

**UW-Eau Claire Student/Faculty Collaborative Research
to Benefit Business and Government**

**Wisconsin Economic Summit IV
October 27-28, 2003
Milwaukee, Wisconsin**

Elizabeth Alden-Anderson, Student, UW-Eau Claire
Sara Chamberlin, Student, UW-Eau Claire
Chris Conklin, Student, UW-Eau Claire
Dr. Doug Faulkner, Assistant Professor
Barbara Featherly, Student, UW-Eau Claire
Crystal Jackson, Student, UW-Eau Claire
Dr. Kevin Klatt, Assistant Professor
Dr. Don Mowry, Director of Service Learning, UW-Eau Claire
Angela Mueller, Student, UW-Eau Claire
Dr. Kim Pierson, Associate Professor
Mitch Stimers, Student, UW-Eau Claire
Chris Theo, Professor
Lisa Theo, Lecturer

UW-Eau Claire Student/Faculty Collaborative Research to Benefit Business and Government

Regional public universities play a pivotal role in Wisconsin's economic health. The University of Wisconsin-Eau Claire's Center of Excellence for Faculty/Student Collaborative Research is a prime example. Through one-on-one work with faculty, our undergraduate students integrate higher order thinking into applied research projects – many of which benefit local businesses and government. In addition, students learn the benefits of public service and exemplify the Wisconsin Idea – UW System schools benefiting the citizens of Wisconsin.

The following abstracts briefly summarize some of the recent research conducted through UW-Eau Claire's Center for Faculty/Student Collaborative Research Program. For more details, please contact the researchers directly.

The Ladysmith Tornado of 2002 Mitchel Stimers (stimermj@uwec.edu)

On September 2nd, 2002, a tornado touched down in the town of Ladysmith, Wisconsin. While the tornado covered a 15 mile path, the vast majority of the damage occurred in downtown Ladysmith. Using GPS and GIS, this paper will demonstrate the location, severity, and reconstruction progress in the damage zone. Using comparative maps and accompanying data, the relationship between the strength of a storm, the damage it causes, and the time required to rebuild the affected area are determined. Data was collected immediately after the storm and in August of 2003. The maps from the 2002 data show the general path of the tornado, as well as the extent of damage to houses along the path. The 2003 data demonstrates the repair/rebuilding of the damaged or destroyed structures. This paper demonstrates the temporal relationship between a storm's strength and the rebuilding process. Also discussed is the impact the disaster had on the area and how unfortunate tragedies such as this change a community's landscape.

Land Recovery, Tribal Sovereignty, and Economic Development: The Stockbridge-Munsees of Shawano County Barb Featherly (featheba@uwec.edu)

In October, 2001, the Stockbridge-Munsee Historical Committee hosted a conference on the topic "Many Trails of the Mohican Nation." Twenty presenters—some academic historians, some tribal historians, gathered on the Stockbridge-Munsee Indian Reservation in Shawano County, Wisconsin to discuss Mohican history, culture, and tribal sovereignty. The Tribe's Historical Committee is working to publish the presentations in a volume. Student cartographers from UW-Eau Claire have designed maps to supplement and highlight the text. In addition, the work of the UW-Eau Claire student cartographers will be featured in a forthcoming book by UW-Eau Claire faculty member James Oberly, "A Nation of Statesmen: The Political Culture of the Stockbridge-Munsee Mohicans, 1815-1974," to be published by the University of Oklahoma Press.

Behavioral Intervention for Children with Autism
Dr. Kevin Klatt (klattkp@uwec.edu)
Elizabeth Alden-Anderson (aldenae@uwec.edu)
Angela Mueller (muelleam@uwec.edu)

The prevalence of autism has dramatically increased in the United States over the past 20 years. In Wisconsin there are several thousand children diagnosed with autism. The only scientifically validated treatment for autism is behavioral intervention. In fact, research has shown that approximately half the children who receive intense behavioral intervention at an early age can enter kindergarten indistinguishable from their typical peers. Access to behavioral intervention, however, is limited in Wisconsin in part because there are only 3 board certified behavior analysts statewide. In response to the demand for behavioral intervention and shortage of trained therapists, the University of Wisconsin-Eau Claire has developed a behavioral emphasis within the psychology department. In addition, the Campus Autism Program was begun last year to train undergraduate students to implement behavioral intervention and to provide a valuable service to local families.

Surface and Interface Characterization of Wide Band Gap Semiconductors
Dr. Doug Dunham (dunhamdj@uwec.edu)
Dr. Marc Mc Ellistrem (mcellimt@uwec.edu)
Sara Chamberlin (chambese@uwec.edu)
Chris Conklin (conklicj@uwec.edu)

Gallium nitride (GaN) is compound wide band gap semiconductor that has many technological applications. It has been the focus of current research due to applications in UV photodetectors, light emitting and laser diodes and high performance transistors. GaN light emitting diodes can be made to emit green, blue and violet light, and have been proposed as a solid state white light source for residential and industrial lighting.

