CHAIR’S MESSAGE

As we begin the new academic year, it is a good time to share with you some of the highlights of the last semester. I am delighted to announce the arrival of our latest faculty member, Xiaowei Yang. A rising star in the area of computer networks and distributed systems, Xiaowei moved here from the University of California, Irvine, where she was an Assistant Professor for the last three years. We also welcome our new students—both graduate and undergraduate. Congratulations to the students who graduated this year. We wish them all the best as they embark on their new careers.

It is always a pleasure to share the accomplishments of the members of the Department, and there are many. Alex Hartemink and Jun Yang were promoted to Associate Professor, with tenure. Alex was also one of the twelve young computer scientists and engineers selected by DARPA for its 2008 Computer Science Study Panel, which is aimed at introducing young researchers to the technical challenges that the military faces. Susan Rodger was promoted to the rank of Professor of Practice. Vince Conitzer received a prestigious Alfred P. Sloan Fellowship. He was also one of the three honorable mentions for the 2007 ACM Doctoral Dissertation Award. Landon Cox received a highly competitive CAREER award from NSF for his work on access control in computer systems. Nicholas Patrick, a junior in Computer Science, was selected for a Barry M. Goldwater Scholarship, on the basis of a nationwide competition. Kamaria Campbell and Matthew Edwards, seniors in Computer Science, received the Department’s Alex Vasilos Memorial Award, for their excellence in academic achievement and undergraduate program support.

After serving as a faculty member in the Department for over two decades, Carla Ellis retired this summer. Besides being a world renowned leader in the area of computer systems, she is also well known for her hard work in making computer science a more diverse field. She has held leadership positions at ACM, CRA, and NCWIT (National Center for Women & Information Technology), and she served as the Chair of CRA-W. Her former students organized a hike and dinner in her honor. We owe her a deep gratitude for her numerous contributions.

We were busy hosting several events during the spring and summer. Five new students joined our C-SURF program this summer, a program designed to provide undergraduates with an intensive research experience. Susan Rodger organized an Alice workshop for North Carolina’s middle and high school students and teachers in which new, innovative methods for teaching computer science were discussed. Mac Mason and Gavin Taylor, two of our graduate students, served as instructors in Duke’s well known Talent Identification Program (TIP) for middle and high school students. The Department hosted twenty undergraduates this summer as part of its Research Experience for Undergraduates (REU) program.

Be sure to check out our Web site to learn the latest news about the Department and to be a part of our community. If you are in the RTP area, we hope you will stop by for a visit. We look forward to hearing from you.

Best wishes,

Pankaj K. Agarwal

Pankaj K. Agarwal, Chair

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WWW.CS.DUKE.EDU

XIAOWEI YANG ASSISTANT PROFESSOR

WE ARE PLEASED to welcome a new member of our faculty, Assistant Professor Xiaowei Yang. Her research focuses on networks and distributed systems, with an emphasis on protocol and architecture design, network security, and network economics. Noteworth Department Chair Pankaj Agarwal, “Not only does Xiaowei build on our existing strengths in distributed systems, she also expands our expertise in the area of computer networks.”

Yang’s goals are to make tomorrow’s Internet more robust to failures, more resilient to attacks, and more flexible in providing new services, and to understand how to build new types of networks.

ALEXANDER HARTEMINK PROMOTED TO ASSOCIATE PROFESSOR

THE DEPARTMENT is pleased to announce the promotion of Alexander Hartemink to Associate Professor, with tenure. “When I came to Duke, I was especially drawn by its commitment to interdisciplinarity and collaborative science,” explains Hartemink. “I have benefited enormously from that commitment and am grateful to be a part of what is happening here. I am excited to see what coming years will bring.”

Computational biology efforts across campus have grown significantly in stature since Hartemink’s arrival, including last year’s NIH $15 million grant to the Center for Systems Biology, where Hartemink serves as Associate Director.

Hartemink’s research focuses on machine learning and computational biology, especially systems biology: how assortments of molecular parts come together to produce living systems. “It’s something of a miracle this exquisitely complex machinery works at all, let alone as well as it does.” His group tackles problems at the interface of cellular biology, Bayesian statistics, and algorithmic computer science. “I’ve been fortunate to work with excellent students who are eager to undertake this kind of science.”

