



February 2007

A Newsletter of the Department of Computer Science and Engineering at the University of Notre Dame



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Senior Kevin Braun Is the ND Leprechaun

Senior **Kevin Braun** is enjoying the magic of being the ND Leprechaun. “This past semester’s experience as Leprechaun has been an incredibly rewarding one,” he says. “I don’t know if I was the first engineer to be Leprechaun, but it certainly seemed novel to my professors and classmates. Juggling the commitments of algorithms homework sets during road trips to Atlanta, Baltimore, and other away games was a tough balancing act, but I had great support from all of my professors. Although I did get a hard time from them when an embarrassing clip of me ended up on YouTube!”

Braun is not the only student in the department with “team spirit.” Each year, a number of computer science and engineering majors play in the marching band. In fact, two years ago, senior **Jeff Serpas** was the drum major for the Notre Dame Marching Band.



"Irish Blue" Finishes 9 Out of 116

The 2006 ACM-ICPC East Central North America Regional Programming Contest was held on Saturday, November 11, 2006. A total of 116 teams from 64 colleges and universities throughout western Pennsylvania, Ohio, Michigan, eastern Ontario, and Indiana (excluding the Greater Chicago Metropolitan Area) participated. The contest consisted of eight problems with 91 teams solving at least one problem. Our two ND teams — "Irish Blue" and "Irish Gold" — finished 9th and 36th respectively.



"Irish Blue" team members were **Jeff Smith**, senior; **Dan Dugovic**, junior; and **Chris Fallin**, freshman. "Irish Gold" team members were **Nick Schott**, junior; **Joey Schmitt**, freshman; and **Eric Riedl**, freshman. (We believe the "Gold" team's finish is the highest a team with two freshmen has received.) Their adviser was **Ray Sepeta**, academic adviser for the University's First Year of Studies Program. Congratulations to all!

Bowyer, Flynn, and Chawla Receive DOJ Grant for Face Recognition from Video

Schubmehl-Prein Chair **Kevin W. Bowyer**, **Patrick J. Flynn**, professor, and **Nitesh V. Chawla**, research assistant professor, received a one-year grant of \$362,476 from the Department of Justice. Major aims of this funded project include investigating the effects of using varying quality of video sources for enrollment and recognition, and developing algorithms to select multiple frames from a video stream in order to maximize recognition performance. Experiments will be conducted using video stream data of the type acquired in video surveillance applications.

Edward C. Ateyeh Jr., Endowment for Excellence Fund Comes Online

Notre Dame alum **Edward C. Ateyeh Jr.**, has generously established the Ateyeh Endowment for Excellence, which supports activities aimed at recruiting, retaining, and nurturing the best undergraduate and graduate students in the Department of Computer Science and Engineering. Activities made possible by the endowment include support of a select undergraduate as an Ateyeh research scholar and a graduate student as an Ateyeh teaching scholar.

Alec Pawling Receives "The Best Student Paper" Award



Alec Pawling

Second-year Ph.D. student **Alec Pawling** received "The Best Student Paper Award" at the 15th annual conference of the North American Association for Computational Social and Organizational Sciences (NAACSOS 2006) in June 2006. His paper, "Anomaly Detection in a Mobile Communication Network," will also be published in the Springer journal, *Computational and Mathematical Organization Theory*. Departmental co-authors included **Nitesh V. Chawla**, research assistant professor, and **Gregory R. Madey**, associate professor. Pawling's work and the paper evolved out of a course project in Data Mining taught by Chawla.

Deborah Thomas Receives Travel Fellowship

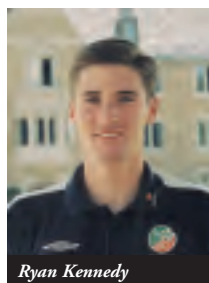


Deborah Thomas

Ph.D. student **Deborah Thomas** received a travel fellowship to attend the October 2006 Workshop for Women in Machine Learning in San Diego, Calif., and present her work in a poster titled "Strategies for Improving Face Recognition in Video Using Machine Learning," co-authored with **Nitesh V. Chawla**, research assistant professor; **Kevin W. Bowyer**, the Schubmehl-Prein Chair; and **Patrick J. Flynn**, professor. Her poster was selected on the basis of technical merit and general interest, including accessibility to a diverse audience. Thomas' work focused on selecting

diverse images from a video clip of an individual, such that the generalization capacity of a classifier could be improved. Each individual frame was then assigned a quality score, resulting in a sampling distribution for selecting images and training the classifier. In addition, clustering methodologies were utilized to select representative images.

