CSU COMPUTER SCIENCE DEPARTMENT

RAM BYTES

SPRING/SUMMER 2004 VOLUME 2.2

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Colorado State University

Knowledge to Go Places

Message from the Department Chair

Darrell Whitley

The 2003-2004 academic year has been a year of change. CSU ranks third in the nation in research funding among universities that do not have a medical school. The new CSU President, Larry Penley, intends to build on this success and attract more undergraduates from around the country by getting out the message that CSU offers a great undergraduate education.

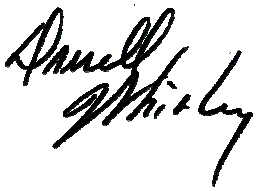
It seems almost certain that Colorado State University will become an "enterprise" of the State of Colorado rather than a traditionally supported public university. This enterprise status will create more independence for CSU while reducing our reliance on state funding.

Another trend affecting computer science departments nationwide is much smaller freshman classes. The number of incoming freshman in Computer Science at CSU is half of what it was two years ago. Other departments in the United States also report 30 to 50 percent decreases in freshman class size. This means in about two or three years, the number of students graduating with bachelors degrees in computer science will decrease dramatically. Yet, despite the current job market and off-shoring, most projections indicate an increased demand for CS and IT professionals.

There are several advantages to a smaller freshman class. Our class sizes are more reasonable, student quality is up, and we are exploring ways to make the first programming class a more satisfying learning experience.

The Computer Science Department continues to improve and grow. We hired new Assistant Professor Daniel Massey this spring. Dr. Massey has been involved in both theoretical research and practical experience in network security and, in particular, internet security. He comes to CSU with a strong research program and funding record. We will hire another new faculty member this coming year, bringing the number of tenure track faculty to 18 and the total number of faculty to 22. Our research programs also continue to expand.

We look forward to a productive, successful 2004-2005 academic year and appreciate your participation and support.



Department Offers Computing Seminar for High School Women

This summer the Computer Science Department ran two one-week sessions of "Making Computers Friendly — A Seminar in Computing for High School Women." Attendees worked in real computer science settings to make web pages by hand and wrote programs to do tasks ranging from simple math and conversations to Blackjack games and calculators. They learned about artificial intelligence and state-of-the-art computer vision. They also explored ways to influence product development. Attendees had a wonderful time, and the department hopes to offer this successful seminar again in the future.

Department Faculty

Roger T. Alexander, Ph.D.
Charles Anderson, Ph.D.
J. Ross Beveridge Ph.D.
James M. Bieman, Ph.D.
Elizabeth Boese, M.S.
A. P. Willem Böhm, Ph.D.
Bruce A. Draper, Ph.D.
Robert B. France, Ph.D.
Sudipto Ghosh, Ph.D.
Dale H. Grit, Ph.D.
Van Howbert, M.S.
Adele E. Howe, Ph.D.
Anura P. Jayasumana, Ph.D.
Yashwant K. Malaiya, Ph.D.
Daniel F. Massey, Ph.D.
Ross M. McConnell, Ph.D.
Sanjay Rajopadhye, Ph.D.
Indrajit Ray, Ph.D.
Indrakshi Ray, Ph.D.
Carolyn Schauble, Ph.D.
Sandy Schleiffers, Ph.D.
H. J. Siegel, Ph.D.
L. Darrell Whitley, Ph.D., Chair

Upsilon Pi Epsilon

Computer Science Honor Society

2004 Inductees

Tarun Banka
Elizabeth S. Boese
Keith A. Bush
Jamie C. Davis
Clayton D. Daylin
Tomas Hajek
Christopher J. Hoover
Sean A. Irving
Michael Nitzberg
Kevin J. Peach
Mary E. Richardson
Mark F. Rogers
Shilo D. Rohlman
Gregory B. Straw
Jason R. Wilhelm
Junxing Zhang
Yuan Zhang

Faculty Research Spotlight

Dr. Wim Böhm and Dr. Sanjay Rajopadhye

HiPHiPECS: High-level Programming of High Performance Embedded Computing Systems

In late 2002, the Computer Science Industrial Advisory Board relayed some of the needs of industry to the department: We need students who have both hardware design skills and high-level programming tool sophistication. We need to bridge the gap between computer science and electrical/computer engineering.

Charlie Ross, Wim Böhm, Monica Chawathe, Sanjay Rajopadhye, Gautam Gupta

Dr. Wim Böhm and Dr. Sanjay Rajopadhye answered the call. With support from the National Science Foundation and Xilinx, they created HiPHiPECS: High-level Programming of High Performance Embedded Computing Systems. The goal of HiPHiPECS is to bring reconfigurable computing and, in particular, high performance embedded computing into the computer science curriculum.

According to Drs. Böhm and Rajopadhye, "A combination of top-down methods based on abstractions and bottom-up methods breaking down abstraction barriers is exactly what is needed to teach a great Embedded Systems Design course." They see three levels of abstraction for embedded systems design: 1) at the bottom, circuit level, using VHDL or Verilog; 2) in the middle, operating system and architecture level, using an Embedded Design Kit; and 3) at the top, high-level programming languages and compilers to automatically derive hardware designs.

First offered in spring 2004, "Embedded Systems" (CS480) is the first part of their two-level course and teaches the bottom two abstraction levels. It familiarizes students with industry standard design tools for embedded and reconfigurable systems and introduces them to hardware design paradigms. This hands-on course has seven lab exercises, four using VHDL and three using the Xilinx Embedded Design Kit. Each of the seven lab exercises is interactive and requires imagination. To engage the students, many of the assignments emphasize game design. The final architecture is a hardware accelerated interactive board game, Connect Four. Student response to the new course has been enthusiastic.