In addition, DARPA recently selected Hartemink for its 2008 Computer Science Study Panel, a program aimed at introducing young researchers to the technical challenges that the military faces. Over the course of a year, panelists visit various military bases, defense contractors, intelligence agencies, and governmental departments to learn first-hand, and at a SECRET classified level, about challenges and opportunities facing the Department of Defense, primarily in computer science and information technology. “It’s a tremendous honor to have been selected. The visits have been eye-opening and stimulating, and the other panelists and mentors have been wonderful.”

JUN YANG PROMOTED TO ASSOCIATE PROFESSOR

DUKE UNIVERSITY has recognized the contributions of Jun Yang with a promotion to Associate Professor, with tenure. “Duke has been an absolutely wonderful place,” says Yang, “and I am really grateful for the support and encouragement from my colleagues over the years. I also feel very lucky to have worked with such an amazing group of students, graduate and undergraduate, both on research and in the classroom. I look forward to growing with this great department.”

Yang’s research interests are databases and data management. In recent years, the world has witnessed an unprecedented increase in the scale of data production and acquisition. Pervasive use of the Web, sensors, experimental apparatus, etc., has generated all sorts of electronic records on our social, business, and scientific endeavors. “The quantity and diversity of data have really stirred things up in both research and practice,” Yang says.

“The problems that I researched in my PhD days—not that long ago—are now considered ‘classic’ topics. Much of my research currently is driven by new applications. What if your database has to support not only ‘one-shot’ queries but also millions of ‘standing’ queries? What if your data is no longer pinch-penny accurate but instead comes from noisy sensors reporting over an unreliable network? What if your data looks like spaghetti in structure and cannot fit into nice, regular database tables?”

Along these lines, Yang and his team of students have contributed many advances to Internet-scale continuous query systems, sensor data processing, and semi-structured data management.
LUKE UNIVERSITY has promoted Susan Rodger to the rank of Professor of the Practice. "Duke and the Department of Computer Science have provided me with strong support over the years in running undergraduate events and many educational workshops for professors and K-12 teachers," says Rodger. "I have enjoyed working with my Duke colleagues. It is especially a pleasure to work with energetic and bright students, both in the classroom and on research projects."

Rodger’s research interest is in computer science education, particularly in the presentation of abstract concepts in a visual and interactive manner. She developed JFLAP, educational software used worldwide to experiment with theoretical machines and other concepts used in the foundations of compiler theory. More recently, she has been focusing on diversity in computer science. At Duke, she has been teaching non-majors the programming language Alice, a 3D virtual worlds environment. "Alice is programming, but to students it is disguised as a fun vehicle for writing an interactive story or game. I am also directing my Alice efforts toward attracting students to computing at the middle school and high school level."

This summer she taught Alice to middle school and high school teachers in a three-week workshop, and middle school students in two one-week camps. "We have developed free online tutorials for middle schools and helped the teachers develop lesson plans. It was exciting to see the engaging uses of Alice the teachers came up with in different disciplines such as English, social studies, art, science and math."

Department Chair Pankaj Agarwal notes, “Susan is an conscientious and well-respected teacher. Her innovative approaches to education play an important role in the Department’s success and in outreach to the community.”

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Assistant Professor Landon Cox has been awarded an NSF CAREER Award for his work in access control in computational systems. Access control is a multi-faceted area that has been advanced by a wide range of computer science research communities including programming languages, human–computer interaction, computer architecture, and operating systems. In general, this body of work has either sought to improve the expressiveness of access control logic or introduce novel mechanisms for enforcing policies. Each approach relies on a human operator or programmer to manually specify access control policies which are then enforced by a trusted reference monitor. Unfortunately, policy specification is often an error-prone process and can lead to damaging breaches of confidentiality due to access control misconfiguration. This work takes a three-phased approach to mitigating the effects of access control misconfiguration: 1) develop heuristics and models of proper access control enforcement, 2) design and implement system monitoring mechanisms capable of automatically identifying suspicious sharing patterns, and 3) evaluate the effectiveness of these heuristics and implementations through user studies and honeypots. These activities target both ubiquitous Internet systems such as the web and email as well as emerging mobile systems such as mobile social networks and participatory sensing.

The highly competitive CAREER award honors teachers and scholars who are likely to become academic leaders in the future. Since 1996, NSF has given the award to faculty who effectively integrate research and education within the context of the mission of their institution.
PROFESSOR CARLA ELLIS RETIRES

PROFESSOR CARLA ELLIS retired in August after twenty-two years of service to the Department.

