports of Indiana, Consulate General of Canada-Detroit, and Crawfordsville High School. Navteq, Ferrovial Group, Delphi, SemMaterials, Conexus Indiana, the Great Lakes Manufacturing Council, the Association of American Railroads, Transportation Technology Center Inc., and Central Indiana Corporate Partnership (CICP) are among the NEXTRANS Center’s current private sector partners.
The theme of the NEXTRANS Center is to develop integrated and innovative solutions to transportation challenges, with some emphasis on intermodal freight transportation to address regional needs and economic opportunities. In working towards these solutions, NEXTRANS recognizes that transportation goals such as mobility, safety, and infrastructure renewal are not disconnected from one another; they are fundamental elements of a seamless, sustainable, and efficient transportation system.

Because our nation’s transportation problems consist of interdependent components, NEXTRANS believes in integrated solutions. These solutions can be integrated across modes (auto, transit, freight, air, rail, and marine), sectors (public and private), or geography (within the Midwest and for the entire nation). They are innovative in that they seek to leverage technology, disparate data sources, limited resources, public-private partnerships, and novel financing strategies. Most importantly, NEXTRANS works towards these solutions by explicitly capturing the interactions between vehicle, traveler, and infrastructure. By implementing this holistic approach, NEXTRANS aims not only to develop integrated solutions, but to foster a new generation of paradigms and a highly qualified transportation workforce.

Figure 1: Center Theme
MEETING NATIONAL & REGIONAL CHALLENGES

MOBILITY
Poor mobility has long-term environmental consequences, creates transportation choke points in the national economy, and reduces U.S. global competitiveness. Because congestion is fast outpacing the rate of infrastructure investment, the NEXTRANS Center strives to leverage technology and existing infrastructure to improve traffic management and provide congestion relief. Recent NEXTRANS projects have aimed to improve traffic flow in congested intersections, utilize information technologies to improve traffic management, calculate work zone delays, apply innovative technology to measure travel-time reliability, study the feasibility of dynamic congestion pricing, explore the idea of a commercial on-demand air service, and utilize existing resources such as air photos and vehicle detectors to obtain better traffic flow data.

SAFETY
The fatalities, injuries, and destruction of property caused by traffic accidents create the need for new paradigms that can minimize safety concerns. Since research can directly link safety to congestion and poor infrastructure, NEXTRANS seeks an integrated approach to safety concerns that analyzes these relationships, as well as the interactions between vehicle and driver. Recent NEXTRANS projects have aimed to integrate safety with mobility and infrastructure goals, reduce emergency vehicle crashes, determine which materials create the shortest braking distances, and develop strategies for mass evacuating citizens in danger. Researchers are also interested in the relationship between safety and technology, which can cause driver distractions as well as prevent collisions through active safety paradigms.
INFRASTRUCTURE RENEWAL
Maintaining, renewing, and adding to transportation infrastructure is essential if we are to address mobility and safety concerns effectively. By upgrading our highway, rail, air, and sea transportation systems, we can reduce congestion and improve safety, while at the same time lowering freight transportation and energy costs. Recent NEXTRANS projects have aimed to promote sustainability by evaluating pavement properties, damage, and failure mechanisms; utilize advanced visual sensing technology to improve railroad track inspection; help agencies make efficient investment decisions; study the impacts of bypasses on communities; develop new models for public-private partnerships; and improve infrastructure longevity.

REGION V
NEXTRANS has identified an efficient intermodal freight transportation system as a major regional need. Recent NEXTRANS projects with particular regional significance have aimed to efficiently monitor, assess, and manage multimodal freight transportation systems; develop models for collaboration between small- to medium-sized trucking firms; and evaluate the infrastructure impacts of biofuels production in Indiana. As part of its outreach efforts, the Center sponsored its first Indiana High School Essay Contest; hosted a meeting to explore the use of solar power to light Indiana highway intersections; and participated in a number of conferences aimed at promoting workforce development and making the region’s transportation systems more efficient, multimodal, and technologically integrated.
INNOVATIVE PARTNERSHIPS

The holistic solutions proposed by NEXTRANS require not only a new generation of paradigms and research, but a new generation of partnerships that leverage the resources of different transportation stakeholders through a more integrated approach. In the delivery of its research, education, and outreach programs, NEXTRANS relies on innovative partnerships that optimize the utilization of available resources and maximize outcome value.

Rather than relying on one partnership model, NEXTRANS uses an open architecture that is based on commonality of goals, comparative advantages and emerging opportunities. These partnerships can be at the local, regional, national, and global level; with other universities, UTCs, or research centers; with the private sector, public sector or non-profit organizations; in the areas of research, education or outreach (See Figure 2 on page 9).

In research, NEXTRANS uses a variety of project types in forming partnerships with state departments of transportation. Depending upon the project components and fund distribution, these projects are categorized as joint, interlocking or supplemental. The resources being shared are also varied and can include items such as actual cash, in-kind, data, and equipment. Finally, these partnerships are not static or limited to some timeframe of a project’s lifetime; they are ongoing, dynamic and interactive.

By fostering these innovative partnerships, NEXTRANS is able to collaborate on research that meets shared goals, maximize its resources, utilize innovative technologies and practices, and create a higher value for research results through efficient technology transfer.
Figure 2: Innovative Partnership Examples

- **Research**
  (Univ. of Illinois at Urbana-Champaign)
- **Education**
  (Illinois Institute of Technology)
- **Technology Transfer**
  (Indiana LTAP)
- **Outreach**
  (Purdue Road School)
- **Actual Cash**
  (Canadian Government)
- **In-Kind**
  (Wayne State University)
- **Equipment**
  (The Ohio State University)
- **Data & Information**
  (NAVTEQ)
- **Local**
  (Crawfordsville High School)
- **Regional**
  (Great Lakes Manufacturing Council)
- **National**
  (Mid-American Transportation Center)
- **Global**
  (National Cheng Kung University, Taiwan)
- **Academia**
  (National Dong Hwa University, Taiwan)
- **Academia-Industry**
  (Ferrovial Group)
- **Academia-Gov.**
  (Indiana Dept. of Transportation)
- **Academia-Industry-Gov.**
  (Conexus Indiana)
MANAGEMENT STRUCTURE

CENTER DIRECTOR

The Center Director is responsible for overall Center operation. He directs programs and activities, implements the Center’s Strategic Plan, manages funds, ensures compliance with UTC Program requirements, and oversees Center Staff and Research Associates. The Director reports to the Executive Director of Purdue’s Discovery Park, which provides administrative and fiduciary oversight on behalf of Purdue University. The Director also chairs the Center’s Executive Committee, and administers the Center with the guidance of the NEXTRANS Advisory Council.

Figure 3: Management Structure
EXECUTIVE COMMITTEE

The seven-member Executive Committee sets strategy, approves budgets and makes final decisions on Center project funding. It is chaired by the NEXTRANS Director and includes Co-Directors from OSU and UIUC.

Srinivas Peeta
NEXTRANS Director
Professor of Civil Engineering, Purdue University

Ray Benekohal
NEXTRANS Co-Director
Professor of Civil and Environmental Engineering, University of Illinois at Urbana-Champaign

Rabi Mishalani
NEXTRANS Co-Director
Associate Professor of Civil and Environmental Engineering, The Ohio State University

Mark McCord
Professor of Civil Engineering / City and Regional Planning, The Ohio State University

Imad Al-Qadi
Founder Professor of Engineering, University of Illinois at Urbana-Champaign; Director, Illinois Center for Transportation

John Schneider
Assistant Vice President for Industry Research, Purdue University

Darcy Bullock
Professor of Civil Engineering, Purdue University
Associate Director, Joint Transportation Research Program
ADVISORY COUNCIL

The Advisory Council provides strategic and programmatic guidance for the NEXTRANS Center. It fosters vital links between the Center and the transportation community at large, and ensures that activities and goals are synergistic with regional and national needs and of value to the stakeholders.

