From the chair

Computer science joins School of Informatics

The computer science department officially became a part of the School of Informatics on July 1, 2005, ending our decades-long administrative association with the College of Arts & Sciences, and realigning ourselves with the recently established school devoted to the academic study of information technology. The faculty of both schools gathered for a brief celebration and cake on July 1, and for a more formal inaugural dinner at the Fourwinds Resort at Lake Monroe on Aug. 19.

The computer science department at this time consists of a total of 30 or so full and part-time faculty, with about 23 full-time positions in total, while the School of Informatics has about 48 faculty associated in various ways, about 28 full time. Computer science thus makes up nearly half of the faculty of the School of Informatics, though the lines blur because of a number of shared appointments and adjunct professorships.

The current undergraduate population in computer science is 185 students; one of the agreements with the College on the administrative separation was that the 90 or so BA students would remain in the College, following the precedent of the School of Music BA program; the BS degree candidates move with the faculty to the School of Informatics. The degree programs do not change. For comparison, informatics itself has about 275 of its own undergraduate degree candidates.

Our incoming graduate class is one of the largest in recent years, with 52 new graduate students (about half PhD candidates and half MS candidates) joining 138 current students to give a population of 190 graduate students in the program. The School of Informatics has about 80 graduate students, 10 of whom have joined the PhD program that was just approved by the trustees to start this year.

Among the other transitions happening this fall, we note that we had eight graduate students completing the PhD and moving out into the real world; we will be following their progress and reporting it in the newsletter from time to time. Congratulations to Chris Giannella, Sriram Krishnan, Jun Luo, Ana Maguitman, Lei Qian, Jeremy Sick, Felipe Bertrand, and Bassem Sayrafi!

Finally, the department is delighted to welcome Raquel Hill as a new faculty member specializing in cybersecurity. Raquel’s faculty position was created as part of the Commitment to Excellence program and was conceived as being shared equally between the main informatics program and the computer science program. Accordingly, Raquel will be teaching one course of each flavor this year, and has already started planning an innovative computer science course based on a special hardware grant from IBM. Welcome, Raquel!

— Andrew Hanson
Analog computing: Exploring a new paradigm

Jonathan Mills and his students are exploring a new paradigm in computing. It is based on the extended analog computer first described mathematically by the late Lee A. Rubel, a mathematician at the University of Illinois at Urbana-Champaign. In the only paper Rubel wrote about this machine, he stated a belief that the extended analog computer, or EAC, was too general to ever be built. However, assisted by Bryce Himebaugh, a staff engineer in the computer science department, Mills and his students have succeeded in implementing a restricted EAC.

Students in Mills’s graduate VLSI Design course have used EACs for the past two years to prototype applications that include pattern recognition, chaotic and dynamical systems, neural networks, Internet traffic modeling, and even solving NP-complete problems — all in the new analog paradigm. The machine they use is simple. In the picture at the right, the major components are visible: a partial differential equation solver implemented with conductive plastic foam (under the LED indicators) and configurable fuzzy logic functions. Students who have learned to use the EAC explain that they have learned a new way to think that complements digital and algorithmic computer programming.

Mills’s work has attracted increasing interest. This year, he presented the research that he and his undergraduate students have completed at the workshop on Unique Chips and Systems in Austin, Texas; the Grand Challenge Workshop in Unconventional Computing held in York, England (and sponsored by Microsoft Research); and was a keynote speaker at the Workshop on Computation on the Continuum, held in Lisbon, Portugal. When asked about the future of the extended analog computer, Mills said, “Using today’s VLSI technology, we have the potential to use EACs as computational memory. We can put 10,000 EACs in a desktop computer and solve one trillion partial differential equations in one second. Biologists, physicists, pharmacologists, and engineers tell me of the need for this caliber of desktop supercomputing.”

Haptic computer interfaces transform mathematical studies

Andrew Hanson’s research students have been involved recently in incorporating haptic, or touch-responsive, computer interfaces into the study and manipulation of mathematical objects. A system designed by Hui Zhang and Sidarth Thakur was submitted to the SensAble Developer Challenge (SensAble is a major manufacturer of haptic devices); their system, an interface for creating and exploring knots via touch methods, placed in the honorable mention category and won a $1,000 prize. Exploring even more exotic mathematical objects was the subject of another effort, and Hanson’s and Zhang’s system for the obstruction-free haptic exploration of four-dimensional surfaces projected to 3-D was presented at the 2005 Visualization Conference in Minneapolis, Minn., in October.

Finally, Hanson has completed a new book, Visualizing Quaternions. Quaternions are an important mathematical artifact for manipulating and animating objects in computer graphics. Visualizing Quaternions presents three layers of information about quaternions, starting with a minimally mathematical description of surprising places where the need for quaternion explanations appears in our everyday lives, proceeding to the mathematical details of quaternion exploitation and the use of quaternion fields, and concluding with the deeper mathematics of division rings and Clifford algebras that show why quaternions are inevitable, and expose the issues involved in attempting to generalize them. The book was published last fall by Morgan-Kaufmann/Elsevier.
From the dean

Welcome to the School of Informatics

Welcome to IU’s new School of Informatics. As of July 1, 2005, the Department of Computer Science has moved from the College of Arts and Sciences to the new School of Informatics. I am personally delighted at this, since I have been a professor of informatics only since 2000, but I have been a professor of computer science since 1989.