From the start, she felt it was her role to push the Department toward a more experimental approach to systems, and she is pleased that this effort is reflected in the very successful systems and architecture group we now have. Her work with the Faculty Women’s Network improved the environment for women faculty at Duke. The prestige of Duke offered opportunities for her to become more visible in the external research community and the resulting leadership roles she held in ACM and CRA (Computing Research Association) returned benefits for more visibility of Duke CS. While serving as co-chair of CRA-W (CRA’s committee on women in computing research), she had the great honor of accepting the National Science Board’s Public Service Award. Department Chair Pankaj Agarwal remarked, “The computer science research community has benefited tremendously from Carla’s leadership and dedication.”

Ellis’s greatest joy in being a Duke professor was watching her students develop and succeed, and her students are grateful for her mentoring. States David Kotz, now Professor of Computer Science at Dartmouth, “Carla is a great mentor; she has a quiet, thoughtful approach to advising, coupled with a great sense of humor. I am grateful for her help in launching my career.”

In retirement, she is busy building a house with her husband, Rick, and also remains active as Editor-in-Chief of the Transactions on Computing Systems, on the boards of CRA and CRA-W, and as co-chair of the Academic Alliance of the National Center for Women & Information Technology.

ASSISTANT PROFESSOR VINCENT CONITIZER has been awarded a prestigious Sloan Research Fellowship.

Conitzer plans to use the fellowship to pursue research on computational aspects of mechanism design, a subfield of economics. Mechanism design concerns settings in which a decision must be made based on the preferences of multiple parties (agents); examples include auctions, elections, and rating systems. A mechanism takes the agents’ declared preferences as input and produces a decision as output. A key issue is that agents will try to manipulate the mechanism by declaring false preferences. Sloan Research Fellowships, awarded for two-year terms, recognize young scientists who show outstanding promise of making fundamental contributions to new knowledge in the fields of chemistry, physics, mathematics, computer science, economics, and neuroscience.

Additionally, Conitzer is one of three honorable mentions for the 2007 ACM Doctoral Dissertation Award, and his paper “Optimal False-Name-Proof Voting Rules with Costly Voting,” with PhD student Liad Hagman, was selected as one of two Outstanding Papers at the annual Conference on Artificial Intelligence, hosted by the Association for the Advancement of Artificial Intelligence (AAAI).

VINCENT CONITIZER NAMED SLOAN FELLOW, DOCTORAL DISSERTATION AND PAPER RECOGNIZED

PANKAJ AGARWAL AWARDED RJR NABISCO DISTINGUISHED PROFESSORSHIP

PROFESSOR PANKAJ AGARWAL was awarded a distinguished professorship at the Annual Distinguished Professor Dinner on April 28. His new title is RJR Nabisco Professor of Computer Science. “I am honored and humbled to receive this award; it is a privilege to be part of such a fine institution as Duke,” says Agarwal. He came to Duke in 1990 as an Assistant Professor after completing his PhD at Courant Institute, New York, and spending a year at the Center for Discrete Mathematics and Theoretical Computer Science, New Jersey, as a postdoctoral fellow. He has been the Chair of the Department since 2004. Agarwal’s research interests lie in geometric computing and its applications to several areas including database systems, geographic information systems, and molecular biology. He is currently engaged in several interdisciplinary research projects.

Pankaj Agarwal
FANTOM: FRAMEWORK FOR ACCELERATING NUMERICAL TRANSFORMS ON MICROCHIPS

A SEVEN-YEAR OLD boy was happily surprised to find a PlayStation in our scientific computing laboratory. The game processors, such as the Sony–Toshiba–IBM Cell processor (the Cell), within the PlayStation and the graphics processing units (GPU) in many laptops and desktops have been utilized as additional and powerful computation resources for scientific computation and visualization, especially for signal and image processing (SIP), which has ubiquitous impact on people’s daily lives at work and at home. Many computational applications demand higher speed, less memory usage and lower power consumption. FANTOM is a research project for integrating and advancing computation techniques to meet the new demands.

FANTOM stands for Framework for Accelerating Numerical Transforms on Microchips. In a nutshell, FANTOM expands the computation platform at both the user end and at the execution end. The user can describe algorithms with mathematical abstraction or application-specific language. At the back-end, user algorithms are supported by architectures running at high speed and low-power consumption. With or without the awareness of the user, the boundary between software and hardware has been shifted and reshaped. Computation-intensive operations may be carried out via software implementation on various emerging processors such as the Cell and GPUs. The operations may be also directly implemented in hardware, in field programmable gate arrays (FPGA).