Joseph Gustin, Deputy Commissioner, Indiana Department of Transportation - Chair
Ruben L. Anthony, Jr., Deputy Secretary, Wisconsin Department of Transportation
Robert J. Bernhard, Ph.D., Vice President for Research and Professor, University of Notre Dame
Randall S. Blankenhorn, Executive Director, Chicago Metropolitan Agency for Planning
Rich Cooper, Chief Executive Officer, Ports of Indiana
Bruce Cox, Vice President and Chief Technology Officer, TransWorks
John C. Friend, Engineer, Bureau of Highway Delivery, Michigan Department of Transportation
Thea Graham, Ph.D., Manager, Strategy, Operations Planning Services, Federal Aviation Administration (FAA)
Richard Kowalewski, Senior Policy Advisor, Pipeline and Hazardous Materials Safety Administration (PHMSA)
Walter Kulyk, Director, Office of Mobility Innovation, Federal Transit Administration (FTA)
David L. Lippert, Engineer, Materials and Physical Research, Illinois Department of Transportation
Brian Majeska, Vice President, Sales and Market Development, SemMaterials
Fidel Saenz de Ormijana, Ph.D., Technical Director, Ferrovial Agroman US Corp
Robert F. Tally, Jr., Division Administrator, FHWA Indiana Division

CENTER STAFF

From left:
Lili Du, Ph.D., Research Associate
Mahmud Farooque, Ph.D., Managing Director
Srinivas Peeta, Ph.D., Director
Jessica Mehr, Communications Coordinator
Nija Phelps, Secretary
Sushant Sharma, Ph.D., Research Associate
Because our nation's transportation problems consist of interdependent components, NEXTRANS believes in integrated solutions.
Expenditures by Partners 2008 - 2009

- Lead Institution (Purdue): 55%
- Major Partners (OSU and UIUC): 42%
- Minor Partners (WSU and MU): 3%

Expenditures by Source 2008 - 2009

- Federal: 48%
- State: 28%
- Institutional & Others: 24%

Expenditures by Activities 2008 - 2009

- Research & Education: 83%
- Programs & Outreach: 4%
- Center Administration: 13%
By fostering innovative partnerships, NEXTRANS is able to collaborate on research that meets shared goals.
Countries around the world are facing similar mobility, safety, and infrastructure challenges. At the same time, increased globalization has created a need for more efficient intermodal connections where international transportation networks meet. These challenges provide innovative pathways for transportation research programs to take advantage of the abundant opportunities available for international collaboration.

This type of global thinking makes sense because:

- Technology transfer on best practices and deployment experiences leverages resources, provides synergies for potential collaborations, and helps to avoid duplication.
- Institutional linkages make technology transfer more efficient and create a higher value for research results.
- We live in a global economy, and therefore have shared interests.

Through our partnership with NEXTRANS, we are not only benefiting from information and technical exchange, but also playing one of the leading roles in integrated corridor management framework. We believe through collaborative research and personnel exchanges, both entities will have opportunities to learn about traffic heterogeneities in different parts of the world, and cutting-edge traffic management skills.

Shou-Ren Hu
National Cheng Kung University, Taiwan
NEXTRANS is committed to the USDOT’s goal of improving global connectivity (Strategic Plan 2006 - 2011), in order to facilitate international trade and world economic growth. In addition to sharing the results of independent research, the Center promotes international collaboration through a number of programs and activities. To date, NEXTRANS has:

- Hosted two Visiting Scholars from universities in Taiwan and Israel.
- Collaborated with National Cheng Kung University in Taiwan on a joint-research initiative aimed at reducing congestion through an integrated corridor management framework.
- Undertaken a Memorandum of Understanding with National Dong Hwa University in Taiwan, aimed at collaborating on projects related to logistics management and land cargo flows.
- Been awarded a grant by the Canadian government to host a one-day conference at Purdue University on November 16, 2009 to explore U.S. - Canada border trade, security, and mobility challenges.

By promoting technology, information, faculty, and student exchange; creating institutional linkages; undertaking joint research initiatives; and hosting events of international importance, the Center works to meet domestic transportation challenges, while at the same time helping to achieve a more efficient global marketplace. Through these activities, NEXTRANS hopes to foster a new breed of international partnerships, in which research programs from around the world pool their resources to solve global challenges together.

My stay at NEXTRANS deepens the roots for future work, and will provide a great basis for collaborations in the years to come.

Hillel Bar-Gera, Visiting Scholar
Ben-Gurion University, Israel
DEVELOPING A 21ST CENTURY TRANSPORTATION WORKFORCE

As population, congestion, and freight transportation continue to increase, our nation will require more and more qualified workers to meet its transportation needs. At the same time, the Transportation Research Board estimates that 50 percent of the state transportation workforce will be eligible to retire in the next 10 years. In addition to the decrease in the pool of qualified workers, the existing workforce will require ongoing training to keep abreast of the rapidly changing technologies used in transportation. Because of these major challenges, the FHWA claims that developing “a skilled, technically competent workforce is the single most effective effort the transportation community can make.”

As a Regional University Transportation Center, NEXTRANS aims to be a leader in attracting and preparing students to be part of a highly-skilled 21st Century transportation workforce. In addition to providing graduate students with experiential learning opportunities, the Center strives to attract new students to the field of transportation, as well as enhance the skills of current practitioners.

The Transportation Research Board estimates that 50 percent of the state transportation workforce will be eligible to retire in the next 10 years.
2008 - 2009 Workforce Development Highlights

• Launched the NEXTRANS Undergraduate Summer Internship in Transportation. This program exposed 5 competitively-selected undergraduate students to the field of transportation through hands-on, collaborative research.

• Initiated the Indiana High School Essay Contest in Transportation. This program encouraged 9-12 grade students to consider how integral transportation is to the future of our nation, and interest them in pursuing transportation-related careers and/or higher education in the field.

• Partnered with Martin University to attract non-traditional students to transportation-related careers through research and active engagement in the local community.

• Joined with other Regional UTCs to participate in the Transportation Leadership Graduate Certificate (TLGC) Program, which allows early to mid-career transportation professionals to complete interdisciplinary course work without leaving their current professions.

• Supported the development of The Ohio State University’s Smart Campus Transit Laboratory, which integrates data and technological resources with educational programs and training.

• Participated in the 21st Century Transportation Workforce Summit in Madison, Wisconsin (December 8-9, 2008), and the the FTA Safety / Workforce Workshop (March 11, 2009).

• Coordinated workshops on Public-Private Partnerships and Travel Demand Modeling for students and practitioners in the transportation field.

Page 18, Top: Fred Mannering discusses NEXTRANS project with Purdue graduate student Mary Martchouk.

Page 19, Top: Student gives tour of “smart” bus system facilities at The Ohio State University.

Page 19, Bottom: Yanfeng Ouyang and NEXTRANS Intern Eunseok Choi (University of Illinois at Urbana-Champaign) are recognized by Director Srinivas Peeta after successful completion of the 2009 Undergraduate Summer Internship Program.
Since its inception in 2007, the NEXTRANS Center has recognized that transportation goals such as mobility, safety, and infrastructure renewal are interdependent, and that priorities within these goals change over time. Embracing this vision, the Center has developed a holistic framework for project selection that is systematic, integrated, amenable to continuous improvement, and adaptable to changing priorities.

- It is systematic because it uses a transparent selection process that considers theme, relevance, cost-share, merit and peer reviews in moving projects from a research need statement through full proposal development and on to the project selection.

- It is integrated because it requires each proposal to address multiple goals, modes and methods, while leveraging technology and innovative partnerships.

- It is amenable to continuous improvement because the quantifiable outcome measures easily identify whether research dimensions are being adequately addressed.

- It is adaptable to changing priorities because the goals can be adjusted based on short and long-term needs, technological and economic opportunities, regional and national concerns, and stakeholder input.

The Center’s recent project selections have provided two cycles of outcome measures that demonstrate the efficacy of this selection process:

- $2 million of federal support has been matched with more than $2.3 million actual non-federal cash support.

- 35 research projects have been awarded across 5 universities in Indiana, Illinois, Ohio, and Michigan.

- 65% of the awarded projects addressed multiple goals; 53% examined solutions that exploited multiple modes; 76% leveraged existing, new and emerging technologies; and 44% studied prospects for partnerships.
Year-to-year comparisons show a successful increase in the number of partnership-related projects (31% vs. 56%) and the continuing need for projects that employ innovative financing (31% vs. 22%).

As these figures demonstrate, the NEXTRANS framework is successfully selecting projects that support its mission of integrating goals, exploiting multiple modes, leveraging innovative technologies, and exploring new models for partnerships. At the same time, the projects selected thus far address some of the critical priorities outlined by Transportation Secretary Ray LaHood, such as incorporating safety with other transportation goals, and building new infrastructure focused on economic opportunities and long-term sustainability. Because the selection process is designed to be adaptable, new priorities can be easily incorporated in the future without changing the framework itself.

Because the NEXTRANS project selection process is adaptable, new priorities can be easily incorporated without changing the framework itself.
The NEXTRANS Center’s research projects are selected based on national and regional significance, peer evaluations, and a holistic approach that ensures the various dimensions of the Center theme, the USDOT priorities, and the multiparty arrangements are being satisfied.
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<td>Effect of Friction on Rolling Tire-Surface Interaction (049IY02)</td>
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*Figure 4: Dimensions Addressed by Year 2 Projects*
Determining Queue and Congestion in Highway Work Zone Bottlenecks

Investigator: Rahim F. Benekohal, University of Illinois at Urbana-Champaign

Every year, bottlenecks created by work zones cost time, money, and lives. Because of this, various mitigation measures are used to reduce the effects of work zone (WZ) congestion. These include working during off-peak hours or nighttime, rerouting traffic, offering incentives for early completion, and using Intelligent Transportation System (ITS) technologies such as speed display or automated photo enforcement. Despite these strategies, long queues and heavy congestion are still common in busy highways work zones.

At the same time, the American Recovery and Reinvestment Act of 2009 has committed nearly 27 billion to repairing our aging infrastructure, creating a prevalence of work zones in many states. With 7,386 stimulus-funded projects authorized, and 4,697 already under construction (FHWA, 10/2009), managing work zone congestion and safety has become particularly important.