What is informatics? (Believe me, I get this question often.) The word “informatics” was introduced in the 1960s (independently, and more or less simultaneously) by the American Walter F. Bauer, the Frenchman Philippe Dreyfus (“informatique”), and the Russian A.I. Mikhailov (“informatika”). For Bauer and Dreyfus, informatics derives from the combination of “information” and “automatic,” and means information processing. For Mikhailov, the word derives from “information” and the “tic” found in “aeronautics,” “arithmetic,” etc., which comes from the Greek word for theory. Informatics in Europe, say France and Germany particularly, is more or less synonymous with computer science. At IU, the word was chosen to mean the application of information technology to the arts, sciences, and professions, and its uses in organizations and societies at large, and it conforms to an emerging common usage in the United States and the U.K. As such, computer science is a core component of informatics.

We have developed a little joke which I will share with you as family members. It is expressed in the equation: Informatics = InformatiCS = Informatic + CS! “Informatic” is a word in Italian along the lines of “literati.” The last means the literary elite, and the first then means something like the information elite.

Computer science was founded in 1969, whereas informatics opened its doors in the fall of 2000 (and also has operations on the Indianapolis and South Bend campuses of Indiana University). Andy Hanson gives a lot of facts and figures in his chair’s message. I want to emphasize that now informatics at IUB has well over 60 faculty, who cross a wide range of disciplines and “multi-disciplines.” Cribbing from our Web pages, I find the following areas:

Computer science:
- Artificial intelligence and cognitive science;
- Database and information systems;
- Distributed and parallel systems;
- Formal methods for system design, hardware, and robotics;
- Foundations: Theory of computing, algorithms, applied logic;
- Graphics and visualization; and Programming languages and compilers.

Informatics:
- Bioinformatics;
- Chemical informatics;
- Complex systems, networks, modeling and simulation;
- Cybersecurity;
- Discovery and application of information;
- Human-computer interaction design;

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Faculty notes

David Leake was invited to teach an intensive graduate course on case-based reasoning at the Technical Institute of Madrid. He also served as one of the program chairs for the Fifth International and Interdisciplinary Conference on Modeling and Using Context. The conference was held in Paris in July 2005.

Dan Friedman and co-authors William Byrd and Oleg Kiselyov have just completed a new book, The Reasoned Schemer. The book is a sequel to one of Friedman’s earlier books, The Little Schemer. The book’s goal is to teach about logic programming as an extension to scheme. The extension is accomplished with three operators and two constants. The book was released in August 2005.

Minaxi Gupta was awarded a faculty research support grant from Indiana University in the amount of $34,000. She was the solo investigator on the proposal Understanding Client Access Dynamics and Performance Bottlenecks in Wired and Wireless Networks. Only 32 of 90 proposals were funded. Gupta is also a senior investigator on the National Science Foundation grant that was recently funded for $1.72 million. The title was Acquisition of a High-Speed, High-Capacity Storage System to Support Scientific Computing: The Data Capacitor.

David Wise was named a Fellow of the Association for Computing Machinery. Wise and 19 others were selected this year for having made significant advances in both the theoretical and practical aspects of computing that have lasting effects on the lives of citizens throughout the world, according to the ACM. Wise was specifically selected because of his “leadership in the computer science community and contributions to functional programming languages.” He was recognized at an awards ceremony in June 2005.

Adrian German organized the 2005 Midwest NKS Conference, which was held here at Indiana University Bloomington Oct. 28–30. This is the first independent NKS conference ever. The first two conferences were organized in Boston in 2003 and 2004, by Wolfram Research and the Wolfram Science Group. German had a paper in the 2004 conference. Dirk Van Gucht and Jonathan Mills served on the advisory committee.
In the early 1960s, NASA was working to send a manned rocket ship to the moon, but there was no department of computer science here at IU. The Department of Mathematics housed a small computing center, and at that time, that center was adequate to assist the few physical scientists on campus who needed computing power to crunch numbers.

In 1967, several mathematicians realized a need to explicitly teach computers and computer programming. At that time, computing was equated with numerical analysis, which was an already-established branch of mathematics. This is why, when IU first made the decision to teach computer science, those professors involved with the teaching of computer science were located in the math department.

George Springer, the chair of the math department at that time, along with Frank Prosser, a chemistry professor who had left chemistry to become the first director of IU’s computing center, Stanley Hagstrom from chemistry, and John Buck taught the initial computer courses at IU.

These pioneers developed a small curriculum in computing, and initially students interested in computing received a math degree with a specialty (minor) in computers. In 1971, computer science broke off from math and became an academic department in its own right. The department at first granted only bachelor’s degrees, and eventually expanded to offer master’s and doctoral degrees as well. Frank Prosser served as the first chair of the computer science department.