FANTOM attempts to answer a few fundamental challenges. The first is to cover the far distance between the rapid paradigm shift in software and hardware platforms on one side and the constant demand to utilize new architectures on the other. In particular, it becomes mission critical to employ low-power-consumption hardware in embedded SIP systems. With modeling and automation techniques, the FANTOM system assists experienced or new system designers and reduces the turnaround time in system design or upgrade by at least ten fold.

FANTOM also supports complicated algorithms for SIP applications with non-uniformly sampled data. This is to fill the long–lasting gap between the equally-spaced sampling condition imposed by conventional algorithms such as fast Fourier transform (FFT), fast convolution and correlation, and the reality that non-uniform sampling is the majority rule, not exception (see figures for an example). The application user will be greatly relieved from severe artifacts and numerical errors or complicated and time-consuming effort in improving signal and image qualities. As this article was being written, ACM made an announcement claiming that NUFFT is a hot topic.

In untangling the complexities in algorithms and in automated software and hardware implementation for application-specific descriptions, FANTOM established an algorithm–architecture codesign principle and approach. The traditional approach for hardware–software partition is based on a specific code interpretation, which is often subject to unnecessary constraints imposed by the programmer or even by an absolute architecture. The codesign approach is in part manifested at the user interface, where the user is no longer asked to provide software code. The user can specify the algorithmic and architectural components separately and prescribe expected performance range. The FANTOM system may render a specific design solution meeting the user specification, or render a few options within a tradeoff neighborhood. The project has many achievements. Using the FANTOM system, a class of junior ECE students at PSU were able to finish the design of a hardware accelerator for simulating molecular dynamics within an average of 27 minutes. FANTOM researchers also accelerated certain critical SIP functions such as FFT and NUFFT on commodity processors, including GPUs and the Cell. In a particular application, the time for a medical imaging formation is reduced from 27 hours to 14 minutes on a workstation (see figures for a resulting image formation with 420 million pixels). They have also used their new algorithms in MATLAB to render images for a spectral imager within 30 seconds per frame, with better quality in comparison to that by other algorithms produced in 13–100 minutes. The FANTOM system may render a few options within a tradeoff neighborhood.

The project has in its second phase, under DARPA support. The researchers include Xiaobai Sun and Nikos Pitsianis at Duke (the leading institute), Chaitali Chakrabarti at Arizona State and Vijay Narayanan and Mahmut Kandemir at Pennsylvania State University.
INTELLIGENT “PUSH” WITH PROSEM

THE ADVENT OF THE DIGITAL AGE and the Internet has brought about unprecedented growth in the amount of data being generated, in the number of data consumers, and in the diversity of their interests and locations. Information is becoming more networked than ever, and modern applications demand increasingly powerful data processing functionalities. Traditionally, users poll sources for information. However, polling is hardly scalable and may miss important events. The alternative push style of data dissemination has long been the goal of publish/subscribe (or “pub/sub”) systems, which push relevant information to subscribers with matching interests.

The pub/sub model is better suited for ensuring scalability and timely notifications and is thus critical for many applications. For example, Google Alerts push updates of the latest Google results (News, Web, etc.) based on users’ choices of queries or topics. In homeland security and disaster management, it is critical to push up-to-date information to relevant personnel or civilian population. Financial services provide real-time updates of financial information such as stock tickers to subscribers, often using expensive, dedicated networks. Content delivery services such as Akamai employ extensive caching of database query results at their “edge servers” to improve performance; these caches can be viewed as subscriptions whose contents must be kept up-to-date when the central database is updated.

Professors Jun Yang and Panloj Agarwal have a vision for the next-generation pub/sub systems with functionalities and scalability to meet these challenges. Funded by NSF, they are collaborating on an end-to-end solution consisting of techniques ranging from subscription processing and indexing to dissemination mechanism design, which work together in concert to provide efficient and scalable support for a powerful and flexible subscription interface, allowing users to control precisely what they want and when they want it.

Traditionally there have been two separate research thrusts in this field. One line of research, primarily from the database community, focuses on efficiently computing notifications to subscriptions on a server; the other line, from networking and distributed systems communities, focuses on efficiently delivering notifications to subscribers over a network. ProSem, on the other hand, explores a range of new and interesting possibilities for interfacing processing with dissemination, which offer a spectrum of trade-offs in terms of efficiency, scalability and manageability of the system.