This project aims to advance the understanding of how traffic operates in work zones, in order to help agencies devise informed strategies for reducing costly and dangerous congestion.

Traffic flow characteristics in work zones are different from normal highways. Often the traffic operates in stop-and-go condition and this creates multiple shockwaves that interact with one another. In work zones with high traffic volume, the effects of vehicular queue on congestion are more pronounced due to interactions among adjacent drivers, and between drivers and roadway or traffic control.
devices. Often congestion grows to upstream of the work zones and creates slow moving or stopped queues on the normal sections of the highways. These queues become congestion chokepoints and can create potentially unsafe conditions for approaching drivers that do not expect to encounter queues there.

The current knowledge about WZ shockwave and queue formation is very limited. Most of what we know is a simple extension of the knowledge from regular sections of highway. Such extension often yields a gross approximation and is not suitable for high traffic demand work zone conditions. When traffic flow breaks down in a work zone, there is often a significant drop in its capacity due to less than ideal roadway geometry or the presence of traffic control devices that are not prevalent in basic freeway sections. There are often multiple causes of this flow breakdown and those effects can accumulate, making the work zone operation much worse than the normally congested basic freeway section.

An ongoing first year NEXTRANS research project is looking into the relationship between speed and capacity of work zones where an Intelligent Transportation System (ITS) is implemented. However, this ongoing study is not looking at congested work zones where traffic flow breakdown occurs, creating stop and go conditions and queue formation. This study will investigate shockwave and queue formation in congested work zones (WZ) where traffic flow breaks down.

The theoretical aspect of this research will advance the basic understanding of shockwave and queue formation/dissipation in work zones, and use it to better manage queue in congestion choke points. Researchers will then validate the theory using field data from a matching study funded by the Illinois Department of Transportation (IDOT). The real-time application of these results will require integration of communication, computing, and vehicle sensing techniques into an on-line queue management strategy. It is envisioned that this on-line system will be placed in work zones to manage the growth of queue.

With 7,386 stimulus-funded projects authorized, and 4,697 already under construction, managing work zone congestion and safety has become particularly important.

In 2008, over 700 people were killed in U.S. highway work zones, including over 100 occupational fatalities (National Highway Traffic Safety Administration). The findings from this research will help practicing engineers to design and operate work zones in safer and more efficient ways, providing a better level of service to motorists and safer conditions for travelers and WZ crew.
In the wake of increased user demand, aging infrastructure, and limited funding, transportation agencies must be judicious in choosing improvements, while leveraging existing resources to the fullest. This extends to the collection of traffic data such as roadway usage.

To forecast infrastructure health, state departments of transportation typically employ expensive vehicle classification stations to monitor usage. The simplest in-pavement detector station can cost in excess of $100,000, not including the cost of delay to travelers arising from lane closures. More sophisticated Weigh in Motion (WIM) stations are much more expensive.

This research continues a previous NEXTRANS grant to develop innovative, cost-effective vehicle classification systems. This project consists of two complementary thrusts: using the existing infrastructure more efficiently, and investigating alternatives to conventional classification.

Loop Detectors: Leveraging Existing Infrastructure
Single loop detector stations are typically deployed on freeways for real-time traffic monitoring. These systems consist of wire loops in the pavement that emit an impulse when a vehicle passes over the loop, (basically a metal detector embedded in the pavement). Dual loop detector stations (2 loops per lane) are used to measure speed and length, and classify vehicles based on the measurements. Because single loop detectors roughly estimate speed, their length estimates have been too noisy to be used for accurate vehicle classification.

This project aims to extend classification coverage to single loop detectors and non-invasive detectors that emulate single loop detectors. At the foundation of the research is the development of algorithms to get accurate speed estimates from single loop detectors. Extending classification coverage would allow agencies to leverage the substantial number of existing single loop detectors in Region V states (Chicago, for instance,
has 2400 single loop detectors, while Minneapolis/St. Paul has 3500). It will also improve the reliability of dual loop detectors in the event that one loop fails.

Researchers are currently refining the accuracy of software algorithms developed during the first-year project. They are also working to develop more efficient techniques for correcting the data errors that affect many systems employing loop detectors, which includes a number of Weigh in Motion stations. By expanding coverage and improving performance, researchers will provide agencies with a low-cost means of collecting data to supplement existing classification systems.

LIDAR: An Alternative to Conventional Vehicle Classification
In addition to leveraging existing resources, investigators are pursuing innovative alternatives for vehicle classification, such as LIDAR (Light Detection and Ranging). A LIDAR unit contains a laser, which is reflected outward by a rotating mirror. The unit is able to detect obstructions in the laser’s path, allowing researchers to produce a 3D “image” of an object.

The investigators are currently studying the feasibility of using this technology for vehicle classification. LIDAR units have been mounted on the side of a van, allowing these sensors to measure length, height, profile, axle spacing, and other vehicle features as the van is driven on several pre-defined routes or parked alongside the roadway. The van is also equipped with cameras, allowing researchers to cross-reference video with LIDAR data in order to verify and develop algorithms for vehicle classification.

The researchers are currently using the LIDAR data to classify vehicles via shape. Since these LIDAR stations can be permanent or temporary, they will potentially cost much less than comparable in-pavement systems. The work may someday make short-term traffic data collection as simple as parking a trailer next to the roadway. The LIDAR may also be able to better distinguish between FHWA vehicle classes that blur together on conventional vehicle classification stations (e.g., Class 2—passenger cars and Class 3—SUVs/pickup trucks, etc.)

The researchers are collecting the LIDAR and conventional detector data at the same locations whenever possible, since obtaining ground truth data is the most labor-intensive component of the study. Simultaneously investigating two innovative strategies therefore adds only marginal cost compared to pursuing either thrust independently, allowing NEXTRANS researchers to “do more for less” in the course of the research as well as the outcomes. Their research will help agencies to better utilize resources in calculating roadway usage, which in turn will lead to more efficient and cost-effective infrastructure maintenance and traffic management strategies.
According to the American Society of Civil Engineers (ASCE), 33% of our nation’s major roads are in poor or mediocre condition, and 36% of our major urban highways are congested (2009 Report Card on America’s Infrastructure). At the same time, user demand is increasing, user expectations remain high, and traditional funding models such as the Highway Trust Fund (HTF) are inadequate to meet all highway preservation funding needs. As such, agencies seek innovative ways of reducing their direct needs or raising additional revenue to preserve their highway assets. One way to do this is to encourage private participation in public projects through public-private partnership (PPP) programs.

In a standard public-private partnership (PPP), the private sector finances, builds, maintains, or operates an asset for the public sector, recovering the investment with revenues. The private entity typically assumes the dominant share of financial, technical and operational risk in the project. Since further shortfalls in public infrastructure funding are expected over the next five years, expanding private sector involvement may provide a sustainable means of financing America’s infrastructure needs.

There are several variations of PPP projects depending on the contract type and intended level of private sector involvement; however, agencies rarely have guidelines for quantifying the costs and benefits of each PPP option, making it difficult to identify the most cost-effective option. To address this problem, this NEXTRANS study is developing an evaluation and decision support framework for highway agencies to decide on...
PPP adoption for a given project, and where PPP is recommended for adoption, the type of PPP that would yield minimum possible costs or maximum possible benefits to the agency.

Traditional contracts are being used as a base case for the study. The types of PPP contracts being analyzed include:

- **Performance-based contracting** (Contractor is paid based on the quality of work that is evident over a time period in the post-construction phase).
- **Lane rentals** (Contractor is charged for lane closures while carrying out the construction).
- **Warranties** (Contractor guarantees a certain minimum quality of work over a time period in the post-construction phase, often 5 years).
- **Cost-plus-time (A+B) Bidding** (Cost is considered as well as the intended completion time to determine the best bid).
- **Incentives/disincentives (I/D)** (Contractor is selected on the basis of the length of contract period).

Using data from over 450 contracts, econometric models are being developed to estimate the implementation costs and benefits of PPP adoption. The benefit of a PPP contract is measured as the likelihood and magnitude of cost savings relative to a base case scenario (for example, traditional contracts). The data contain information on a variety of project characteristics such as the physical size (length) of the infrastructure facility (i.e., lane-miles of road sections); project duration; project cost; engineer’s cost estimate for the project; bidding information (winning bid cost, number of submitted bids, etc.); number of maintenance and/or rehabilitation activities; and specific maintenance or rehabilitation activities.

This research will provide a rational, data-driven approach for public-sector agencies to identify the most beneficial public-private partnership (PPP) arrangements.

Current results show that the major project characteristics that significantly influence the benefits of PPP contract are: length, duration, and cost of the project. Econometric models are being developed to measure the strength of the influence of these variables and the associated elasticities of PPP benefits with respect to these characteristics.

The researchers are also carrying out a cost-benefit analysis of the different PPP types to identify the most appropriate PPP choice under a given set of circumstances. They are developing a simple, Excel-based expert system that would help in the implementation of this framework by facilitating the selection (by agency decision-makers) of the best PPP approach for a given project based on the project characteristics.