The second, graduate-level course will focus on the creation of high-performance architectures using high-level design tools (SA-C and MMAlpha) developed here at CSU. The course covers an introduction to Dataflow computation, the Synchronous Dataflow Model (SDF), the Systolic and Polyhedral Model, and high-level programming of embedded systems. The course will be offered to graduate students in spring 2005.

Both courses utilize the newly created Embedded Systems Lab containing 12 workstations, each consisting of a PC, a Diligent FPGA board (D2E), and an IO board (DIO1) donated by Xilinx. Both the PC and the FPGA board are connected to their own flat panel display. Each PC is loaded with the latest versions of the ISE tools and the Embedded Design Kit (EDK) also donated by Xilinx.

Dr. Böhm and Dr. Rajopadhye's objectives are training designers for tomorrow's Systems-on-a-Chip (SoCs) and teaching engineers/scientists to operate at multiple levels of abstraction. They are developing a curriculum that casts circuit design as the final step in a step-wise refinement process from a high-level program to hardware. They plan to structure this course into tutorials for industry, organize workshops for academics, and possibly write a book when the course structure becomes stable. But they agree that the biggest reward of this project is seeing the spark and excitement in the eyes of the students.

"It was the most challenging and interesting class that I have taken, and I had fun."

~ student evaluation

DEVELOPMENT ACTIVITIES

The Computer Science Department has important development goals:

★ We continue to build the endowment for our *Computer Science Graduate Fellowship* as well as the *Evolutionary Computation and Artificial Intelligence Fellowship*. Under university rules, we must raise $50,000 for each fellowship within a five year window to create a permanent endowment. The first year, we raised a combined total of approximately $10,000, so we need to double our efforts over the next 4 years. Fellowships are an important tool for recruiting strong new students to our graduate program.

★ We want to grow both our *Mohilner* and *Heidenfelder* undergraduate scholarships. We also would like to create new scholarship opportunities for incoming freshman in order to attract new students to CSU.

★ Over the next five years, the College of Natural Sciences has the goal of increasing its number of Endowed Chairs from three to eight. Endowed Chairs were created in Chemistry and Mathematics this year. Our department supports this development endeavor, which is critical to recruiting and retaining high-quality faculty and funding their research.

★ We continue planning for a new building on the oval. Currently, building projects are on hold, but providing a new building for Computer Science sometime in the near future is a priority for the University.

★ We continue to build our Industrial Advisory Board and to reach out to our alumni.

We welcome your involvement and support!

New Faculty Members

The department welcomes Dr. Daniel F. Massey to our faculty. Dr. Massey received his Ph.D. from UCLA and has been a researcher at the University of Southern California for the past 4 years. He is an expert on network security. RamBytes will feature Dr. Massey in an upcoming Faculty Research Spotlight segment.

CS Faculty Win Industrial Research Awards

Dr. Sudipto Ghosh, *Providing Support for Executing and Testing UML Design Models.* IBM-Eclipse.

Dr. Darrell Whitley and **Dr. Ross Beveridge**, *Cooperative Coevolution for Constructing Teams of Agents*. Raytheon Company.

Recent Ph.D. Graduates

Dr. Dae-Kyoo Kim, Summer 2004. *A Meta-Modeling Approach to Specifying Patterns*. Dr. Kim is an Assistant Professor in the Department of Computer Science and Engineering at Oakland University in Detroit, Michigan. His research interests are in software engineering, particularly, pattern formalization, model refactoring, aspect-oriented modeling, security, and component-based development.

Industrial Advisory Board

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Lockheed Martin Space Systems
LSI Logic
The MITRE Corporation
Northrop-Grumman
OnRamp Technologies
ProtoTest
Qwest
Sun Microsystems
Xilinx Laboratories

ACM NEWS!

★ The ACM-CS Department fall picnic was highlighted by the undergrads winning the faculty/grad vs. undergrad softball game. Look for a rematch this fall!

★ This spring, the ACM hosted a Jeopardy-like competition based on computer science trivia called "Win IBM's Money." It was a big hit with IBM donating prizes like an IBM Thinkpad Laptop, zip drives, mini radios, and gift certificates.

★ A lecture series and technical series is planned for this coming year.

The ACM is a student group that organizes visits to local industry, guest speakers, and social gatherings.

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Colorado State University

Knowledge to Go Places

MASTERS DEGREES AWARDED

FALL 2003-SPRING 2004

Padmanabhan Srihari Aiyer
Warin Avirutnant
Mingyan Bao
Sagar Shripati Bilgi
Jeffrey Lewis Boody
Keith Alan Bush
Abraham Joshua Suresh Daniel
Kenneth Patrick Davis
Deepali Deshpande
Trung Thanh Dinh Trong
Ting Feng
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Na Li
Monte S. Lunacek
Jayshankar Chandran Nair
David Arden Patterson
James L. Ross
Kurt. W. Schmidt
David Allan Starkey
James Richard Steinborn
Sudhin Sugathan
Supphachai Thaicharoen
David Lee Todd
Ramchander Varadarajan
Jian-Ping Yan
Ke Yang
Zongjun Yang
Hongyan Zhang
Lizhong Zhang
Steven Kirk Zimmerman