The Indiana University computer science department gained national recognition in the mid-1970s as a stronghold for the study of programming languages. In 1974, Scheme was invented at MIT, and by the late 1970s, both MIT and IU were hotbeds of programming languages research. Dan Friedman and David Wise significantly advanced the department’s research reputation at that time. Professor Friedman has published numerous books and articles on the Scheme programming language, and his course, Advanced Programming Languages, in spite of being one of the most demanding, is one of the most highly rated undergraduate core courses.

The computer science department today retains many of its intellectual ties to mathematics. The undergraduate curriculum is mathematically rigorous. Each student takes calculus, as well as at least two advanced math courses beyond that. Many computer science majors either minor or double-major in math. Further, each student takes at least 12 credit hours of natural science.

The curriculum is scientifically and mathematically challenging, but with the added advantage of being broad enough to foster truly well-rounded scholars. Computer science students take arts and humanities and social and historical courses, and they are proficient in at least one foreign language.

Students from the computer science department today use these academic tools in
News from our most recent graduates

Congratulations once again to the 2005 graduates of the computer science department – our newest alumni!

**Mike Stoval** writes, “Right now I’m living in Chicago with my brother while he attends University of Chicago Law School. I landed a job within a month of graduating at HealthCare Services Corp., the parent company of Blue Cross/Blue Shield. My job title is junior application developer, and they have me specializing in Web-based projects using various Java technologies. Sometime within the next three years I plan to seek either an MS in computer science or an MBA. That covers my life for the moment. Considering how fast I landed a job, I’d recommend IU to upcoming college students who are interested in studying computer science.”

**Alex Platte** writes, “There is not too much exciting going on for me, but I do have a good job. My wife and I are living in suburban Chicago, and I spent the past summer working at Discover Card for an internship that has now turned into full-time work. I primarily work with Java, but also COBOL/mainframe. I hope all is well around CS these days.”

**James Ellis** writes, “I’m settling into my new home in Houston, Texas. I started working for ExxonMobil in Upstream Technical Computing in the middle of June. I’m currently working in a group that manages much of the technical application (engineering and geoscience) support and deployment. My girlfriend has transferred to the University of Houston, which made the transition down here much easier. I’m excited about the future to get involved in some of the larger development projects that are going on in the exploration company at ExxonMobil, helping to find more gas and hopefully to help out with gas prices that don’t seem to be getting any better lately.”

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More alumni news

**1980s**

After a 16-year career as a principal with American Management Systems in Denver, **Katherine A. (Moyer) Gensits**, BA ’83, moved to New Tripoli, Pa., with her husband, Steve, BA ’83, and three children. She works part-time as a programmer for Vitra Inc. in Allentown, Pa. Her address is gensits@yahoo.com.

**1990s**

**Jack Y. Duan**, BS ’97, is pursuing an MBA at the University of California, Berkeley. He lives in Sunnyvale, Calif., and can be reached at jyduan@yahoo.com.

In March, **Jeff Murray**, BS ’97, completed an MS in computer science with a focus in database systems and artificial intelligence from DePaul University. He is the software architect for Nuveen Investments in Chicago. He can be reached at jdmurray@rcn.com.

**2000s**

**Zach Arbuckle**, BA ’02, of New York City, is IT director for Care-Plus Health Plan. His address is zacharbuckle@yahoo.com.

**Dennis P. Groth**, PhD’02, received an IU SBC Fellowship in summer 2005 for his project “Transitioning Capstone Projects to Oncourse CL and e-Portfolio.” He was awarded a $2,500 grant to pursue applications in the category of Preparing for Innovation. He is a faculty member in the School of Informatics at IU Bloomington.

**Christopher M. Friend**, BA ’03, MIS’04, is a Web technical specialist for the Austin American-Statesman. He lives in Austin, Texas.

History

*(continued from page 4)*

pursuit of their own education as well as to benefit the research community here at IU. For example, several undergraduate computer science students who are conversational in Japanese are using their knowledge of Japanese, as well as their knowledge of math and computers, to translate a Japanese text that investigates properties of positional number systems with negative digits.
From the dean
(continued from page 3)

Logical and mathematical foundations of informatics;
Music informatics; and
Social and organizational informatics.
While there are clearly a few areas of overlap, you can see that, roughly speaking, by combining informatics and computer science, we have doubled the numbers of research areas and faculty, and have
outgrown one of the largest and most comprehensive schools of information technology in the country. This is a very
exciting and very strategic move on the part of IU, and I want to compliment the people who made this possible, including
Kumbe Subbaswamy, dean of the College of Arts & Sciences, and Ken Gros Louis, Bloomington chancellor and interim vice
president for academic affairs of IU.
Please keep in touch. You have seen just the beginning of a great union!
—Michael Dunn
University Dean, School of Informatics

Please send me information about IU Alumni Association membership.
IUAA membership supports and includes membership in the School of Informatics Alumni Association and your local alumni chapter. You may join online
at www.alumni.indiana.edu or call (800) 824-3044.

Please mail to the address above, or fax to (812) 855-8266.