It is envisaged that the research product will provide a rational, data-driven approach for public-sector agencies to identify the most beneficial PPP arrangements. This would help ensure that infrastructure systems can be preserved and rehabilitated cost effectively. By encouraging private-sector investment in highway infrastructure development, PPP adoption would reduce the financial burden on highway agencies at this time of declining revenue.
Maintaining an efficient freight transportation system for moving raw materials to manufacturers and finished products to consumers is a critical element of the U.S. economy. (Hence, freight transportation is often referred to as “the economy in motion.”) However, in response to rising fuel costs and decreased demand, many freight transportation systems will either cease to exist or suffer further service level decline. This is especially true for the small- to medium-sized freight carrier firms that form the bulk of the less-than-truckload (LTL) industry.

LTL shipping involves the transportation of mid-sized shipments of freight. (As opposed to truckload [TL] shipping, which involves shipping an entire semi trailer of freight.) To minimize fuel costs, carriers must maximize the use of every trailer in terms of the load carried. Hence, LTL carriers seek to combine freight from several shippers when transporting inter-city freight. Due to the nature of these operations, LTL carriers operate on razor-thin profit margins.

Since much of U.S. freight is transported by ground, increasing fuel prices are eating away at already slim profit margins of LTL carriers. At the same time, the economic slump is resulting in less demand for many goods, and in turn, less demand for carriers to move freight. This has created a buyer’s market, causing increased competition amongst carriers and putting additional pressure on profit margins.

Decreased demand, rising fuel costs, increased competition, and operational inefficiencies are threatening the viability of many small- to medium-sized LTL trucking firms (in 2008, over 3000 carriers went out of business). This not only endangers jobs
in the LTL industry, but can potentially affect other commercial industries as well. (The cost of trucks moving empty, for example, can produce a ripple effect that raises global food prices.) This makes freight logistics an important element in U.S. economic recovery.

In response to these immediate challenges, this project aims to develop models for carrier-to-carrier collaboration in the LTL industry, which will leverage existing transportation infrastructure and advances in information and communication technologies (ICT). This collaboration will be in terms of sharing capacity. This is a key issue considering that “deadheading” (empty trips that do not generate revenue) can represent a significant portion of truck route operations. Reducing or avoiding deadheading by sharing capacity becomes all the more important as fuel prices continue to increase. Developing a collaborative network, however, is not an easy task, especially if the carriers are spread out over large distances. Carriers must ensure their needs are met before committing excess capacity, and carriers seeking additional capacity must plan in advance the routes that will minimize its shipping costs over the collaborative network. Collaboration also requires transfer of freight from one carrier to another, making transfer locations, as well as holding and transfer costs, key issues in promoting efficiency.

This research will therefore develop models for identifying efficient transfer locations, which lead to the formation of cost-effective carrier collaborative rates. Investigators will also consider the attitudes of freight carriers to various collaboration mechanisms and potential barriers, which will be provided by a survey study conducted through a New Manufacturing Economy Booster Plan Seed Grant from Purdue University.

Advances in ICT and e-commerce paradigms will also be leveraged. The real-time information on truck locations provides ICT-equipped LTL firms with information on real-time capacities and the status of their loads, which would allow them to collaborate with other firms more effectively. Researchers will be able to assess the impact of information technology on the operational efficiencies of collaborative firms. The findings of this study will also aid the private sector by providing them with decision tools regarding investment decisions in ICTs and assessment of collaborative opportunities.

The models developed in this study will provide small- to medium-sized LTL carriers with the necessary decision-making tools to form operationally efficient collaborative networks. These networks will provide a host of potential advantages for both the market (efficiency and profit) and performance (congestion and delay reduction). Collaboration can lead to greater use of existing fleet infrastructure, enhance revenue for the firms that provide capacity, and allow LTL carriers to enter markets once deemed inaccessible.

NEXTRANS researchers will be providing an innovative and sustainable solution for the immediate and long-term challenges faced by the LTL industry, and at the same time, helping to keep the American economy moving.

Decreased demand, rising fuel costs, increased competition, and operational inefficiencies are threatening the viability of many small- to medium-sized LTL trucking firms.
Traffic Signal Coordination and Queue Management in Oversaturated Intersections
Investigator: Rahim Benekohal, University of Illinois at Urbana-Champaign
Traffic signal coordination in congested networks is complex and requires in-depth understanding of traffic flow characteristics. This research aims to advance the basic understanding of optimizing traffic flow in congested networks. Oversaturated conditions in these networks often cause queue spillbacks that affect adjacent lanes or nearby intersections. Researchers are developing a traffic signal coordination methodology for a network of oversaturated intersections, based on the concept of queue minimization.

Thermal Cracking Performance Prediction and Asset Management Integration
Investigators: William Buttlar, Glaucio Paulino, University of Illinois at Urbana-Champaign
Low-temperature cracking of hot-mix asphalt (HMA) pavements continues to be a leading cause of premature pavement deterioration in cold regions. This study aims to deliver a user-friendly, computationally efficient program that can be used to analyze and design against thermal cracking in asphalt pavements. This new tool will help prevent unnecessary infrastructure damage in cold regions around the world.

System Methods for Uncovering Economic, Technological, and Policy Enablers of an “On-demand air service” Regional Passenger Transportation Solution
Investigator: Daniel DeLaurentis, Srinivas Peeta, Purdue University
This project explores the idea of a commercial on-demand air service (ODAS) utilizing very light jets. If ODAS can deliver better speed and flexibility in door-to-door transportation than commercial airline service or other modes, then it could generate significant economic benefits in the Midwest with moderate investment. Research is being conducted to explore what multimodal resources (air and ground), transportation policies, and economic variables are likely to enhance “doorstep-to-destination” mobility for citizens seeking personal and business trips.

A Multi-Scale Approach For Near Surface Pavement Cracking and Failure Mechanisms
Investigators: C. Armando Duarte, Imad Al-Qadi, University of Illinois at Urbana-Champaign
This study aims to investigate near surface failure and cracking mechanisms of hot-mix asphalt (HMA) pavements, using recently emerged numerical techniques. Researchers are developing a multi-scale, digital HMA pavement model that will allow distress predictions with simplified user inputs. Integrating these models into the design process will help to develop long-lasting and cost-effective flexible pavements.
Machine Vision Inspection of Railroad Track
Investigators: J. Riley Edwards, Christopher Barkan, Narendra Ahuja, University of Illinois at Urbana-Champaign
The objective of this project is to increase the efficiency and effectiveness of railroad track inspection by applying machine vision, an advanced visual sensing technology. This is being accomplished by recording images of track from a moving vehicle using digital video and imaging technology, and using advanced machine vision algorithms to detect broken or defective track components. The results will be communicated to railroad infrastructure management to enable safer and more efficient maintenance and operation.

Transportation and Socioeconomic Impacts of Bypasses on Communities: An Integrated Synthesis of Spatial Econometric Methods and Agent-Based Simulation
Investigator: Jon Fricker, Purdue University
This project seeks to minimize the adverse impacts of bypasses on communities. Researchers are developing statistical models to predict regional economic impacts, as well as the individual decision-making processes of affected landowners. These models can potentially reduce the subjective element of the sometimes-controversial issue of bypasses, and may help to promote partnerships between local community organizations and the private sector.
Impact of Public Transit Market Share on Energy Consumption and the Environment: Developing Statistical Models for Validation and Gross Predictions

Investigators: Prem Goel, Rabi Mishalani, The Ohio State University

There are numerous models currently used to evaluate the effectiveness of transportation policies on energy consumption and the environment. This study aims to develop a set of empirically derived statistical relationships that can evaluate the accuracy of these mechanistic models, allowing researchers to provide better answers to policy questions. These empirical relationships might also be used to roughly evaluate the effectiveness of new transportation policies before beginning detailed and costly analyses.

Financial and Technical Feasibility of Dynamic Congestion Pricing as a Revenue Generation Source in Indiana – Exploiting the Availability of Real-Time Information and Dynamic Pricing Technologies

Investigators: Samuel Labi, Kumares Sinha, Purdue University

This project aims to study the feasibility of dynamic congestion pricing (DCP), which allows toll prices to increase or decrease in response to traffic conditions. This could provide a sustainable approach to reducing traffic congestion and generating highway revenue. Researchers are conducting numerical experiments to determine the technical and economic feasibility of dynamic pricing, and identify any threats or opportunities that might arise during its implementation.

Incorporating Image-Based Traffic Information for AADT Estimation: Operational Developments for Agency Implementation and Theoretical Extensions to Classified AADT Estimation

Investigators: Mark McCord, Prem Goel, The Ohio State University

Annual average daily traffic (AADT) is traditionally collected from “on the road” sensors that disrupt traffic and expose crews to danger. In this project, investigators are working with the Ohio DOT to implement a new method that combines information from existing air photos with traditional ground-based traffic counts to produce more accurate AADT estimates. Researchers will also investigate the potential of extending this method to classifying vehicles.