Ph.D. Students Kennedy, Lane, and Niederwieser Receive "Best Presentation Award"



Ryan Kennedy

Ph.D. students **Ryan Kennedy**, computer science and engineering; **Kelly Lane**, biological sciences; and **Gerhard Niederwieser**, visiting student from the University of Innsbruck, Austria, presented a poster, software demo, and a talk on "Modeling Disease Transmission in Long-tailed Macaques on Bali, Indonesia" at the Tenth Annual Swarm Agent-based Simulation Meeting (SwarmFest2006) held at Notre Dame in June. Their presentation was selected for "Best Presentation Award" of the meeting. The meeting was hosted by the Department of Computer Science and Engineering and the University's Interdisciplinary Center for the Study of Biocomplexity.

Professor Peter Kogge Named CCC Interim Council Member



Peter M. Kogge

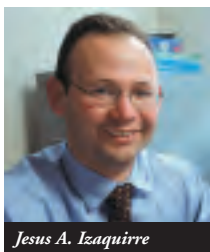
Peter M. Kogge, the Ted H. McCourtney Professor of Computer Science and Engineering, has been named to the Interim Council for the newly-initiated Community

Computing Consortium (CCC). The CCC is being created by the Computing Research Association under a three-year, \$6 million agreement with the National Science Foundation. In addition to identifying major research opportunities and establishing grand challenges for the field, the consortium will create venues for community participation while also developing visions and creating new research activities.

Article by Bowyer, Chang, and Flynn Tops “Most Downloaded” List

Schubmehl-Prein Chair **Kevin W. Bowyer**, Ph.D. graduate **Kyong Chang**, and **Patrick J. Flynn**, professor, published a paper, “A Survey of Approaches and Challenges in 3D and Multi-modal 3D+2D Face Recognition,” in the printed version of the January 2006 issue of *Computer Vision and Image Understanding*, although it appeared in the online version in December 2005. The article has since been honored as the No. 1 paper on the journal’s quarterly “Top 25 Most Downloaded” list for October through December 2005 and January through March 2006. The “Top 25” list reflects the number of downloads by Elsevier Science Direct users. This is the first article to rank as No. 1 for two consecutive quarters since the list began in 2004. It ranked No. 8 and No. 4 in the following two quarters, April through June 2006 and July through September 2006, staying in the Top 10 for an entire year.

Izaguirre and Alber Receive Grant for Simulation of Biochemical and Cellular Networks

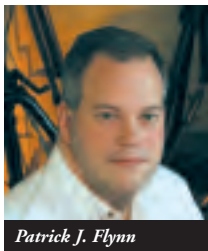


Jesus A. Izaguirre

Jesus A. Izaguirre, associate professor of computer science and engineering, and **Mark S. Alber**, professor of mathematics and director of the Interdisciplinary Center for the Study of Biocomplexity, received \$300,000 from the National Science Foundation to study the simulation of self-emerging properties of coupled biochemical and cellular networks in the social behavior of Myxobacteria. They are developing a multi-scale 3D computational model of Myxobacterial fruiting-body formation based on very short-range (cell contact) interactions, differentiation, and motility. Single-scale models of biochemical and cellular networks are unable to

capture the complexity, for even very basic biological phenomena occur over diverse space and time scales. This is why it is crucial to determine how best to combine models at different scales and how the combination of several different types of models impacts the accuracy of the general multi-scale model. The proposed 3D computational model will also serve as a tool for analyzing mechanisms for building other multicellular structures dependent on cell contact signaling.

Flynn Named Fellow of the IAPR



Patrick J. Flynn

In August 2006 **Patrick J. Flynn**, professor, was named a fellow of the International Association for Pattern Recognition (IAPR), an association of nonprofit, scientific and professional organizations concerned with pattern recognition, computer vision, and image processing. He is the first Notre Dame faculty member to receive such an honor. The designation of fellow is conferred on persons in recognition of their outstanding contributions to the IAPR and to the field of pattern recognition. IAPR elects fellows biennially, and the number elected may not exceed 0.25% of its total membership (1 in 400).

