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Montana State University
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Advancing rural transportation through research and education...

BAUCUS: "SAFETEA" BILL BEST WAY TO BRING JOBS, SAFE ROADS TO MONTANA

During a recent visit to WTI, Senator Max Baucus (D-MT) called on Congress to "bite the bullet" and pass a full, six-year highway bill instead of a temporary, one-year extension.

Speaking in reference to the federal transportation reauthorization bill - also known as "SAFETEA" - Baucus emphasized that the pending legislation is "not just a highway bill - it's a jobs bill." He said that the measure would support 17,000 Montana jobs and bring $2.2 billion to the state over the next six years.

Baucus met with Montana transportation leaders and contractors, including representatives of WTI, Montana Department of Transportation, the Montana Contractors Association, local contractors and American Wildlands. The purpose of the meeting was to bring them the latest information on the status of the federal highway bill, and hear their input on how the bill can best serve the transportation and economic needs of the state.

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Senator Max Baucus (L) and Steve Albert (R) at the recent discussion regarding the Federal highway bill

"SAFETEA" and Safety: Key Issues for WTI

by Steve Albert, Director

WTI had a valuable opportunity this summer to host a meeting between U.S. Senator Max Baucus and key Montana transportation leaders. The focus of the meeting was the importance of the federal highway bill to the future of the Montana transportation system. As evidenced by the bill's nickname -- "SAFETEA" - the priority of many the bill's provisions is to ensure safe travel throughout the nation.

At WTI, improved safety for the traveling public is the impetus behind much of our research. We test and evaluate new procedures and technologies that can improve road conditions, alert drivers, and facilitate emergency response. In this issue of our newsletter, you'll read about projects to demonstrate driver warning systems specifically designed for mountain passes, icy roads, and hazardous curves. You'll also learn how transportation agencies can promote the personal safety of our children, by linking road condition message devices to the AMBER Alert system for missing kids. Finally, we introduce a new area of safety research called "Vehicle Infrastructure Integration."

If you or your organization has ideas how we work together to collaborate on future safety research, please don't hesitate to contact me at (406) 994-6114 or at stevea@coe.montana.edu.

ITS Deployments Enhance Safe Travel throughout Yellowstone Region

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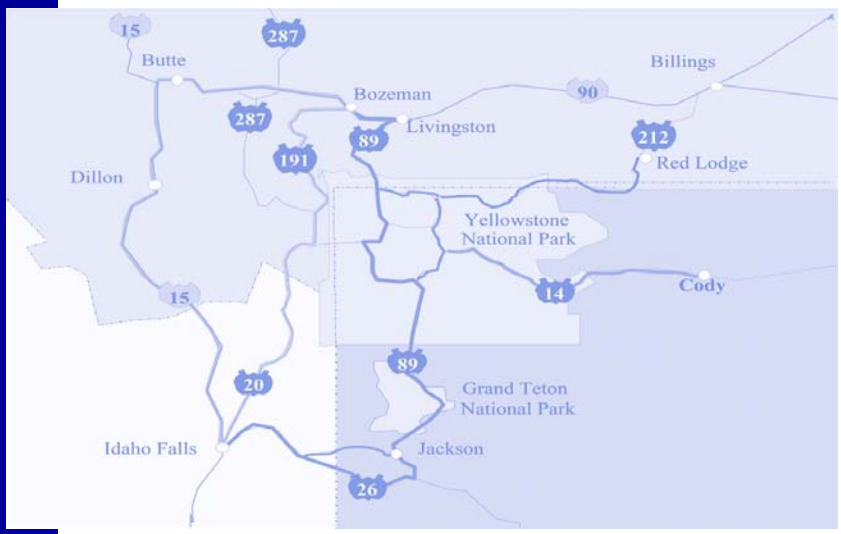
Yellowstone National Park and the surrounding region attract a growing number of national and international travelers each year. The Park alone estimates the number of annual visitors at more than 3 million, with the majority touring the park in private vehicles. The regional transportation infrastructure must also serve the needs of visitors to nearby recreational destinations (such as Grand Teton National Park), residents of the three states that border the Park (Montana, Idaho, and Wyoming), and the trucking industry.

Transportation facilities in the region range from Interstate freeway to low-volume two-lane rural highways. The area also experiences severe weather conditions, such as snow, icy roads and high winds. The various jurisdictions charged with transportation planning and management in the Yellowstone region are constantly looking for new ways to promote safe and efficient travel through the area, while still preserving its historic and natural resources.



GYRITS Study Area

In cooperation with FHWA and several state DOTs, the Western Transportation Institute (WTI) at Montana State University initiated the Greater Yellowstone Rural Intelligent Transportation Systems Project (GYRITS) to demonstrate and evaluate ITS in a rural environment. GYRITS began in January 1997 with a Congressional Earmark to fund the creation of a Regional ITS Strategic Deployment Plan and the implementation of "early winner" projects.

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Baucus and the meeting attendees agreed that without the long-term funding guaranteed by a six-year bill, transportation agencies can not begin multi-year safety, construction or rehabilitation projects. Sandy Straehl, MDT Transportation Planning Administrator, also reiterated the importance of the highway bill for Montana's economy. "The construction sector in our state continues to grow," said Straehl. "This is not from building dams - it's from building roads."

The U.S. Senate and House have each passed their own version of the federal highway bill. A key author of the Senate bill, Baucus will serve on the conference committee that drafts the final version.

In addition to his meeting with transportation officials, Baucus had the opportunity to tour the research facilities at the Western Transportation Institute. Senator Baucus has been a strong supporter of WTI and its research activities since the inception of the center in 1994. In 1998, Baucus was one of a handful of senators that crafted the last highway spending bill, which contained language that established WTI as a University Transportation Center, one of only 35 in the country. Through this USDOT program, WTI receives $1.8 million per year in federal funding to expand its research and educational activities.

Senator Baucus had the opportunity to "test drive" one of WTI's newest projects, a state-of-the-art driving simulator that allows researchers to conduct realistic highway studies in the safety of a laboratory setting. The simulator is the only one of its kind in the Pacific Northwest, and is available to support faculty, undergraduate, and graduate research projects from numerous departments across the MSU campus. Currently, the simulator is being used to develop young driver and elderly driver education programs, and to study driver distraction from the use of mobile phones.

In February 2000, WTI completed the strategic plan, which included stakeholder input, GYRITS organizational structure, regional architecture, legacy systems, and candidate projects.

During phase two, WTI worked with numerous federal, state, and private agencies to implement the projects identified in the strategic plan. The deployment projects addressed a variety of safety, mobility, traveler information, and planning challenges throughout the Yellowstone region.