Optimal Condition Sampling of Infrastructure Networks

Investigators: Rabi Mishalani, Prem Goel, The Ohio State University

When evaluating infrastructure condition, agencies must consider the cost of inspection, and make smart decisions in terms of condition sampling. Recently, this problem was addressed at the facility level. This study aims to address the condition sampling optimization problem for a network of facilities, using both statistical and network modeling.

Smart Campus Transit Laboratory for Research and Education

Investigators: Rabi Mishalani, Prem Goel, Mark McCord, The Ohio State University
NEXTRANS investigators, various OSU entities, and Clever Devices, Inc., are currently upgrading OSU’s Campus Area Bus Service (CABS) with a state-of-the-art “smart bus” system. This new system includes advanced automatic vehicle location (AVL), automated passenger counting (APC), and a passenger information system. It also creates an infrastructure for research and education: the OSU Campus Transit Lab (CTL). Activities will include researching operations and service planning questions, developing a simulation tool, and studying passenger perceptions.

Development of a Mobile Probe-Based Traffic Data Fusion and Flow Management Platform for Innovative Public-Private Information-Based Partnerships

*Investigators: Srinivas Peeta, Purdue University; Xuesong Zhou, University of Utah*

This project aims to maximize the value of mobile probe data collected by private sector vendors (GPS, mobile phones, etc.) in order to encourage information-sharing under public-private partnerships. Researchers are quantifying the value of different data sources and optimizing traffic sensor locations based on data availability. Mobile probe data is being used to evaluate sensor quality for state DOTs, identify major bottlenecks, and assess travel-time reliability. Researchers are also developing traffic management mechanisms that offer incentives to drivers who take alternate routes provided by their GPS devices.

Using Detector Data to Identify and Examine Crashes and Incidents on Freeways

*Investigator: Peter T. Savolainen, Wayne State University*

This study is using data collected by the Michigan Intelligent Transportation Systems (MITS) Center to evaluate freeway operations in metro Detroit. Researchers are identifying factors that affect the incident response and clearance times of Freeway Courtesy Patrol (FCP) vehicles, potentially improving freeway operations and safety. Researchers are also examining what incident-related factors lead to secondary crashes and determining if dynamic message sign (DMS) alerts have a significant impact on downstream traffic flow.

Effect of Friction on Rolling Tire-Surface Interaction

*Investigators: Ilinca Stanciulescu, Imad Al-Qadi, University of Illinois at Urbana-Champaign*

Modeling the interactions between tire and pavement can be difficult, especially in scenarios such as tires sliding on ice, rolling on sand, etc. For this project, researchers are developing nonlinear frictional contact models for tire-pavement interaction that take into account the vehicle sliding velocity. This will help determine the ideal combination of tire and pavement properties that lead to shorter braking distances, enhanced tire-pavement friction, and better pavement performance. This will improve driver safety and reduce costs by preventing pavement damage.
Pavement Damage Due to Different Tire and Loading Configurations on Secondary Roads  
Investigator: Imad Al-Qadi, University of Illinois at Urbana-Champaign  
Researchers developed models for evaluating the pavement damage caused by wide-base tires on secondary roads, comparing this damage to that caused by conventional dual-tire systems.

Traffic Flow Characteristics and Capacity in Intelligent Work Zones  
Investigator: Rahim Benekohal, University of Illinois at Urbana-Champaign  
This study investigated traffic flow characteristics in intelligent work zones, in order to determine more accurate methods for computing work zone delay, speed, capacity, and user cost.

Development of a Finite Element Based Thermal Cracking Performance Prediction Model  
Investigators: William Buttlar, Glauco Paulino, University of Illinois at Urbana-Champaign  
Researchers developed a user-friendly program that analyzes low-temperature cracking of hot-mix asphalt (HMA) pavements. This will help agencies to prevent premature and costly pavement deterioration.

Length-Based Vehicle Classification on Freeways From Single Loop Detectors  
Investigator: Benjamin Coifman, The Ohio State University  
This project aimed to develop a reliable method for utilizing single loop detectors to provide length-based vehicle classification. This will leverage existing infrastructure to obtain more data at minimal cost.

Uncertainty-Based Tradeoff Analysis Methodology for Integrated Transportation Investment Decision-Making  
Investigator: Samuel Labi, Purdue University  
This project aimed to develop a methodology that helps transportation agencies make the most globally-optimal infrastructure investment decisions, based on the benefits and costs of each alternative.

Analysis of Travel-Time Reliability on Indiana Interstates  
Investigator: Fred Mannering, Purdue University  
Researchers applied innovative technology to develop statistical models that can accurately measure travel-time reliability on highways. This may provide a new basis for monitoring the effectiveness of activities implemented on roadway networks.

Estimating AADT From Combined Air Photos and Ground Based Data: System Design, Prototyping, and Testing  
Investigators: Mark McCord, Prem Goel, The Ohio State University  
Researchers designed and tested an alternative method for measuring Average Annual Daily Traffic (AADT) that utilizes existing air photos to obtain traffic flow data, instead of relying on expensive, dangerous and disruptive ground-based traffic counts.

Optimal Conditioning Sampling of Infrastructure Networks  
Investigators: Rabi Mishalani, Prem Goel, The Ohio State University  
This project developed methods to help agencies consider the cost of inspecting infrastructure, and make smart decisions in terms of condition sampling for a network of facilities.

Research and Education from a Smart Campus Transit Laboratory  
Investigators: Rabi Mishalani, Mark McCord, Prem Goel, The Ohio State University  
This project aimed to develop a state-of-the-art “smart bus” system...
for The Ohio State University, which provides a unique opportunity for research and educational activities: the OSU Campus Transit Lab (CTL).

Sensor Network Design for Multimodal Freight Transportation Systems
Investigator: Yanfeng Ouyang, University of Illinois at Urbana-Champaign
Researchers developed an analytical framework to quantify the benefits of deploying traffic sensors in multimodal freight transportation systems, as well as reliable models for selecting optimal sensor locations. This will maximize expected traffic surveillance benefits when sensors suffer probabilistic failures.

A Decision Support Tool for Vehicle Infrastructure Integration: Advancing Data Fusion Algorithms for Traffic Management Applications
Investigator: Srinivas Peeta, Purdue University
Vehicle Infrastructure Integration (VII) uses (probe) vehicles to anonymously collect real-time traffic data. This project aimed to study the interplay between the information communicated and traffic conditions on the network, and develop a decision support tool for processing large amounts of probe data to generate meaningful information.

Investigators: Srinivas Peeta, Purdue University; Shou-Ren Hu, National Cheng Kung University
Researchers developed a framework for identifying “optimal” locations for vehicle detectors, which will enable the monitoring of the entire network at the lowest cost. This will also allow agencies to infer origin-destination patterns for the entire network using limited resources.

Integrating Supply and Demand Aspects of Transportation for Mass Evacuation
Investigator: Srinivas Peeta, Purdue University
Researchers aimed to more efficiently evacuate citizens in danger by developing an operational tool that responds to real-time conditions unfolding in the traffic network.

Investigation of Emergency Vehicle Crashes in the State of Michigan
Investigator: Peter T. Savolainen, Wayne State University
This project investigated the factors that cause emergency vehicle crashes in Michigan, where ambulance-involved fatalities are particularly prevalent.

Nondestructive Pavement Evaluation Using Finite Element Analysis Based Soft Computing Models
Investigator: Erol Tutumluer, University of Illinois at Urbana-Champaign
Researchers developed and tested an innovative methodology (SOFTSYS) that can evaluate pavement condition without destructive testing, ensuring that infrastructure maintenance is performed when and where it should be.

Transportation Infrastructure Implications of Development of a Cellulose Ethanol Industry for Indiana
Investigators: Wallace Tyner, Frank Dooley, Purdue University
Researchers developed supply curves for feedstocks in each region of Indiana and determined the best places for cellulosic biofuel production plants. The research concluded that cellulose biofuel plants will have a substantially greater road infrastructure impact than corn-based ethanol.
The NEXTRANS Center selected Salvador H. Hernández as its 2008 Student of the Year. Salvador is currently completing his Ph.D. in Civil Engineering at Purdue University, where he was awarded the Gerald I. Gilbert Memorial Scholarship and the Purdue Doctoral Fellowship for talented minority students. His research involves developing collaborative Less-Than-Truckload (LTL) carrier-carrier operational paradigms that take advantage of operational synergies amongst small- to medium-sized carriers to increase capacity utilization. He also seeks to identify the potential factors that will lead to a successful collaborative effort.

Salvador was formally honored on January 10, 2009 at the Council of University Transportation Centers (CUTC) Annual Banquet and Awards Ceremony in Washington, D.C.

In January 2010, Salvador will begin a tenure-track position as an assistant professor at the University of Texas at El Paso.