Preventing contamination and preserving high quality surfaces of the gallium nitride between the time the gallium nitride crystals are grown and the time they can be used in devices has been problematic. In order to protect the surface, we investigated whether a thin layer of Indium nitride deposited on the surface could prevent contamination from the air. The Indium nitride was removed by heating. Using X-ray Photoelectron Spectroscopy (XPS) and Scanning Tunneling Microscopy (STM) we have determined that the Indium nitride layer neither protects the surface from contamination nor results in a well ordered GaN surface after its removal.

The materials science techniques used in this project have wide applications in industrial research and development. In particular, products that have layered materials can be analyzed to determine thickness of layers, chemical information and contamination products. We are currently working on establishing industrial collaborations with companies in the Chippewa Valley. We have been working with Momentum Chippewa Valley and the Eau Claire Economic Development Corporation to inform local industries of our instrumentation capabilities, and have worked with Union Semiconductor in past years.

Jumpstart
Crystal Jackson (jacksocl@uwec.edu)

Jumpstart is an Americorps program that pairs college students with head start children. Jumpstart's mission is to engage young people in service to work toward the day that every child in America enters school prepared to succeed. For two hours twice a week, a team of eight to ten college students, meet with head start children to hold Jumpstart sessions. Each college student is paired with a child. During Jumpstart sessions the team member works with his/her child on different goals. These goals are known as School Success Outcomes. Jumpstart uses three elements during a session to work on achieving these outcomes. The three elements are Circle Time, One to One Reading Time and Choice Time. During Circle Time team members work on social relations skills with children, by singing songs and doing group activities. During One to One Reading, team members read to their children using dialogic reading techniques. The goal of this is to help children become familiar with books and to work on literacy skills. The final element is Choice Time. During this time the children choose what they would like to do or play with. This helps children work on language, making choices and interacting with other children and adults.

Jumpstart holds these sessions though the academic year. Corps members are required to work a minimum of 300 hours for their Americorps requirement. Corps members are also required to participate in two service projects during the year.

Jumpstart is a great project to get involved in for students of all majors. No matter what you are going to do in your future, chances are that you will deal with children. Jumpstart helps to prepare you for this time, and at the same time you change the life of a child.

Assessing the Hydrologic Impacts of Urbanization in the Otter Creek Watershed, Eau Claire County, Wisconsin
Doug Faulkner (faulkndj@uwec.edu)

Floods are costly natural disasters that are made worse by the hydrologic effects of urbanization. In the Otter Creek watershed in southern Eau Claire County, land use is predominantly rural at the present time, though residential development is slowly converting portions of it to urban land use. In this study, we assessed the effects that future urbanization in the watershed could have on flooding along Otter Creek and identified those areas of the watershed where urbanization would have the greatest impact on the creek's flood hydrology. We did this by developing a rainfall-runoff computer model for the watershed using the hydrologic software application HEC-HMS. With this model we characterized the flood hydrology of Otter Creek for current land-use conditions and for hypothetical future conditions of a more urbanized watershed. In particular, we investigated the spatially distributed effects that urbanization could have on flooding along Otter Creek and identified those areas that would be the most hydrologically sensitive to development. In addition to shedding light on the hydrology of urbanization, this project has practical significance in that it provides useful information to planners concerned with minimizing the environmental impact of urban development in southern Eau Claire County.

**Enhanced Development of Semiconductor Devices and Materials Using
Transmission Electron Microscopy**

Dr. Kim Pierson (piersokw@uwec.edu)

Jack Kollwitz (kollwijt@uwec.edu)

Randy Recob

Andrew Zich

This project was designed to bring to the Chippewa Valley specialized facilities and expertise to characterize the unique semiconductor devices being developed at Union Semiconductor Technology Corporation (USTC). Specialized instrumentation to prepare samples for analysis with UW-Eau Claire's transmission electron microscope was acquired via a UW System Applied Research Grant in 2000. In April 1999, Union Semiconductor Technology Corporation completed the acquisition of the Cray Research, Inc. Integrated Circuit Operations of Silicon Graphics, Inc., located in Chippewa Falls, Wisconsin. USTC began development of nonvolatile computer memory elements based on a principle known as the "giant magnetoresistive" (GMR) effect. These materials are comprised of alternating very thin layers of various metallic elements. The analysis of these devices involves preparing extremely thin sections of the film layers and obtaining high resolution images (up to one million magnification) with the transmission electron microscope. The images are used in an iterative engineering process to refine the device performance. These samples were initially being characterized by other universities and private companies outside Wisconsin at a cost of tens of thousands of dollars per year. Turn around times and misinterpreted results severely hampered development cycles.

**Reconstructing the Visual Identity of the Chippewa Valley: Stimulating the
Effectiveness of Area Businesses and Organizations Through the Use of Design
Student Collaborative Projects.**

Christos Theo (theoem@uwec.edu)

Darcy Way (dway@cvtc.edu)

For years, the University of Wisconsin-Eau Claire has enjoyed a working relationship with various non-profit organizations from throughout the surrounding community. As part of a programmatic restructuring initiative seven years ago, the Graphic Design program in the Department of Art & Design, has expanded upon these traditions by having their students "connect" with businesses and organizations, as part of their degree requirement. Since then, the city of Eau Claire and surrounding region, have been working in collaboration with design students in developing a wide range of visual identity systems as a means of stimulating economic growth while providing students with "real world" experiences.