Dynamic Message Signs

For several of the projects, WTI evaluated the effectiveness of displaying driver warnings on Dynamic Message Signs (DMS). In Idaho, the Department of Transportation identified six highway sites with high rates of auto accidents. Eight portable DMS were purchased and deployed starting in December 2000 to warn drivers of icy road conditions on sharp curves. (By purchasing portable signs, ITD can move them in the summer to post messages about road construction, accidents and even wildlife near roadways.) To conduct the evaluation, researchers collected and evaluated data, including traffic speed, traffic volumes, and crash statistics. WTI also conducted motorist surveys in 2001 and 2002 to assess motorist response to the DMS. While sign usage has not yet yielded a significant reduction in crashes, motorists reported that the signs were effective and trucks exhibited lower speeds when the signs were activated.

In a similar project in Montana, eight new portable DMS were deployed to display safety messages about construction, road conditions and potential delays at various sites in both winter and summer. At four locations where winter weather frequently creates challenges, concrete pads were constructed to facilitate installation and increase stability. To evaluate the effectiveness of these signs, Montana Department of Transportation maintenance personnel completed user surveys regarding their perception of the signs' performance during the deployment period. From the survey data, WTI was able to develop several important recommendations for improving future use of DMS in Montana, including creation of a user's training program, a policies and procedures manual for DMS use, and a message guide set. Maintenance personnel also identified 34 additional locations in Montana where DMS could provide useful traveler information and safety messages.

In Wyoming, a single DMS was deployed in conjunction with smart technologies to provide targeted warning messages on a challenging stretch of road. Near the town of Lovell, Wyoming there is a section of Highway 14A with numerous, consecutive downgrades and sharp curves. Despite the road's low traffic flow (approximately 300 vehicles/day), the location has been the site of numerous rollovers by high profile vehicles, including three recent fatal accidents. The Wyoming Department of Transportation and WTI coordinated a project to install loops in a section of road preceding the trouble spot that can measure the vehicle's length and speed. If the vehicle is large and exceeding a safe speed, the DMS sign is activated, flashing a message such as "Curve Ahead, Slow Down." To evaluate the sign's effectiveness, WTI collected speed and crash data and conducted motorist surveys. Speed data suggests that there has been a reduction in vehicle speeds, and motorist response to the signs has been generally positive. While crash data has to date been statistically inconclusive, the absence of fatal crashes since the sign's deployment suggests that it is probably a cost-effective investment in highway safety.

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Incident Management Response Guide

To facilitate response to accidents and other emergencies in the region, WTI developed an Incident Management Response Guide. Researchers

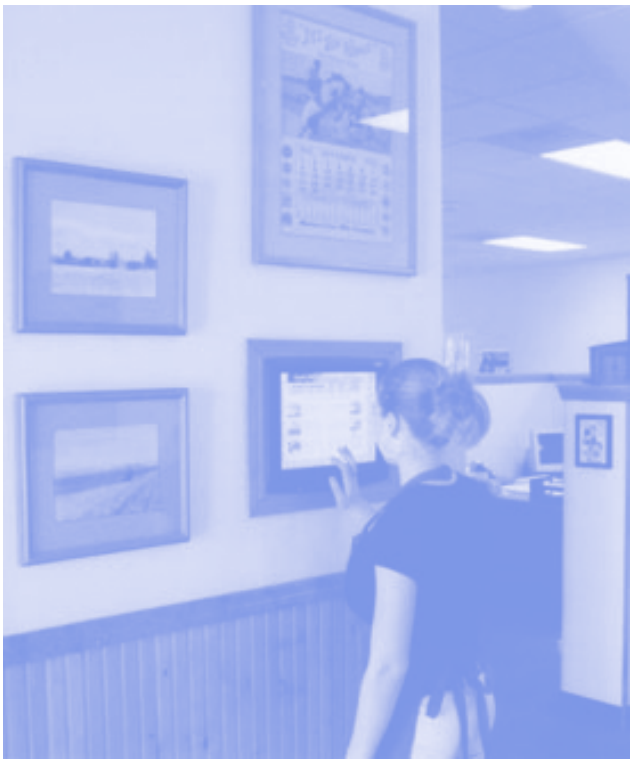
conducted surveys and personal interviews with incident response professionals throughout the Yellowstone region, and developed recommendations for improving the procedures for managing incidents. One recurring theme in the recommendations was enhanced coordination and communication among the various jurisdictions responsible for incident management, in large part so that travelers can have access to the most up-to-date information about incidents throughout the region that may cause delays or pose safety hazards. The Incident Response Guide also includes recommendations for posting effective and consistent traveler information messages on Highway Advisory Radio, Dynamic Message Signs, and 511 systems.

Touch Screen Information Kiosks

The most "hands on" deployment in the GYRITS project was the creation of touch screen kiosks for use throughout Montana. In cooperation with the Montana Department of Transportation and the Montana Department of Commerce (Travel Montana), WTI coordinated with the University of Montana to develop and deploy 6 kiosks at key locations where Yellowstone tourists stop (restaurants, a rest area, an airport, etc.). Through the use of a touch screen and interactively designed formats, travelers can get information as follows.

- Listings of tourism and recreational facilities in the region
- Local weather and road condition information
- Real time images from roadside cameras
- Interpretative information about Yellowstone National Park
- Local events and activities
- Maps and area information

The pilot deployment of the kiosks yielded important lessons learned regarding technical challenges, content development, and placement and marketing of the kiosks. WTI and the State of Montana continue to work with the University of Montana in this field through the development of upgraded kiosks targeted at tourists visiting the state for the Lewis and Clark Bicentennial.



Automatic Vehicle Identification at Entrance Gates

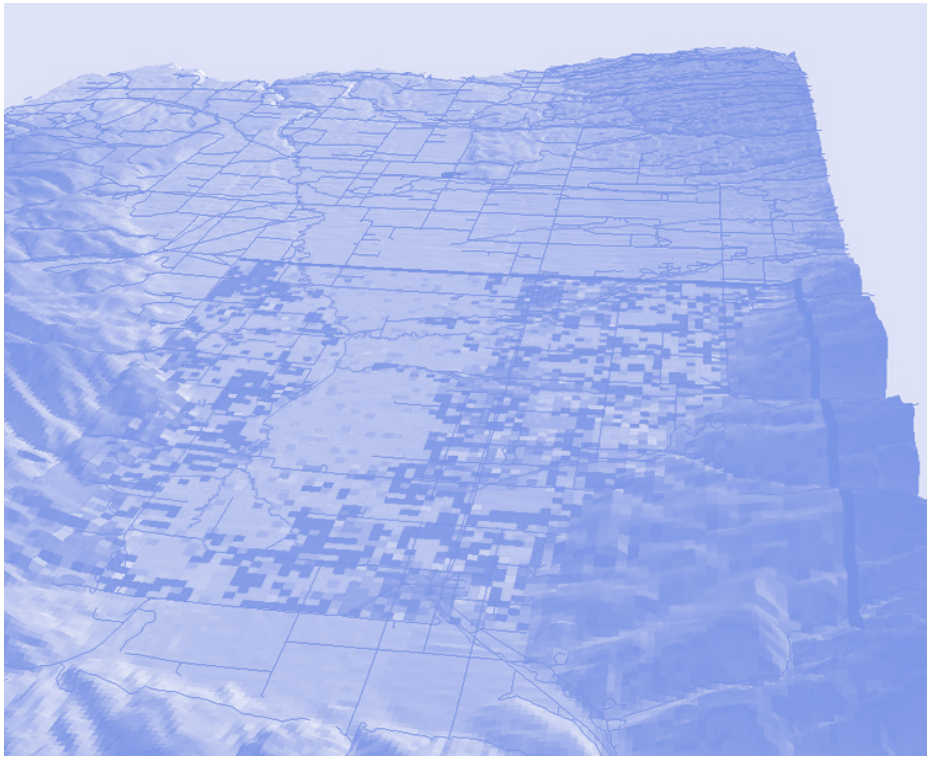
WTI and Yellowstone National Park jointly developed and managed the installation of Automatic Vehicle Identification Systems (AVI) at two