ANUJ SHARMA WINS PIKARSKY AWARD

On January 10, 2009, recent Purdue graduate Anuj Sharma was awarded the Milton Pikarsky Award for Outstanding Ph.D. Dissertation in Science & Technology during the 12th Anniversary CUTC Awards Banquet in Washington, D.C. Anuj’s dissertation, titled “Integrated Behavioral & Economic Framework for Improving Dilemma Zone Protection Systems,” was co-chaired by NEXTRANS Director Srinivas Peeta and NEXTRANS Executive Committee Member Darcy Bullock.

Anuj is currently an assistant professor at the University of Nebraska-Lincoln, where he is working on research aimed at improving the safety of trucks at high-speed isolated intersections.

XIAOPENG LI RECEIVES CHESTER P. SIESS AWARD

NEXTRANS-funded student Xiaopeng Li received the Chester P. Siess Award by the Dept. of Civil and Environmental Engineering at the University of Illinois at Urbana-Champaign. This award is presented to an outstanding graduate student to enable the student to attend a professional society conference. Xiaopeng has been working with Professor Yanfeng Ouyang on a NEXTRANS project aimed at providing more accurate traffic data for multimodal freight transportation systems. Xiaopeng also mentored undergraduate student Eunseok Choi, who worked on this project as part of the NEXTRANS Summer Undergraduate Internship Program.
GRADUATE STUDENTS

Anwaar Ahmed, The Ohio State University
Kivanc Avrenli, Univ. of Illinois at Urbana-Champaign
Jongeun Baek, Univ. of Illinois at Urbana-Champaign
Qiang Bai, Purdue University
Sarah Brechbill, Purdue University
Cheng Chen, The Ohio State University
Amanda Cope, Purdue University
Eshan Dave, Univ. of Illinois at Urbana-Champaign
Kakan Chandra Dey, Wayne State University
Indrajit Ghosh, Wayne State University
Salvador Hernandez, Purdue University
Yu-Ting Hsu, Purdue University
Yuziong Ji, The Ohio State University
George Kalafatas, Purdue University
Teja L N Karra, Wayne State University
Seoungbum Kim, The Ohio State University
Amit Kumar, Purdue University
Ho Lee, The Ohio State University
Sofie Leon, Univ. of Illinois at Urbana-Champaign
Xiaopeng Li, Univ. of Illinois at Urbana-Champaign
Jinjian Liang, The Ohio State University
Han-Tsung Liou, National Cheng Kung University

Maria Martchouk, Purdue University
Onur Pekcan, Univ. of Illinois at Urbana-Champaign
David Perkis, Purdue University
Hani Ramezani, Univ. of Illinois at Urbana-Champaign
Craig Rismiller, Purdue University
Anuj Sharma, Purdue University
Dong Yoon Song, Purdue University
Brandon Strohl, The Ohio State University
Hao Wang, Univ. of Illinois at Urbana-Champaign
Yufang Zhang, The Ohio State University
Fanyu Zhou, The Ohio State University
Dunke Zhou, The Ohio State University
Honglei Zhu, The Ohio State University
PPP WORKSHOP BRIDGES GAP BETWEEN CLASSROOM AND REAL WORLD

On December 2, 2008, the NEXTRANS Center hosted a workshop that allowed students to analyze a toll road project from the perspective of private-sector investors. The workshop, titled “XYZ Express Toll Route: A PPP (Private Toll Road Concession) Practical Case Study,” was presented by Fidel Saenz de Ormijana (NEXTRANS Advisory Council Member) and Ricardo Sanchez of Ferrovial Group. It was attended by approximately forty Purdue students and faculty members, in addition to other representatives of Ferrovial Group.

For the exercise, Saenz and Sanchez asked students to analyze the financial feasibility of a hypothetical toll road project. After being presented with a case study and data spreadsheet in advance, attendees created a concession financial model that weighed revenue against operation, maintenance, and capital costs.

This workshop presented a strong experiential learning opportunity for students. Participants were asked to set aside pure theoretical and technical formulation to examine real-world variables that influence the decision-making of a private-sector investor.

NEXTRANS CO-SPONSORS UNDERGRADUATE INTERN

Kyle Bemis was competitively selected for a 2009 Discovery Park Undergraduate Research Internship (DURI), co-sponsored by the NEXTRANS Center. The DURI program allows students to work with faculty on research projects that combine two or more disciplinary strengths at Purdue University.

A Purdue statistics student, Kyle was introduced to the field of transportation by working with Professor Dan DeLaurentis on a NEXTRANS project exploring on-demand air service (ODAS), which aims to enhance “doorstep-to-destination” mobility through the use of very light jets. If ODAS can deliver better speed and flexibility in door-to-door transportation than commercial airline service or other modes, then it could generate significant economic benefits in the Midwest with moderate investment. Kyle’s role in the project was to aid in developing statistical models of multimodal transportation networks.

After graduation, Kyle plans to obtain a Master’s Degree in Statistics from Purdue and pursue a career in data analysis.
COMMUNITY RESEARCH INTO TRANSPORTATION ISSUES
Sponsored by NEXTRANS and Purdue University

Located within the Martindale Brightwood community on the east side of Indianapolis, Martin University’s mission is to serve low-income, minority, and adult learners. In partnership with the NEXTRANS Center and Purdue University, Martin recently undertook a community outreach project exploring the negative impacts of the I-70 renovation project on the Martindale Brightwood neighborhood, focusing in particular on its senior citizens.

A NNORC (neighborhood naturally occurring retirement community) is defined as a community with a high concentration of older residents 60 years of age and older, that is not planned but developed naturally. These older adults want to remain in their homes as long as possible, a concept known as “aging in place.” The aim of this NEXTRANS co-sponsored project was for Martin University’s non-traditional undergraduate students to conduct a study regarding the transportation usage of these older residents. More specifically, the goals were to identify and address health, social, and economic impacts of transportation issues related to the seniors living in the Martindale/Brightwood community.

This NEXTRANS project allowed Martin University students to:

- Complete two transportation survey reports on the impact of the I-70 renovation project and the transportation usage of senior citizens living in a NNORC.

- Participate in a series of specialized courses in Environmental Science as part of this project. These courses focused on the environmental impact of transportation on the Martindale/Brightwood community. Questionnaires were developed to study a number of transportation issues. Students were trained in interview techniques before conducting these surveys amongst the general population and senior citizens.

- Conduct four meetings with Martindale Brightwood residents who were 60 years or older over a period of one and a half months. These meetings were designed to gather information regarding the impact of the transportation needs of the residents living in the community. Each of the four meetings had a different focal point: Mobility, Environmental Quality and Sense of Place, Quality of Life, and Citizen Participation. As an outgrowth of these four meetings, the Martindale Brightwood Neighborhood Naturally Occurring Retirement Community (NNORC) Transportation Survey was developed.
2009 UNDERGRADUATE SUMMER INTERNS

The NEXTRANS Center’s Undergraduate Summer Internship in Transportation provides competitively-selected undergraduate students with the opportunity to complete a program of transportation research and activities at Purdue University, the University of Illinois at Urbana-Champaign, or The Ohio State University. 2009 participants were exposed to the field of transportation through hands-on, collaborative research under the guidance of NEXTRANS faculty members and graduate researchers.

In addition to participating in field trips and submitting regular progress reports, interns were required to deliver formal presentations showcasing their work on July 27, 2009 at Purdue University’s Discovery Park. This event was an opportunity for interns to share their research accomplishments with faculty, graduate mentors, and other undergraduate students from all three institutions, as well as the NEXTRANS Center staff, and Discovery Park Associate Director Pankaj Sharma. Besides gaining insight about a variety of transportation topics, interns received encouragement and guidance in considering graduate-level education and transportation-related careers.

I learned that there is a whole lot more to the field of transportation than I had imagined.

Divya Kumar
NEXTRANS Intern
2009 INTERNS (Continued from previous page)

Dan Brandesky is pursuing a B.S. in Electrical Engineering at The Ohio State University. For his internship, Dan worked with Professor Benjamin Coifman (OSU) on two projects. One aims to determine the feasibility of using existing freeway loop detectors to predict traffic congestion. The second is investigating a new method of collecting traffic survey data via detectors mounted on vehicles. Dan’s future goal is to work in the field of transportation designing systems for urban traffic flow management.

Eunseok Choi recently completed a B.S. in Civil Engineering at the University of Illinois at Urbana-Champaign (May 2009). For his internship, Eunseok worked with Professor Yanfeng Ouyang (UIUC) and Graduate Researcher Xiaopeng Li on research aimed at providing more accurate traffic data for multimodal freight transportation systems. Eunseok helped to determine the prime sensor locations that will maximize the number of truck detections at minimum cost. Eunseok’s future plans are to complete a Master’s Degree at UIUC and eventually work for a transportation consulting firm.

Erin Kersh is pursuing a B.E. in Civil Engineering and a B.S. in Mathematics at Vanderbilt University. For her internship, Erin worked with NEXTRANS Director Srinivas Peeta and Research Associate Lili Du (Purdue University) on research that aims to enhance the ability to manage network traffic flow under disasters. Erin’s role was to run a program that helps agencies identify the most optimal links in the network for upgrade. After graduation, Erin plans to pursue a Master’s Degree in Civil Engineering.

