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July 2005

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



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## CSE Department 2005 Commencement

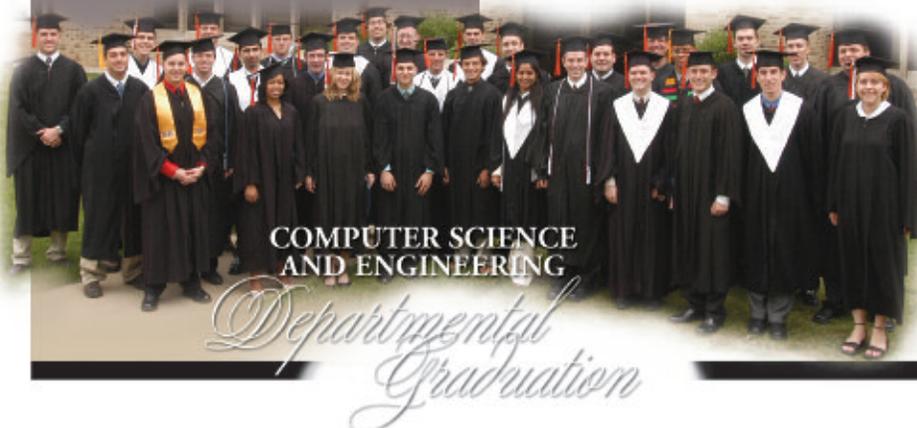
The Department of Computer Science and Engineering graduated 31 students on Sunday, May 15, 2005. A departmental ceremony was held in the morning before the University Commencement Exercises and attended by the graduates, their friends and families, and the faculty. It was organized by seniors **Andrew J. Callan**, **Brian J. McRoskey**, **Karsten Steinhäuser**, and **Aaron M. Wenger**. **Eugene W. Henry**, professor emeritus, gave the invocation. This year's faculty speaker, selected by the students, was Assistant Professor **Jesus A. Izaguirre**. This year's Outstanding Undergraduate Teaching Award, also selected by students, went to Assistant Professor **Douglas L. Thain**. The Outstanding Computer Science Senior Award went to Steinhäuser. The Outstanding Computer Engineering Senior Award went to Wenger. The James Sands Jr., Memorial Computer Science Award went to Callan. Wenger was also one of the recipients of the 2005 Rev. Thomas A. Steiner, C.S.C., Award.

This year's graduates were **Alfredo H. Arvide**, **Andrew J. Callan** (Upsilon Pi Epsilon [UPE] member), **Rebecca A. Camus** (dual-degree program), **Ryan K. Colahan**, **Michael S. Crocker**, **Brian L. Fontana**, **Lance D. Gallop** (Reilly Scholar), **James B. Gieszemann**, **Michael J. Heilman** (UPE member, Reilly Scholar), **Ryan K. Hurd** (dual-degree program), **Matthew D. Ivers**, **Raymond J. Kilway II** (Navy ROTC), **William J. Leimkuehler** (UPE member), **Stephen P. Maderak**, **Swati Malik** (UPE member), **James P. McNamara** (UPE member), **Brian J. McRoskey** (UPE member, Etta Kappa Nu member), **James S. Moiani**, **Matthew L. Nyerges** (UPE member), **Nicholas D. Petrella**, **Walter C. Pruchnik III** (UPE member, Reilly Scholar), **Troy W. Raeder**, **Thomas D. Samaras**, **Todd M. Schneider** (UPE member), **Michael G. Sheehan**, **Gautam V. Shewakramani** (UPE member, dual-degree program), **Yolanda N. Smith** (Air Force ROTC), **Sean M. Sprigg**, **Joshua C. Stagni** (dual-degree program), **Karsten J. Steinhäuser** (UPE member), and **Mary E. Willoughby** (dual-degree program).

Companies hiring several of this year's graduates include Lockheed Martin, Deloitte Consulting, and Accenture. Graduates also took jobs with places as diverse as Abbott

Laboratories, the U.S. Patent and Trademark Office, the Alliance for Catholic Education, and Sony Entertainment. Other graduates entered the Ph.D. programs at Carnegie Mellon University and at Notre Dame, the M.B.A. programs at Harvard University and at Notre Dame, and the graduate program at the Savannah College of Art and Design.

Congratulations to all of our 2005 graduates!



## Poellabauer and Striegel Receive Grant from Intel

Assistant Professors **Christian Poellabauer** and **Aaron Striegel** received a grant from Intel Corporation in support of their project entitled "IXP-based Transparent Bandwidth Conservation for Wireless Clients." The award includes Intel hardware (several IXP2350 boards) as well as funds to support the research effort and travel to the 2006 IXA University Summit. Ph.D. student **Dave Salyers** is working on the project with Poellabauer and Striegel.

The increase in the availability of wireless clients and the number of real-time multimedia applications has resulted in the need for techniques to efficiently use the limited bandwidth available for wireless systems. This IXP project will explore the concept of "wireless stealth multicast" as a means to improve the effective bandwidth of wireless communications. Target applications that would benefit from wireless stealth multicast include a wide variety of rich multimedia applications, such as live audio/video streaming and on-line games.