Park entrance stations. Park employees, who received electronic tags to attach to their vehicles, can now enter the Park through a designated AVI lane, where an antenna reads the ID number and authorizes automatic entrance. The primary goal of this project was to reduce the wait time at the entrances for employees, but it has the added benefit of increasing the amount of time rangers can spend advising tourists about travel and recreation within the park.

GIS Land Use Forecasting

Rural Teton County, Idaho is the fastest growing county in the state, due to its proximity to many recreational and tourist areas, including Yellowstone National Park. Existing land use forecasting models did not take into account potential changes to the transportation infrastructure. It is commonly accepted that there is a relationship between improvements in transportation infrastructure and how land use changes. However, the exact relationship is not fully understood. WTI staff and MSU faculty (Jerry Johnson and Bruce Maxwell) developed a new model that integrated changing highway configurations. Gallatin County, Montana was taken as a case study because it has had several major transportation improvements over the past decade and associated growth. The relationships developed from the case study were incorporated into the model and applied to the Teton Valley study area. Using GIS technology, digital maps were created displaying potential development patterns resulting from different road improvement scenarios.

The deployment phase of the GYRITS project concluded in December 2003. WTI has just released an interactive CD-ROM that includes the final reports for all of the demonstration projects.



Vehicle-Infrastructure Integration Research and Demonstration

In early 2004, the USDOT Intelligent Transportation Systems (ITS) Joint Program Office announced its plans to develop a Vehicle-Infrastructure Integration (VII) Initiative. The concept behind VII is to develop a nationwide system in which vehicles have the capability to communicate with the transportation infrastructure and other vehicles in real-time. This ongoing exchange of traveler information, driver alerts and other data could be used to improve safety and support commercial activities.

WTI has been actively involved in VII research since 1997. WTI has spearheaded or collaborated on a variety of VII demonstration projects, with a particular focus on those that improve safety in the rural environment. Through these projects, WTI has benefited from the support and expertise of numerous public and private research partners, including California Department of Transportation Montana Department of Transportation, Idaho Transportation Department, Wyoming Department of Transportation, Yellowstone National Park, NAHS Consortium, Lockheed-Martin, and National Science Foundation.

Several of these projects are described below, along with potential future research that will support the ongoing development of VII within the national transportation network.

NSF/USDOT Partnership for Exploratory Research - ICSST: Timely and Effective Dissemination of Traveler Information in Rural Areas

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In collaboration with the Department of Electrical and Computer Engineering at Montana State University, WTI is participating in a project to explore alternative technical and structural approaches to effectively disseminating traveler information in rural areas. Principal Investigator Dr. Richard Wolff, along with WTI researchers

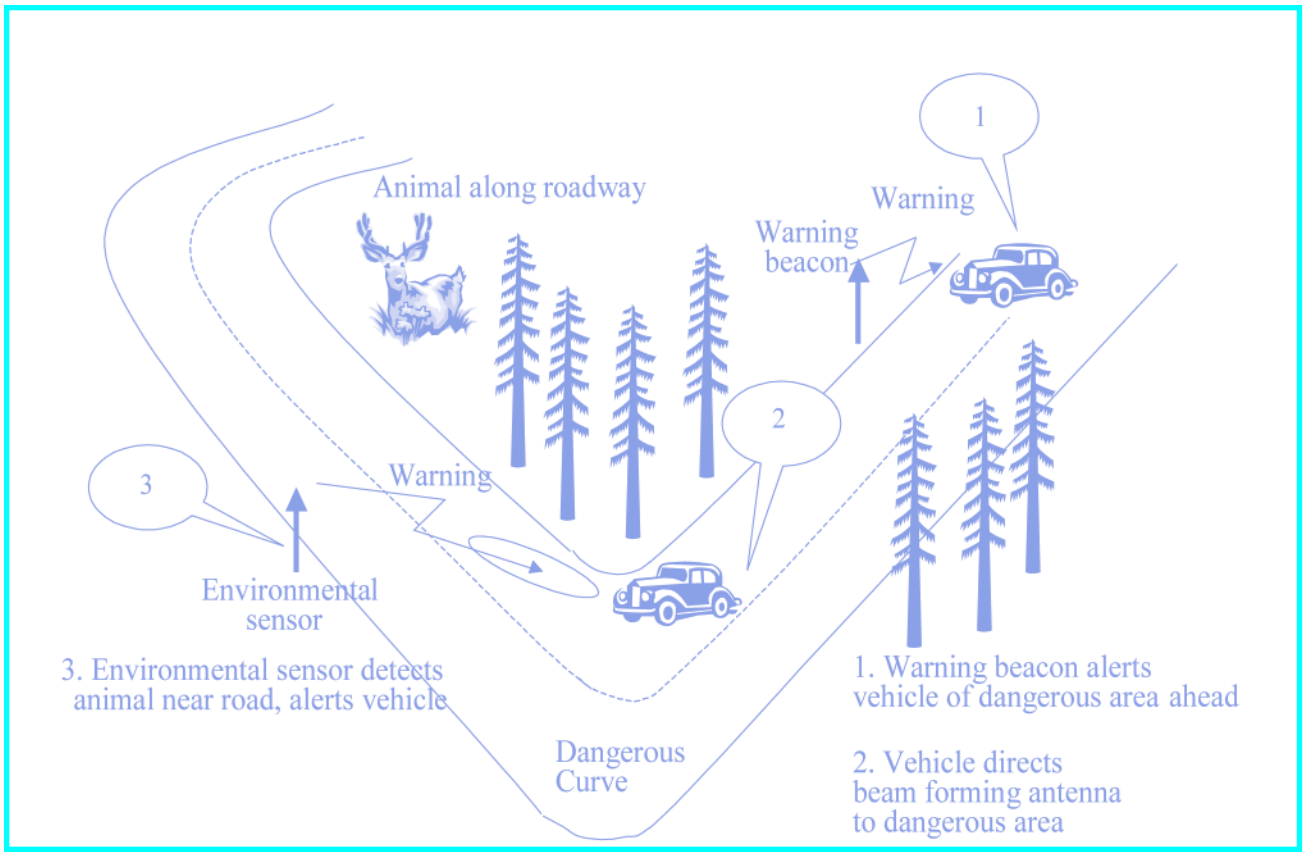

Illustration of the use of ad hoc networking to provide travelers early warning of animals crossing a roadway