Divya Kumar recently completed a B.S. in Civil Engineering at the New Jersey Institute of Technology (May 2009). For her internship, Divya worked with NEXTRANS Director Srinivas Peeta and Graduate Researcher Amit Kumar (Purdue University) to analyze the convergence properties of traffic assignment algorithms for planning purposes. This information will be used to estimate the link/route flows and travel times in a network. Divya plans to pursue a Master’s Degree in Civil Engineering and eventually become a licensed Professional Engineer (PE).

Matt Toussaint is pursuing a B.S. in Civil Engineering at the University of Illinois at Urbana-Champaign. For his internship, Matt worked with Riley Edwards (UIUC) to increase the efficiency and effectiveness of railroad track inspection and maintenance. Matt’s role was to analyze historical derailment data to determine causes of derailment specific to turnouts (sections of track that divert trains from one track to another). After graduation, Matt hopes to secure a job in a railroad track maintenance department.
Transportation not only helps Indiana businesses to grow, but also builds up cities and towns. Without viable transportation systems, many Indiana cities and towns would eventually die off.

An example of this is Ogden, Indiana. Ogden used to have a school, three churches, a gas station, and a small family grocery store. When the state put in the new National State Highway 40, it caused people who travelled through the area to bypass Ogden. The lack of transportation through Ogden led to businesses closing, job losses, and the town dwindling away.

Ogden now only consists of one small church and a collection of individually-owned houses. Ogden serves as an example of how vital transportation through cities and towns is to keeping the state of Indiana alive.

One transportation challenge Indiana is facing is the need for extra taxes or fees to raise money for road repairs. In Madison County, Indiana, drivers have to pay a $25.00 wheel tax for every wheel on their car, sedan, or small truck when they register for their license. For drivers with larger trucks or buses, they must pay a $40.00 wheel tax. Some people believe it is not right to charge people who drive all the time the same amount as those who drive rarely. With rising costs in fuel and insurance, many people simply cannot afford paying an extra $25.00 or $40.00 for each wheel of their car to get their license. A solution to this dilemma might be using some of the money from the Hoosier Lottery to pay for road repairs. If this isn’t possible, Indiana officials should search for other alternatives to charging taxpayers flat-rate wheel fees...."
"All forms of life depend on an organism's ability to transport itself from place to place. An organism may need to move to locate new sources of food, to avoid predators, or to find a mate. Man too, has a need to travel. Each Hoosier stimulates the economy when he or she travels to find food, whether their hunting grounds are the local Kroger or the Olive Garden in a nearby town...

There is no perfect mode of transportation. Airplanes, trains, buses, and cars all have flaws. These flaws are maximized when one form is utilized more heavily than all the others. In the same way, these flaws can be minimized if all these forms are used together in an efficient manner...

Indiana has created an infrastructure system that relies heavily on automobiles and petroleum fuels... One of the greatest flaws of cars is the large consumption of gas per person. A car consumes more gas per person than via public transportation, such as buses and trains, which carry 60 to more than 100 people per trip. With the state’s current transportation system, if one wishes to travel from Crawfordsville to Lafayette or Indianapolis, one must take a car. However, if Indiana established railway or bus routes connecting these cities with trains or buses running on an efficient schedule, one traveling from Crawfordsville would have more options in how to reach a destination. If public transportation is available and efficient, Indiana residents are more likely to use it in their day-to-day travels; thus each person would be using less fossil fuels for commutes..."

Mikayla Janney is a sophomore honors student at Tri Junior-Senior High School (Straughn), where she is Co-Editor of the Olympian Newspaper, and involved in volleyball, bowling, track, and the English Academic Team. After graduation, she hopes to pursue a college degree in Elementary Education, with a minor in Journalism or Graphic Design.

Chelsea DeLarm is a senior honors student at Crawfordsville High School, where for 4 years, she has been actively involved in a problem-based learning (PBL) project aimed at promoting local Amtrak usage. In addition to maintaining a 4.0 GPA, Chelsea is a member of the National Art Honor Society, National Honor Society, Chess Club, Spanish Club, and English Academic Team.
TRAVEL DEMAND COURSE PROVIDES TRAINING FOR TRANSPORTATION PROFESSIONALS

On June 8-9, 2009, NEXTRANS and the Joint Transportation Research Program (JTRP) at Purdue University co-sponsored a two-day outreach course on travel demand model theory.

Held in conjunction with the Indiana Department of Transportation’s (INDOT) annual TransCAD software training event, this course was led by Srinivas Peeta (NEXTRANS Director), Jon Fricker (Investigator), and Hillel Bar-Gera (Visiting Scholar). The two-day course provided in-depth information regarding the common 4-step modeling methods, theory, and best practices. Topics addressed included trip generation, trip distribution, traffic assignment, and travel demand forecasting.

In addition to gaining exposure to theory, participants were given hands-on exercises and sample problems. Participants who attended both days of training were eligible to receive Continuing Education (CEU) Credit.

DISTANCE LEARNING CERTIFICATE PROGRAM

The NEXTRANS Center has joined with other Regional University Transportation Centers to participate in the Transportation Leadership Graduate Certificate (TLGC) Program. This distance-learning program is geared towards early to mid-career transportation professionals with technical, operations, and planning experience in the public or private sector.

The program’s objective is to nurture those with potential leadership qualities to advance from technical responsibilities to management and leadership roles by completing interdisciplinary courses without leaving their current professions.

Interested professionals can visit http://www.transleader.org for an opportunity to enroll in courses at some of the country’s finest graduate transportation programs.
The NEXTRANS Center’s technology transfer program aims to transfer knowledge to transportation professionals, and create opportunities for commercialization of research results.
TECHNOLOGY TRANSFER

NEXTRANS SEMINAR SERIES

On November 6, 2008, Professor Venky Shankar (Pennsylvania State University) delivered a presentation to faculty and students at the Purdue University School of Civil Engineering as part of the NEXTRANS Seminar Series. In a lecture titled “Consideration of Frameworks for Incorporating Accident Severity Heterogeneity in Traffic Safety Modeling,” Dr. Shankar presented methodological perspectives on frameworks for addressing severity heterogeneity that occurs in reported traffic accident injury outcomes. An empirical context was then described to illustrate a data-centric view on this framework. Preliminary results from sample model structures were also discussed.

Professor Michael Cassidy (University of California, Berkeley) delivered NEXTRANS-sponsored lectures at the University of Illinois at Urbana-Champaign (October 30, 2008) and The Ohio State University (December 15, 2008). The lecture, titled “Managing Cross-Modal Conflicts on Multimodal Transport Net-

works,” examined the disruptive vehicular interactions that arise when different modes, such as cars, buses, and bicycles, share the same roadway. It went on to describe how the thoughtful management of these cross-modal conflicts can enhance accessibility for all users of a transport system, while encouraging the use of greener travel modes.
DIRECTOR PEETA PRESENTS AT CUTC SUMMER MEETING

NEXTRANS Center Director Srinivas Peeta delivered a presentation on UTC Best Practices at the Council of University Transportation Centers (CUTC) Summer Meeting, which was held June 30 – July 2, 2009 in Amherst, MA. The NEXTRANS Center was one of eight centers invited to present at this year’s meeting in order to promote technology transfer of best practices to other UTCs.

Dr. Peeta’s presentation illustrated how the NEXTRANS Center aims to develop integrated solutions while responding to shifting USDOT priorities. The Center strives to achieve this goal through strategic internal planning; innovative partnerships; and an integrated, dynamic approach to project selection (see page 20).

Dr. Peeta also discussed the importance of the UTC Grant; results achieved during the first two years of operations; and some of the risks the Center has taken to attain operational, financial, and programmatic integration across major partners. By utilizing a central administration, NEXTRANS promotes consistency in activities conducted at each university (seminars, internships, the role graduate students play, etc.), and ensures the Center is not duplicating research or resources. Research, education and outreach programs are aligned in a manner that makes the most efficient allocation of sponsor dollars by matching them with its partners’ resources in order to meet its thematic commitments and regional charge (see Figure 5).

Figure 5: Programmatic integration of the NEXTRANS Center’s research, education, and technology transfer activities.
The NEXTRANS Center, in collaboration with the Discovery Park Energy Center, hosted a Solar Power Initiative Exploratory Meeting at Purdue University on July 24, 2009. This meeting aimed to evaluate the possibility of utilizing solar power to provide electricity for lighting of major highway intersections in Indiana.

The meeting was chaired by Leigh Morris, Deputy Commissioner, Toll Road Oversight, Indiana Department of Transportation and Chairman of the Board, Northwest Indiana Regional Development Authority. Professor Richard Schwartz (Purdue University) provided expertise on the state of photovoltaic technology and outlook for the future.

Public agencies, vendors, researchers, and private sector investors then weighed in on the feasibility of implementing this technology in Indiana. Multiple perspectives were provided by representatives from Duke Energy; NIPSCO; Indianapolis Power & Light; Inovateus Solar LLC; Indiana and Michigan Power; Indiana Economic Development Corporation; Indiana Department of Transportation (INDOT), Federal Highway Administration, Indiana Division; Purdue University; Discovery Park; the Joint Transportation Research Program (JTRP); and NEXTRANS.