## LicketyShip Offers Same-day Delivery to On-line Shoppers

A 2005 graduate of the Department of Computer Science and Engineering, **Aaron Wenger** is serving as co-chief of software engineering for LicketyShip, a South Bend, Ind. based on-line startup company. The business began as part of the Four Horsemen Venture Program, funded by **Timothy J. Connors** (B.S., EE '89) to promote entrepreneurship in the College of Engineering and the collaboration of University undergraduates, graduate students, and alumni.

LicketyShip hopes to be the first electronic mega-mall (e.g., Amazon) to offer same-day delivery to on-line shoppers. The company utilizes forward-deployed, local inventories rather than centralized warehouses, so it is able to offer same-day delivery at a price that is often less expensive than that of the popular next-day delivery option.



Team LicketyShip

The LicketyShip team — Wenger, Chris Kelly (B.S., FIN '05), Robert Pazornik (B.S., GOVT '02), Justin Carter (M.B.A. '05), Radu Olievschi (M.B.A. '05), and Sarah Coffman (M.B.A. '05) — recently won the McCloskey Business Plan Competition sponsored by Notre Dame's Mendoza College of Business and was awarded the top prize in the Information Technology division at the Jungle Media Business Plan Competition in Silicon Valley.

In his role with the company, Wenger, in collaboration with Kelly, is developing and maintaining the LicketyShip Web site (<http://www.licketyship.com>). While the LicketyShip site is similar to other on-line malls, it presents a number of unique technical challenges. In particular, the site utilizes advanced spidering technology to compile the list of products offered by LicketyShip's retail partners. It also requires seamless communication with retail and shipping partners. LicketyShip held a test launch in the South Bend area in June. Upon fine-tuning the system from the test launch, the company plans to expand nationwide.

## Nitesh V. Chawla Begins Term as Associate Editor

**Nitesh V. Chawla**, research assistant professor, began a term as associate editor for the *IEEE Transactions on Systems, Man, and Cybernetics: Part B* in March 2005.

The scope of *Transactions* encompasses the field of cybernetics, or computational intelligence, including: communication and control across humans, as well as

machines and organizations, at the structural, or neural, level and at functional and purposeful levels. It focuses on topics such as vision, neural networks, genetic algorithms, fuzzy systems, and robotics.

As associate editor Chawla will be responsible for managing the peer

review process for submitted manuscripts that are assigned to him by the editor-in-chief. This includes identifying and communicating with reviewers, communicating with authors, and making recommendations for publication or rejection to the editor-in-chief.



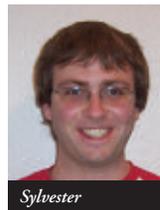
Chawla

## Undergraduates Have Papers Accepted

During the spring semester juniors **Daniel Mack** and **Jared Sylvester** took *CSE498: Data Mining* with Research Assistant Professor **Nitesh V. Chawla**. Highly motivated by the course, each of their class projects resulted in a paper that was accepted for presentation at a professional meeting.



Mack



Sylvester

Mack's project related to the research that he has been doing with **Gregory R. Madey**, professional specialist and director of graduate studies for the department, which was supported by Madey's NSF grant (02-22829) as part of the Digital Society & Technology program. The paper, "Activity Mining in Open Source Software," was accepted for publication at the Annual Conference of the North American Association for Computational Social and Organizational Science. It

discussed the discovery of associations and activity in the games subgroup of the Open Source repository; association and regression rule-learners were utilized for the project.

Sylvester's project focused on utilizing genetic algorithms to select the best combination of learning agents from an ensemble. Various learning algorithms and classifiers learned on random perturbations of data or algorithms were used as learning agents for the ensemble. The paper resulting from this work was titled "Evolutionary Ensembles: Combining Learning Agents using Genetic Algorithms" and co-authored by Sylvester and Chawla. It was accepted for publication in the American Association for Artificial Intelligence Workshop on Multi-agent Learning to be held during the Twentieth National Conference on Artificial Intelligence. During the summer Sylvester and Chawla will be continuing to work on extensions of this project.

## Study Abroad: A Student's Perspective

*Editor's Note:* Like many students, **Andrew J. Callan** spent part of his junior year studying abroad. In fact, he was the first department major to attend Notre Dame's Australia Program as most opt to go to London. Here are his observations regarding the international experience.

First for the academic stuff: The University of Western Australia (UWA) is a prestigious school located in Perth. During UWA's second semester, which occurs during Notre Dame's fall semester (generally the end of July through the end of November), the school offers *Computer Architecture* through the electrical engineering department and *Data Structures & Algorithms* through the computer science and software engineering department. These two classes have been approved by Notre Dame and satisfy the two required classes for the first semester of the junior year for computer science or computer engineering majors.