John Taylor and Dr. Mike Kelly, is using a systems engineering approach to incorporate technologies and methodologies from diverse disciplines. Peer-to-peer, ad hoc communications between vehicles and between vehicles and roadside sensors, using recent advances in wireless technologies such as DSRC and ad hoc networking protocols are being explored to serve as a surrogate for extensive fixed communication and information infrastructure. Human factors and inputs from private and public sector stakeholders are being used to further shape the system design. Emerging technologies such as smart antennas are being evaluated using requirements-based criteria and an end-to-end system design.

Researchers are using modeling and simulation techniques to conduct performance assessments and technology trade-off studies. Yellowstone National Park has been selected as a representative example of a remote area where communications infrastructure is limited and numerous information intensive activities ranging from public safety to tourist services are taking place. With the cooperation of park staff, researchers are building a model of the Yellowstone area including topography, demographics, vehicle flows and other data and then examining how ad hoc networking can be used as a surrogate for more conventional communications infrastructure to meet application demands in a timely way. One of the objectives of this research is to design a prototype that might be deployed in a rural area for a field trial.

The results of this research will direct future investments in communications and information technology infrastructure that will suit the particular demands of rural and sparsely populated areas. The approach provides a high benefit to cost ratio that meets the structural requirements of large portions of the less populated regions of the country. The benefits go beyond improvements in safety and efficiency, as the infrastructure also supports a broad range of traveler information services that are of value to businesses that rely on transportation, such as fleet management, as well as the broader tourist industry. The development of the communications and information infrastructure in remote areas will also benefit the economic development efforts of rural and Native American communities.

Caltrans Northern California Advanced ITS Project

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Coastal Northern California provides a microcosm of rural driving challenges including difficult terrain, challenging roadway geometries, weather extremes, and communication limitations. Through this project, the California Department of Transportation (Caltrans) and WTI reviewed VII technologies that can be implemented in the near term, are beneficial in the rural environment, and can be implemented in a fleet of vehicles. The proposed system will provide increased benefits over roadside infrastructure (e.g., signs) that can only provide information to the driver and not communicate with the vehicle.

Several methods were used to identify transportation challenges and hazards in the selected geographic area and select a prioritized list of four potential VII application sites. These included a detailed accident epidemiological analysis of three years of traffic accident data in Caltrans District 1 and interviews with a technical advisory panel consisting of Caltrans District 1 engineering, fleet management, and safety staff members. Literature and market reviews identified relevant VII technology that is available or nearing the market for use in fleet or commercial vehicles. Operational characteristics and objectives of various technologies were examined in light of the identified challenges at the identified sites.

Specific challenges were identified at high priority sites in Caltrans District 1 in coastal Northern California. The most common kinds of crashes

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in rural areas, including those in the study area, result from lane departures. These include head-on or sideswipe collisions and run-off-road crashes. They may result primarily from excessive speed, a distracted driver, or a fatigued driver.

In Mendocino County on US 101, the objectives of a recommended deployment would be to achieve reductions in mean speed, speed variance, and crash frequency on a short length of two-lane highway approaching and in the vicinity of the Jitney Gulch Bridge. WTI recommended installation of a Wizard CB Alert System in this area to provide warning information to supplement the existing standard signage. The Wizard CB would be programmed to automatically transmit a brief message on CB channel 19 every 60 seconds warning of fixed hazards including a narrowed roadway, curves, and bridge.

In Del Norte County on US 199, the objective of a recommended deployment would be to reduce the variance in lateral lane position by participating fleet vehicles. This would, in turn, reduce the frequency of lane excursions. WTI recommended that a field deployment and evaluation of the Iteris Lane Departure Warning System be conducted with the participation of one or more fleet operators operating in this area. The LDWS predicts lane departures using image-processing technology that tracks the standard lane delineation markings and alerts the driver to current or potential lane excursions using auditory or haptic warnings.

National Automated Highway System Consortium/Caltrans Greater Yellowstone Rural AHS Case Study

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In cooperation with the National Automated Highway System Consortium (NAHSC), case studies are being conducted on existing transportation corridors to determine the feasibility of AHS; however, initial activities by the NAHSC have focused on urbanized areas. The intent of this study is to recommend applications and consider implications of AHS in a rural environment, where the primary challenge is safety.

The Greater Yellowstone Rural Intelligent Transportation Systems (GYRITS) corridor comprises a loop roadway system traversing through Wyoming, Yellowstone National Park (YNP) and Grand Teton National Park, connecting Bozeman, Montana with Idaho Falls, Idaho. The combination of varied, often undesirable driving conditions with wildlife, unfamiliar drivers, a diverse traffic stream and a lack of communication infrastructure makes it an ideal location to showcase field operational demonstrations of advanced technologies. This study focused on developing an applicable AHS for the GYRITS corridor that would ultimately increase safety and improve transportation operations.

Rural AHS Vision: The system conceived for this project and used in the benefit-cost analysis assumes four incremental service levels: (1) Spot Application: locations where accidents are statistically over-represented will be implemented with technology to warning the driver of hazards via the infrastructure and dynamic messages; (2) Information Assistance: dangers warnings will be relayed to the driver via the vehicle; (3) Control Assistance: the vehicle warnings will be relayed to the driver and in the event the driver does not respond the vehicle will temporally assume control; and (4) Full Automation: in this instance the vehicle is fully autonomous. Information Assistance, Control Assistance and Full Automation have three primary functions that assist with collision avoidance. These three functions are (1) longitudinal collision warning/guidance, (2) lateral collision warning/guidance and (3) intersection collision warning.

Analysis/Site Selection: Researchers analyzed accident rates to identify the number and severity of accidents at specific locations. The regional benefit-cost analysis revealed potential future benefits from accident reductions in the

Greater Yellowstone Corridor, and also identified desirable field operational test sites. As a result, possible early field operational testing (FOT) with low-level AHS technology have been identified. The specific candidate sites include.

Friction/Ice Detection and Warning System

- A one mile section of Montana U.S. Highway 191;

Intersection Crossing Detection

- A one mile section of Idaho U.S. Highway 26;
- Two, one mile sections of Idaho U.S. Highway 20;

Animal-Vehicle Collision Avoidance

- Two, one mile sections of Wyoming U.S. Hwy 89;

Horizontal Curve Speed Advisory

- A one mile section of Wyoming U.S. Highway 89.