Hu and Chen Receive Grant from Prowess, Inc.

X. Sharon Hu, associate professor, and **Danny Z. Chen**, professor, received a research grant from Prowess, Inc. — an international provider of medical software products and services for the radiation therapy community — to support their work on developing a hardware-based dose calculation system for radiation therapy. The specific project funded by this grant will focus on improving the existing design (developed by the same team), devising a memory interface to a host PC, and integrating the hardware system with Panther, which is the commercial treatment planning system from Prowess.

Niemier and Lieberman Receive Funding for Nano-scale QCA Circuit Design



Michael T. Niemier

Michael T. Niemier, assistant research professor of computer science and engineering, and **Marya Lieberman**, associate professor of chemistry and biochemistry,

received \$300,000 from the National Science Foundation to study how nano-scale, molecular Quantum-dot Cellular Automata (QCA) devices can be patterned to form circuits and systems. They will develop processes for self-assembly in solution of mesoscale (1-100 nm) circuit boards (DNA structures) to which molecular QCA cells or other components would attach — using a new process for guided self-assembly of DNA circuit boards on lithographic features on silicon. They are also attempting to leverage this process to implement systolic architectures. Molecular QCA systems are expected to operate at room temperature, dissipate very little power, and potentially offer densities and speeds that are at least two orders of magnitude beyond what CMOS can provide.



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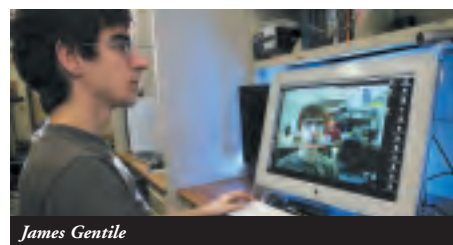
Hu, Niemier, Bernstein, and Porod Receive NSF Grant to Study Magnetic Logic

X. Sharon Hu, associate professor of computer science and engineering; **Michael T. Niemier**, research assistant professor of computer science and engineering; **Gary H. Bernstein**, professor of electrical engineering; and **Wolfgang Porod**, the Frank M. Freimann Professor of Electrical Engineering, have received \$300,000 from the National Science Foundation to study the potential performance of lithographically defined nanomagnets within the Quantum-dot Cellular Automata (QCA) architecture scheme. Recent work shows that nanomagnets can be configured to realize a universal logic gate. Systems made from these magnetic QCA devices could have a natural interface with MRAM, dissipate less power, and be very tolerant to the effects of radiation. One seemingly natural match for the technology is space and military applications. Niemier and Hu will provide design and performance benchmarking, while Porod and Bernstein will work to fabricate core design components.

Brockman and Hu Receive Grant from Altera/AMD/Sun/ XtremeData

Associate Professors **Jay B. Brockman** and **X. Sharon Hu** received a grant of an XtremeData development system through the University Program administered by Altera, AMD, Sun, and XtremeData, which will initially be used in support of three research projects. The projects include the development of a computational model for lightweight threads in memory (aimed at problems for which the cluster computing model has so far proven unsuitable); medical image registration involving magnetic resonance images (MRI), positron emission tomography (PET) images, and FPGA-based and positron emission tomography (PET) images; and FPGA-based systems for dose calculations for radiation therapy treatment. The review committee for the grant was composed of members from all four of the partner companies.

Flynn and Bowyer Receive Funding for Biometrics Research



James Gentile

Professor **Patrick J. Flynn** and Schubmehl-Prein Chair **Kevin W. Bowyer** received \$382,401 from the National Science Foundation and the Central Intelligence Agency for continuation of their research in biometrics. The research supported under this award is primarily in the areas of iris recognition and face recognition. In the iris area Flynn and Bowyer will support the government's Iris Challenge Evaluation, as well as continue research into improved iris recognition algorithms. In the face area they will support the Face Recognition Grand Challenge, as well as continue research into improved face recognition algorithms using video.