The Center hopes to continue its involvement in this promising initiative as it develops.
Professionals from industry, the public sector, and academia convened on October 22 – 23, 2008 for the Annual Illinois Traffic Engineering & Safety Conference. For nearly six decades, this conference has provided participants with information on transportation research, government policies and regulations, product development and testing, product evaluation, and computer hardware and software developments. 2008 sponsors included the Illinois Department of Transportation, the FHWA (Illinois Division), the NHTSA (Great Lakes Region), and the University of Illinois at Urbana-Champaign (UIUC).

A number of NEXTRANS students and faculty members from UIUC participated in the 2008 conference, including NEXTRANS Center Co-Director Ray Benekohal, and Executive Committee Member Imad Al-Qadi. Al-Qadi, who is the Founder Professor of Engineering at UIUC and serves as Director of the Illinois Center for Transportation, delivered a presentation titled “Update on Safety Research Projects at IDOT” during Friday morning’s general session. Ray Benekohal presided over Thursday afternoon’s luncheon program, in addition to giving the conference’s final presentation, titled “Effectiveness of the Illinois Speed Photo Enforcement Program.”

The 2008 conference also gave NEXTRANS faculty members from UIUC the opportunity to share NEXTRANS Center goals and activities with the transportation community by networking with colleagues in the Illinois area.

The Sixth Annual Indiana Logistics Summit was held in Indianapolis on Nov. 12, 2008, giving Center staff the opportunity to share NEXTRANS workforce development goals with colleagues from throughout the region. Presented by the Ports of Indiana and Purdue University, the summit brings together leaders from the worlds of industry, academia, public policy and government to discuss how to make Indiana’s transportation, distribution and logistics businesses more competitive.

NEXTRANS Director Srinivas Peeta served as a panelist during the final session of the day, titled “Our Logistics Workforce & University Resources,” and moderated by NEXTRANS Executive Committee Member John Schneider (Assistant Vice President for Industry Research, Purdue University). NEXTRANS was cited several times during this session to highlight how universities can work with industry to create a highly-skilled transportation workforce. Director Peeta discussed how the Center strives to respond to industry feedback in developing student initiatives, including internships, research opportunities, distance learning certificates, and special programs designed to attract non-engineers to the field.
NEXTRANS faculty members from The Ohio State University actively engaged students at the 62nd Annual Ohio Transportation and Engineering Conference (OTEC), which was held in Columbus on October 28 – 29, 2008. Sponsored by the Ohio Department of Transportation (ODOT) and The Ohio State University (OSU), the conference focused on the 2008 Theme: “The Power of Multimodal Transportation: Linking Ohio to the World on All Fronts.”

NEXTRANS Executive Committee Member Mark McCord organized two panel sessions geared toward students attending the conference. Approximately 80 participants attended the first session, titled “University Transportation Centers in Ohio: What They Mean for Transportation Education and Practice.” NEXTRANS Center Co-Director Rabi Mishalani served as a panelist during this session, which discussed educational opportunities fostered by the UTC Program. Approximately 60 students attended the second session, which was titled, “The Transportation Profession: Observations and Tips for Students From Transportation Engineers.”

Nearly 100 people attended The Ohio State University alumni breakfast, which featured a presentation by Mark McCord and Benjamin Coifman. Their presentation, “Department of CEEGS Federally Funded Transportation Projects,” provided an overview of NEXTRANS-sponsored projects at OSU, including the development of a state-of-the-art campus transit lab for research and education.

MIDWEST TRAFFIC MONITORING WORKSHOP

NEXTRANS researchers at The Ohio State University participated in the Midwest Traffic Monitoring Workshop on March 24-25, 2009. Executive Committee Member Mark McCord served as a member of the workshop planning team, and participated in a panel titled “Improving Availability and Use of Traffic Data in the Midwest.” Mark McCord is currently conducting a NEXTRANS-sponsored project that aims to improve the accuracy of Annual Average Daily Traffic (AADT) data by leveraging existing air photos.

Organized by the Transportation Research Board (TRB) and hosted by the Ohio Department of Transportation (ODOT), the Midwest Traffic Monitoring Workshop provided a forum for Midwestern state and local agencies to share successful strategies for collecting, analyzing, disseminating, and using traffic data. Participants also emphasized the importance of maximizing productivity and results through regional collaboration.
TRANSPORTATION AND HIGHWAY ENGINEERING CONFERENCE

Each year, hundreds of transportation engineers, officials, technicians, faculty and students gather at the Transportation and Highway Engineering (T.H.E) Conference to discuss issues critical to the safe and economical movement of people and goods across Illinois, the U.S.A., and beyond. 2009 marked the 96th Anniversary of the T.H.E. Conference, which was held at the University of Illinois at Urbana-Champaign on February 24-25, 2009, attracting nearly 1,000 attendees.

A number of NEXTRANS students and faculty members from UIUC were involved in the 2009 conference. NEXTRANS Investigator William Buttlar served as Chairperson of the event, in addition to presiding over Wednesday’s Luncheon Program. Executive Committee Member and ICT Director Imad Al-Qadi updated attendees on current Illinois Center for Transportation (ICT) research during Wednesday’s General Session. Tuesday afternoon’s technical breakout sessions featured NEXTRANS affiliated faculty member Jeff Roesler, who delivered a presentation titled “Concrete Pavement Solutions for Low Volume Roads.”

During the 2009 T.H.E. Exhibit and Mixer, participants were given the opportunity to network with colleagues and visit exhibits in order to keep up with the latest industry trends. They also mingled with ASCE, ITE, and ACI student members as well as NEXTRANS students.

PURDUE ROAD SCHOOL

The NEXTRANS Center was pleased to participate in the non-profit exhibition at the 95th Annual Purdue Road School on March 10-12, 2009. Held at Purdue since 1914, the Road School consistently attracts well over 1,000 Indiana local and state officials, consultants, and suppliers each year.

This year’s conference provided numerous opportunities to network with local and state officials during exhibits, sessions, and luncheons. Hundreds of participants visited the NEXTRANS Center’s booth, where they were updated on the Center’s current research, education, and technology transfer activities. Staff members publicized educational projects such as the NEXTRANS Undergraduate Summer Internship and Indiana High School Essay Contest, and worked to forge partnerships in support of the Center’s regional goals.

The Purdue Road School is coordinated by the Joint Transportation Research Program (JTRP), and chaired by JTRP Director Kumares Sinha, and NEXTRANS Investigator Jon Fricker.
INTERNATIONAL CONFERENCE ON THE BEARING CAPACITY OF ROADS, RAILWAYS, AND AIRFIELDS

The Eighth International Conference on the Bearing Capacity of Roads, Railways, and Airfields (BCR2A) convened at the University of Illinois at Urbana-Champaign (UIUC) from June 29 - July 2, 2009.

NEXTRANS faculty members from UIUC presented numerous papers and workshops throughout the 4-day event. The conference was chaired by NEXTRANS Investigator Erol Tutumluer, and co-chaired by Executive Committee Member Imad Al-Qadi. Investigator Christopher Barkan served as Railroad Area Coordinator. William Buttlar (Investigator) and Jeffrey Roesler (Faculty Affiliate) chaired conference sessions, and Riley Edwards (Investigator) served on the organizing committee (with Buttlar and Roesler).

Attracting 250 academics, researchers, and practitioners from 32 countries, this conference aimed to address the bearing capacity problems of roads, railways, and airfields. Bearing capacity issues are changing because of ever-increasing traffic volumes and weights, which require stronger and more durable pavements, railroad track structures, and superstructures.

BCR2A provided international experts in this field with an opportunity to exchange experiences and views, as well as identify the needs for further research and development. This conference is the eighth in the series that began in Trondheim, Norway in 1982 and occurs at four-year intervals.

NEXTRANS FOSTERS COMMUNITY OF INTEREST

The Transportation Research Board’s (TRB) Transportation Network Modeling Committee (ADB30) promotes research and information exchange in transportation network modeling, an interdisciplinary field spanning Computer Science, Logistics, Mathematics, Operations Research, Telecommunications, and Transportation Science.

Chaired by NEXTRANS Director Srinivas Peeta, the committee has over forty members. In 2009, ADB30 received a commendation from TRB’s Technical Activities Council and TRR Publication Board for successfully reviewing over 155 papers and completing 550 reviews.

As part of its technology transfer activities, NEXTRANS is supporting this active committee by hosting a Community of Interest web site. The Center hopes this site will serve as a venue for the effective and rapid sharing of information and experiences among researchers, practitioners, and decision makers.

This site can be viewed at www.nextrans.org/ADB30/
PUBLICATIONS & PRESENTATIONS


Leon, S. E., Paulino, G.H., and Buttlar, W.G. , “Investigation of Low Temperature Cracking Through an Improved
PUBLICATIONS & PRESENTATIONS
(Continued from previous page)


* This list is not comprehensive, but represents a sampling of presentations & publications related to NEXTRANS projects.