These sites were estimated to have the greatest potential for improving safety in the GYRITS corridor through the deployment of AHS. Official designation as FOTs will require additional site research, stakeholder outreach and participation, and jurisdictional coordination.

Future Research

With the recent installation of a new Driving Simulation Laboratory, WTI has additional, in-house capability to conduct future research in the field of Vehicle-Infrastructure Integration. For example, WTI is considering using the Lab to evaluate the effectiveness of "virtual rumble strip" technology for preventing lane or road departure.

Rumble strips, consisting of grooves milled into the pavement perpendicular to the roadway edge, have been found to significantly reduce run-off-road accidents. When vehicles' tires encounter the rumble strips, they create the characteristic noise and vibration to alert the driver that a tire has left the lane. However, use of rumble strips has two major limitations. First, milling the rumble strips is a relatively costly and time consuming process and only a small fraction of rural highways employ them. Second, for rumble strips to sound their alert, the tires must already be some distance outside the travel lane.

"Virtual rumble strip" technology addresses these limitations. The position and orientation of the vehicle within the lane is constantly monitored by a system of sensors and computers. The sensors may use GPS, magnetic strips, lane striping, or even the trail of oil droplets left by other vehicles. Using algorithms that determine or predict vehicle location, the computer continuously determines whether to alert the driver using a computer-generated simulation of the rumble-strip sound and/or vibration.

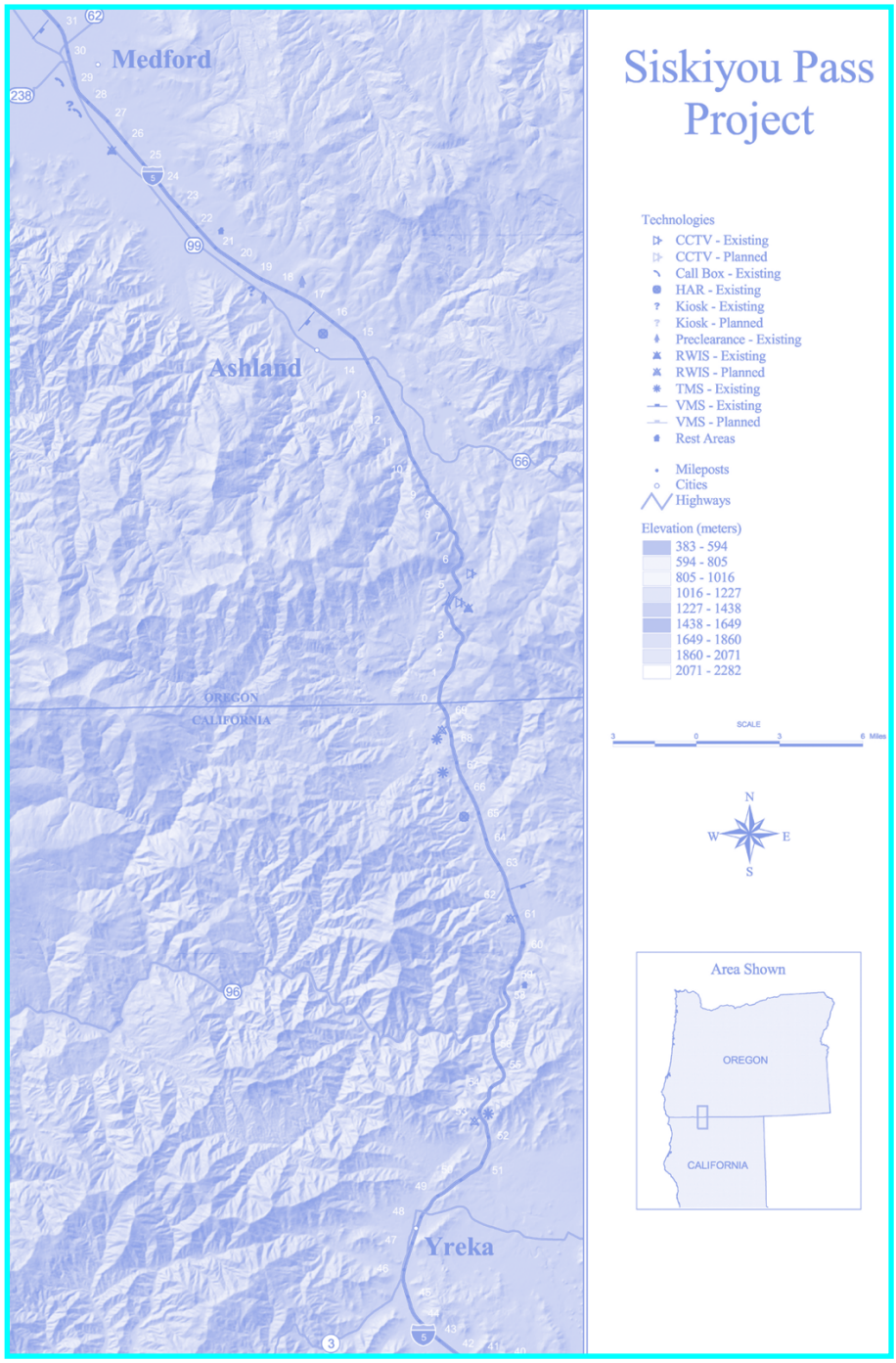
Industrial Engineering Ph.D. candidate, Laura Stanley, is interested in utilizing the Driving Simulation Lab to optimize the driver interface with virtual rumble strip systems. Working with WTI Research Director Mike Kelly, she plans to explore the comparative effectiveness of computer-generated auditory and haptic (seat vibration) warnings. Furthermore, the research would compare the effects on driver lane-keeping performance and driver satisfaction of different triggering algorithms for measuring and predicting lane position. For more information on this future research, contact Laura Stanley at (406) 994-6994 or at lstanley@coe.montana.edu.

Ph.D. candidate, Laura Stanley demonstrates the driving simulator

Safety Improvements Evaluated on California's Siskiyou Pass

In 1998, the Western Transportation Institute began working with the California and Oregon Departments of Transportation (Caltrans and ODOT, respectively) on the Rural California/Oregon Advanced Transportation Systems (COATS) project. The goal of the project was to enhance safety, improve transportation and spur economic development in the region through the use of Intelligent Transportation Systems (ITS). In 2000, the COATS Steering Committee selected the Siskiyou Pass project as an "Early Winner" project for immediate implementation.

Siskiyou Pass is located on a mountainous stretch of Interstate 5, near the California/Oregon border. Interstate 5 is an important travel and trade corridor on the West Coast. However, travelers in the region of the Pass must contend with a variety of transportation challenges, including unpredictable weather, high elevations that increase the chance of snow and ice, steep grades, tight curves, and the need for frequent road maintenance. These conditions increase the potential for accidents; moreover, when accidents do occur, the relatively long distance between services may adversely affect emergency response times.