**Clive R. Neal**, associate professor of civil engineering and geological sciences at Notre Dame, is the coordinator of the Notre Dame engineering program at UWA. It is mostly civil engineering majors who go over to UWA, as well as a number of students from the College of Science. This affects the elective courses that are readily available. I took two technical electives: One was an internship with an Australian mineral exploration company. This was possible because Professor Neal coordinates new projects on an annual basis depending on what is available. During the internship I worked on a research project relating to Open Source GIS, RDBMS. The other class I took was in UWA's geography department. Titled *Remote Sensing & Applied Image Analysis*, it dealt with the type of data you would put into a GIS; this was a great precursor to *Biometrics* and *Data Mining*.

My fifth class was an anthropology course, and I would encourage anyone considering going to Oz to leave some general University requirements such as a philosophy, history, fine art/literature, or social science open, as numerous classes have already been approved to fulfill these needs. I also got another technical elective approved, called *Computer-aided Materials Selection, Drafting, and Manufacture*, which I did not take but one of my friends did.



*Andrew J. Callan*

Overall, the courses in Australia were definitely challenging, and I learned quite a bit. UWA has a different system in that instructors place the responsibility to learn on each student. There wasn't nearly as much homework or time spent in class, and final exams generally constituted 50-75 percent of the final grade. All the tests I took were quite challenging, so knowing the material was essential.

Additional information and a (currently) complete listing of classes can be found at the International Studies Office's Perth Web site (<http://www.nd.edu/~intlstud/locations/australia/perth1.htm>) and Professor Neal's Web site <http://www.nd.edu/~cneal/uwa/index.html>.

Social life is as important to the program as is the academic life. UWA is predominantly a commuter campus. Perth is approximately the size of Phoenix, Ariz., or San Diego, Calif., and is a fairly suburban setting. Students live in a dorm (called a "college") across the street from UWA with Australians (unlike "Camp Notre Dame" in London or Fremantle, where students study abroad and meet Notre Dame students) and quite a few international students from Asia and other study abroad programs.

The dorm put on lots of social events and was really a great place to have fun and meet Australians. Sports were a pretty big part of both dorm and everyday life in Oz, and it was very easy to stay active. The dorm was only a minute's walk from Perth's huge park and a couple minutes from the Swan River, so there

were ample scenic places to walk or jog. The drinking age is 18, so most students socialized in the dorm and at local pubs whenever they were not studying or involved in sports activities.

The weather was cool and fairly wet when the semester began, but it gradually warmed and cleared up as the semester progressed. It did not get unbearably hot as summer had really just begun when the semester finished.

Public buses were the best mode of day-to-day transportation; they were fairly convenient and not too expensive. It was about a 25-minute bus ride to the beach, which was quite popular later in the semester. I found this to be a nice place to study for finals.

Although there was a pronounced British influence, life in Oz really wasn't too much different than the States. The hardest thing for me to get used to was walking on the left side of hallways and stairs (which I still do here now) and seeing tropical birds flying around in the wild.

There were also ample travel opportunities, including a two-week mid-semester break, which could be used for an internship or a trip Notre Dame provided to the northern half of Western Australia. As the semester finished at the end of November, there was a month before Christmas to travel. I went to Thailand, the Great Barrier Reef, and New Zealand, but any location in Oz, NZ, or SE Asia was certainly doable. While traveling was not cheap, it was definitely more economical to see any of those places while already in Australia.

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## Chandra and Flynn Receive Funding for Developing Large-scale Storage for Video Surveillance

Assistant Professor **Surender Chandra** and Professor **Patrick J. Flynn** have received a grant from the Defense Intelligence Agency (DIA-MASINT) that will fund multimedia sensor storage research. The one-year grant, which is renewable for three years, will ultimately focus on developing recognition algorithms that use a large number of multimedia sensors. **Ashish Gehani**, research assistant professor, will spearhead the security aspects

of the project.

The storage component of this research focuses on storing large video data for application scenarios that can benefit from the availability of past data. Video streams are large, and the information value of stored data diminishes with time. The storage is tuned toward unmanned deployments. Self-managing and fully distributed, the system will require innovations in a) peer-to-peer overlay

mechanisms to efficiently search and manage a large number of video capture, storage, and analysis components; b) operating system resource management mechanisms for managing and transporting the voluminous data; and c) cryptographic techniques

that allow the system to trust the data by following the chains of custody. The system will also use the concept of lifetime abstraction to manage the storage volume. This technology will be developed through a separate CAREER grant from the National Science Foundation. The pattern recognition component of this research will use the storage system to develop retrospective video surveillance algorithms that scour the stored objects to detect complex behavior such as loitering. Such analysis requires data from multiple camera views over extended periods of time. Mechanisms to extract patterns of interest from multimedia datasets will be developed to fully leverage the advantage of vast quantities of historical data stored in the system. These will facilitate tasks such as semantic tagging of actor trajectories and multi-camera moving object tracking.

The system will be deployed to capture lectures and other events to validate the various technologies. For more information about the project, visit <http://www.cse.nd.edu/~cse/sys/hydra>.