The Siskiyou Pass project attempts to address these challenges on Interstate 5 from Yreka, California to Medford, Oregon. The objectives of the project are as follows.

- Improve local incident management near Siskiyou Pass
- Improve traveler information services
- Enhance traveler mobility

Prior to the project, some ITS technologies had already been installed in the region. These "legacy" systems included one Closed Circuit Television System (CCTV), one Changeable Message Sign

(CMS), five traveler information kiosks, one pre-clearance site, two Road Weather Information System (RWIS) stations, two Traffic Management Centers (TMC), and a Traffic Monitoring Center. As part of the Siskiyou Pass project, additional ITS technologies were deployed including highway advisory radio (HAR), and added CMS and CCTV. The project seeks to meet its objectives through an evaluation of all of these ITS deployments and through the development of an incident management plan for the region.

Evaluation of Traveler Information ITS

The ITS deployments in the Siskiyou Pass region are designed to enhance information available to travelers about weather conditions and road situations, to increase safety by decreasing accidents and improve mobility by reducing congestion and delays. The effectiveness of these ITS applications was primarily measured using surveys conducted with the traveling public.

Four surveys were administered at four separate times from March 2000 through May 2003. Targeting travelers within the Siskiyou Pass project area, researchers distributed surveys at various truck stops and rest areas along Interstate 5, and at the California Border Agricultural Station. The surveys were designed to evaluate traveler acceptance and awareness of the new technologies in the Siskiyou Pass area, and included questions regarding the following.

- Traveler Characteristics
- ITS Functionality
- Demographic information

Survey results indicate that travelers are using all the technologies available to them. Of the five ITS technologies evaluated (CMS, Highway Advisory Radio, Touch Screen Information Kiosks, Road Weather Information on the Internet and Camera Images on the Internet), Changeable Message Signs received the highest functionality rating, followed by Camera Images on the Internet, and Road/Weather Information on the Internet. The results also indicate that travelers are becoming increasingly aware of all five technologies, although more could be done to increase awareness of Internet information and Touch Screen kiosks.

The surveys also revealed useful information about how travel decisions are made. Survey participants indicated that they would be most likely to use radio, CMS, television or personal observations of conditions to influence their travel plans, and that road and weather conditions would be the most likely reason for changing those plans. In the case of a road closure or delay, participants responded that they would be most likely to leave later, take an alternate route, or stop in a nearby town, in that order.

Finally, survey participants made specific recommendations for improving traveler information in the region, including development of consistent chain requirements across the state border, and adding pass temperature information to the CMS.

Development of Incident Management Plan and Winter Response Plan

Siskiyou Pass is jointly managed by a variety of agencies including the Oregon Department of Transportation, Oregon State Police, California Department of Transportation, and California Highway Patrol. The purpose of the Incident Management Plan was to develop an Operations Guide, Message Sets and Routing Plan that will assist with communication, coordination, and cooperation between all of the local and state, public and private sector organizations in the management of Siskiyou Pass.

To develop the Incident Management Plan, four inter-related tasks were identified.

- National Review of Similar Plans
- Determine Incident Scenarios
- Develop Operations Guide
- Determine Common Message Sets

From the national review of similar plans, it was learned that most states do not concentrate efforts on mountainous regions, but create Incident Management Plans for statewide use. This suggests that the Siskiyou Plan will advance the state-of-the-practice.

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Safety Improvements Evaluated...

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Preliminary research included determining priority incident management scenarios that range in severity and impact and that need different levels of response by various agencies. In order to identify these scenarios, researchers conducted extensive data collection specific to the region regarding crash data, road closure data, tire chain requirements, travel time and delay, traffic volumes, and weather conditions. In addition, researchers interviewed many of these agencies involved in incident management to identify and compare their procedures for responding to an incident, their equipment and resources, and their efforts to coordinate their activities with other agencies.

The Incident Management Plan that resulted from this research consisted of an Operations Guide and a Message Guide. The Operations Guide provides brief, step-by-step procedures for the different phases of incident management; it includes sections on the following.

- Incident Levels and Related Actions
- Agency Roles and Responsibilities
- Guidelines for Regional and Corridor Incident Management
- Detection and Verification
- Response
- Traffic Control
- Scene Management
- Motorist Information
- Traffic Diversion and Alternate Routes
- Incident Debriefing

The Message Guide contains specific message sets for Variable Message Signs (VMS) and Highway Advisory Radio (HAR), based on various situations. It also describes the methodology used for developing messages, and important considerations such as credibility and liability.

The preliminary Incident Management Plan was distributed to various response agencies in May 2001. One year later, WTI returned to several of the agencies to determine how implementation had progressed. Most indicated that the Plan, while thorough and concise, did not sufficiently address those transportation-related incidents related to winter weather.

As a result, a supplemental Winter Response Plan was created to respond to these needs. The Winter Response Plan focuses on managing Winter Related Events (WRE) only, and leaves the management of other events to existing procedures. Two main scenarios are used to cover the majority of WRE within the Siskiyou Pass region: winter-related road closures caused by vehicle crashes, and tire-chain requirements. The procedures for response operations for each scenario are detailed in the Plan, including communication and coordination protocol to be followed by each agency responding to WRE.

Montana plans upgrades to Amber Alert System

The Montana Department of Transportation (MDT) and WTI will use Intelligent Transportation System (ITS) technologies to enhance the Department of Justice's (DOJ) AMBER alert system throughout the state.

The AMBER (America's Missing: Broadcast Emergency Response) Alert program assists in the recovery of abducted children. The plan was put into place in 1996 in memory of Amber Hagerman, a 9-year old Texan who was abducted and murdered. Law enforcement personnel use the plan to broadcast announcements of missing children (fitting certain Montana criteria) using the Emergency Alert System, which has traditionally been used for severe weather emergencies.

Montana DOJ developed and adopted a statewide AMBER plan in 2003. In the event of an activation, critical information (descriptions of the child and abductor, motor vehicle information, and photographs) is broadcast through radio, television, the Montana lottery system, and state websites.

The enhancement project by MDT and WTI in conjunction with DOJ will use ITS technologies to expand the reach of the AMBER alert messages. Using MDT devices such as highway advisory radio (HAR), dynamic message signs (DMS), the 511 traveler information number, and maintenance radio systems in hopes of reaching people who might be driving right next to the abductor.

The project will include the following components.

- Concept of Operations - WTI will develop a Concept of Operations to define MDT's role in the statewide AMBER Alert Plan, and outline specific issues, such as how MDT equipment should be used during an activation.
- Policies and Procedures document - WTI will then create a policies and procedures document that will serve as a supplement to the current statewide plan. It will provide MDT with specific guidelines for an AMBER Alert activation, and will include such information as how to update HAR, DMS and 511 and what format to use for the messages.
- Requirements document - A requirements document will be created to define vendor upgrades of the current HAR and DMS systems that are necessary to implement the project.
- Updates to DMS guides - WTI will create supplements for the draft Montana Protocol and Procedures Guide and Message Set Guide for DMS Operations to include protocols, procedures and message sets specifically for AMBER Alerts.
- 511 Upgrade - The 511 traveler information system will be upgraded to allow authorized personnel to add an AMBER Alert message that would be heard by all callers to the system.
- Marketing - Promotional cards and other items will be developed and purchased for use by MDT in community relations' activities.

Nationwide interest in incorporating Departments of Transportation into statewide AMBER Alert Plans has made it possible for WTI to gather extensive information and lessons learned from other states at conferences dedicated to this issue. The project is scheduled for completion in early 2005.

For more information on the National AMBER Alert program go to http://www.ojp.usdoj.gov/amberalert/ and for more information on Montana's AMBER Alert program go to http://www.doj.state.mt.us.

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MDT Emergency Operations and Disaster Plan

WTI has begun a project to help the Montana Department of Transportation (MDT) craft an Emergency Operations and Disaster Plan that addresses how MDT will function as part of the State response in the event of a natural or man-made disaster.

Effective emergency preparedness is an ongoing process that requires continual training of state and local responders. In addition, many states want to expand their traditional efforts to address homeland security issues.

MDT seeks to improve the training of its emergency responders by developing comprehensive response procedures and easy-to-use reference documents. To support the efforts of the Montana Homeland Security Task Force, MDT also plans to incorporate procedures for responding to a terrorism threat or attack.

WTI will work closely with MDT throughout the project to assess their specific emergency response needs. A literature review will also be conducted to identify plans from other states that may contain applicable components.

Following these research and outreach efforts, WTI will produce three principal emergency response planning and training tools.

Emergency Operations and Disaster Plan

WTI will produce an Emergency Operations and Disaster Plan for MDT. WTI's goal is to develop an overall Concept of Operations document that can be applied to any natural or man-made disaster. The Plan's emphasis will be on training (needs, protocols, course development, and exercises) and appropriate responses to a wide range of emergencies. Major components of the Plan are as follows.

- Emergency Operating Procedures - WTI will develop an Incident Command Structure, training modules, and Emergency Operation Center guidelines.
- Emergency Response - WTI will evaluate and update MDT's Emergency Management Procedures Guidelines, focusing on incorporating procedures for addressing disasters relating to Weapons of Mass Destruction.
- Hazard Specific Guidelines - WTI will develop specific and unique procedures and protective actions for a wide range of disasters, such as Earthquakes and Hazardous Waste incidents.

The Plan will also incorporate the other two major deliverables described below.

All Hazard Incident Management Response Guide

WTI will develop an All Hazard Incident Management Response Guide to provide MDT employees at the field level with guidance on roles and responsibilities for those personnel who are first on scene. Specifically, it will address issues such as situation assessment, personal protection, initial Incident Commander responsibilities, quick clearance of roadways, and maintenance of traffic control. A condensed All Hazard Incident Management Response Guide will be developed in a format and size suitable for being carried in the glove box of MDT vehicles.

Employee Disaster Survival Plan

An Employee Disaster Survival Plan for MDT's main campus in Helena will be created to outline actions to be taken by personnel to reduce vulnerabilities and injuries and increase response effectiveness in the event of a WMD incident at MDT headquarters.

Through this project, MDT will provide its employees with a clear understanding of individual responsibilities and recommended actions in the event of any type of disaster. Additional benefits will include more effective use of personnel and equipment, minimizing the damage to transportation infrastructure, and expedient restoration of normal travel on roadways. To facilitate implementation of the Plan, MDT will conduct ongoing training and tabletop exercises.

Undergraduates Gain Experience in Rural Transportation Research at WTI

Students from universities as far away as Massachusetts, Pennsylvania, Illinois, Texas, Arizona, Maryland and Colorado gave up their usual summertime activities to brave the chilly June temperatures of Montana. The eight undergraduates arrived prepared to learn something about rural transportation challenges as participants in the 2004 summer Research Experience for Undergraduates (REU) Program. WTI's REU program, funded by the National Science Foundation (NSF)/ Department of Defense (DOD), recruits top undergraduate students nationwide to conduct research on a specific topic related to a rural transportation issue. This year's students focused on a variety of issues spanning road ecology, rural traffic simulation modeling, highway infrastructure design, and transportation policy. During the ten-week program, the students worked on projects that have direct relevance to Montana, while gaining hands-on research experience and learning more about rural transportation challenges in general.

In addition to their individual research projects, the REU participants were exposed to urban transportation challenges during a field trip to Seattle, Washington where they toured the Washington Department of Transportation (WDOT) Seattle Area Traffic Management Center, King County Transit, the WDOT Ferry Systems Operation Center, and the Boeing Everett Center. They also enjoyed the privilege of attending the Transportation Research Board Task Force meetings on Transportation Needs of National Parks and Public Lands in Glacier National Park. The students learned a great deal about challenges in national

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Summer 2004 REU Participant Information

Name	Major	Institution	Project
Lisa Andes	Civil Engineering	Northern Arizona University	Fish Passage at Road Crossings in Montana Watersheds
Joel Danforth	Physics	Metro State College	Economic Feasibility of Biodiesel in Montana
Pamela DeAmicis	Engineering Science	Smith College	Guidelines for Bilingual Traffic Signs
Victoria Falcon	Systems Science and Engineering	University of Pennsylvania	Montana Three City Parking Generation /Land Use Pattern Correlation Study
Luis Gonzalez	Civil Engineering	Texas A & M University	Investigating Thermal Effects on Concrete Structures
Eric Kerestes	Civil Engineering	University of Illinois	Examining Traffic Control Parameters at Single Lane Closures on Two-Lane Two-Way Rural Roads
Nicholas Trimble	Civil Engineering	Pennsylvania State University	Permeability Characteristics of RAP/ Aggregate Blends for Use in Highway Construction
Olivia Yu	Environmental Science and Policy	University of Maryland	Assessment of Road Impacts on Wildlife Populations in U.S. National Parks

Undergraduates Gain Experience...

Continued from page 15

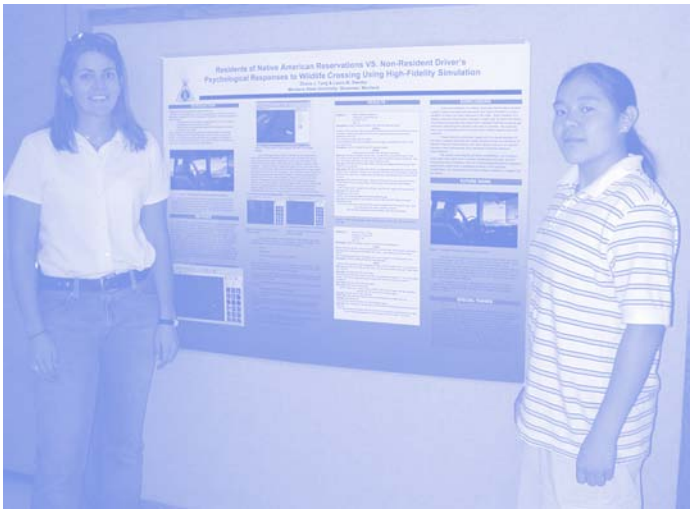
REU Students explore the "Going to the Sun" road in Glacier National Park's famous red touring cars.

parks and current strategic planning in the areas of road reconstruction, ITS deployments, transit development, visitor experience enhancement, wildlife impacts mitigation and alternative fuels. They were also treated to a tour of the Going-to-the-Sun Road on Glacier's red buses in the company of transportation professionals.

In August, REU participants submitted final reports and presented their research findings to staff, faculty, sponsors, and peers during a research symposium. Over the course of the program, the students improved academic and research skills while having the opportunity to explore what research and professional opportunities are available to them in the transportation field. Despite a packed schedule, all of the students found time to explore some of the cultural and backcountry opportunities available in the Bozeman area before heading for home.

MAP Student Presents Research

Zhona Tang (right) presents a poster on her research study, entitled "Residents of Native American Reservation vs. Non-Resident Driver's Psychological Responses to Wildlife Crossing Using High-Fidelity Simulation." Zhona is one of 20 high school students who participated in the Montana Apprenticeship Program at Montana State University this summer. The program is jointly sponsored by the American Indian Research Opportunities program and the Designing our Community program. Zhona had the opportunity to conduct her research using the WTI Driving Simulation Laboratory, under the mentorship of Laura Stanley (left).



Second Graders and MSU Students Encourage Each Other in Engineering Pursuits

For the past eighteen months, MSU students have been meeting on a regular basis with second graders as part of an Engineering Information Foundation (EIF) funded outreach program coordinated by WTI. Undergraduate and graduate female engineering students from a variety of disciplinary backgrounds, including chemical, electrical, industrial, mechanical, and civil engineering were recruited and trained to facilitate interactive engineering design workshops for Montana youngsters. The workshops were conducted during local after-school programs and at elementary schools in Montana tribal regions. The program was designed to excite young children about career opportunities in science and engineering through fun, hands-on activities. Enthusiastic MSU facilitators were selected to provide role models for underrepresented groups in these fields, particularly girls and Native Americans. Over the course of the year and a half long program, twenty-four MSU students served as workshop facilitators, leading engineering activities for over four hundred elementary school aged children.

Montana elementary students participate in engineering workshops.

2003-2004 Program Facilitators

Undergraduate students	19
Graduate students	5
Total number of MSU facilitators	**24**
Number of engineering departments represented	*6*

2003-2004 Workshop Participants

Girls	248
Boys	155
Total number of participants	**403**
Native American	*71*

The outreach program has proven to be an invaluable learning experience for both participants and facilitators. On questionnaires, young participants listed a number of new things they learned in the workshops, including that "being an engineer is fun." For their part, MSU facilitators discovered that teaching is also a learning process. One facilitator commented that "it was great to be a part of a project that incorporated what we have learned…Helping lead project workshops gave me confidence that we have something to present for [it]."

All in all, there was mutual encouragement and support between facilitators and participants. A note from one young participant to a student facilitator demonstrates this nicely. After thanking the MSU student for teaching her Girl Scout Troop about bridges and dams, she wrote, "I encourage you in your career. You go girl!!"

New Fellowship Opportunity Offered to Native American Students

WTI is conducting a research project to evaluate the effectiveness of wildlife crossing structures being installed as part of the reconstruction of U.S. Highway 93, which passes through the Flathead Reservation of the Confederated Salish and Kootenai Tribes (CSKT). WTI and the Wildlife Conservation Society (WCS) have pooled resources to offer a new graduate fellowship opportunity to a Native American student pursuing a wildlife or transportation related degree and career. The fellowship allows a qualified student to develop a wildlife research thesis pertaining to US 93 and wildlife crossing issues.

The first fellowship has been awarded to Whisper Maillet, who earned a B.S. in Wildlife Biology from the University of Montana and is an enrolled member of the CSKT. She has worked as a Wildlife Biologist Trainee with the CSKT wildlife management program for five years, and her professional goal is to protect and manage the natural resources within the CSKT reservation. Whisper will receive a tuition waiver, stipend, and research expenses, as well as professional and academic guidance from WTI, WCS and MSU.

The development of this new, tailored fellowship has many benefits for all. Students have the opportunity to earn an advanced degree, while simultaneously pursuing personal and professional goals. WTI has expanded its education program by offering unique learning opportunities, as well as enhanced the quality of its research program by involving native peoples in resource projects on their lands.

Fellowship student Whisper Maillet inspects and rakes, animal tracking beds on US 93 in Montana.

New Staff

Shaowei Wang, Research Associate

Bringing extensive skills in software and systems engineering, Shaowei Wang has joined WTI as a Research Associate. Shaowei has more than 12 years experience in industrial and management engineering in both the private and public sector, with particular expertise in system design and requirements analysis, programming, modeling, and systems administration.

Currently, Shaowei is supporting the design, development, implementation and evaluation of the Transportation Toolkit for Federal Lands Managers, as well as the "Weathershare" weather information system. For both of these WTI projects, Shaowei has been instrumental in the construction of the prototype systems.

Shaowei earned his Bachelor of Science in Industrial Management Engineering from Tianjin University in China, and his Master's Degree in the same field from Montana State University, Bozeman. Prior to his arrival at MSU, he served as a Professional Engineer for the Techno-economic Department of the East China Design & Research Institute of the China National Petroleum Corporation in Qingdao, China.

Shaowei lives in Bozeman and enjoys fishing and camping with his wife Tao and son Anan.

He can be reached at (406) 994-5923 or at swang@coe.montana.edu.

Silvia Harrington, Administrative Associate

WTI is pleased to welcome Silvia Harrington as the new Administrative Associate in the Main Office. Her duties include answering the phones and greeting visitors; arranging and managing travel, scheduling and documentation, and providing general administrative support to WTI Staff.

With a Bachelor of Science in Business and a Bachelor of Arts in Communications and Public Relations, Silvia brings strong communication skills and multi-tasking expertise to WTI. She comes to us following a 13 year career in Customer Service with Mail-Well Envelope Manufacturing in Portland, Oregon.

A Montana native, Silvia is happy to return to the Gallatin Valley after a 14 year absence. Outside of WTI, she enjoys swimming, water aerobics, and long walks with her beagle, Shelby.

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