ProSem supports complex, stateful subscriptions, e.g.: “keep me informed of stocks with the minimum price-to-earning ratio in a certain risk range,” “notify me when the price of Google has changed by more than 3%,” etc. ProSem uses a novel technique called “reformulation” to implement these stateful subscriptions on top of standard network substrates that otherwise only support stateless subscriptions. This approach enforces a clean interface between processing and dissemination, avoids pushing complicated application state and logic into the network, and leads to a clean, modular system design that is easy to implement and deploy in a wide-area network.

Yang and his student Badrish Chandramouli recently demonstrated a prototype of ProSem at the 2008 ACM SIGMOD Conference, and the demonstration subscription server easily achieved a throughput of thousands of events per second with a hundred thousand active, distributed subscriptions, and generated orders-of-magnitude less network traffic than traditional pub/sub. The team is now working on supporting new types of subscriptions, and studying how better dissemination network design and approximation techniques can further increase the efficiency and scalability of ProSem.
Having launched in 2006, nine students have participated in this prestigious program to date. This summer we were very fortunate to have five new Fellows join the program. Martin Azizyan is helping Professor Romit Roy Choudhury investigate PhoneScope: Designing a Virtual Software Telescope Using a Network of Smart Mobile Phones. Maggie Bashford is assisting Professor Vincent Conitzer and graduate student mentor Liad Wagman research Computational Issues in Markets, Elections and Game Theory. Professor Chris Dwyer is advising Frederick Ehrsam in designing nanoscale devices that build themselves. Graduate student Constantin Pistol is helping to mentor Ehrsam. Matthew Ragnile is also working with Conitzer and graduate student Lirong Xia to investigate computational issues in markets, elections and game theory. Professor Jeffrey Forbes is advising David Stecher in the study of modeling and analysis of social networks. Mac Mason and Gavin Taylor are graduate mentors for Stecher.

**C-SURF**

THE C-SURF PROGRAM is designed to provide undergraduates with an intensive research experience in a core Computer Science project or an interdisciplinary project leveraging core concepts in collaborative ways. This competitive program not only capitalizes on the educational benefits of Duke’s capabilities as a premier research university, but is also increasing the connection of Computer Science students to the process of inquiry and discovery. Fellows are mentored on research projects as part of a team of faculty and graduate students. They dedicate one summer and two linked independent studies in successive semesters. Research projects are solicited from Computer Science faculty and from faculty in other disciplines who have projects with computational or programming tasks. The overarching goal of this program is to expose bright and talented undergraduates to the research process and to encourage them to consider continuation of their studies in graduate school.

**CHALLENGING SUMMER PROGRAMS ENGAGE TEACHERS AND STUDENTS**

Three very successful programs were hosted by the Department this summer, involving CS faculty, North Carolina middle and high school teachers, local middle school students, and undergrads from Duke and other schools.

**ALICE WORKSHOP**

Professor Susan Rodger led an effort to teach Alice to North Carolina teachers and students. Alice is a teaching tool designed to get middle and high school students interested in the field of computer science. Alice takes a new tack on teaching introductory programming concepts through inventive 3D programming.

Rodger, in conjunction with Carnegie Mellon University and the National Science Foundation, held a two-week Alice Workshop at Duke for state middle and high school teachers. It was followed by workshops in which the teachers introduced Alice to middle schoolers from the Durham area. According to Rodger, interest in computer science is declining, especially among women and minorities. “The main objective is to get Alice into the public schools to raise interest in the computer science field,” said Rodger. “The field could use some diversity and this could be a great start.”

Alice is available for download at www.alice.org.

**VIRTUAL CONFLICT RESOLUTION**

Three Duke students, Rosie Kilgore, Vanessa Sochat, and Whitney Mickens, worked this summer on a project funded by the MacArthur Foundation. The project is a collaboration between Duke, the Duke-UNC Rotary Center for Peace and Conflict Resolution, and the Virtual Heroes Company to develop a 3D virtual simulation to train participants in the delivery of effective humanitarian assistance in a disaster situation with good coordination among engaged parties, using conflict resolution skills.

The simulation is based on the Hurricane Mitch case in 1998. The players are expected to act upon the aftermath of the disaster, allocating their resources to relieve the suffering of affected people, providing shelters and food/medical aid, and planning for recovery and reconstruction. The three student interns created avatars that participants will control as they participate in the simulation exercise.

**ARTSI**

The ARTSI (Advancing Robotics Technology for Societal Impact) Alliance is a collaborative education and research project centered on robotics for healthcare, the arts, and entrepreneurship. Spelman College is leading the alliance in partnership with several other HBCUs and Research I institutions. As part of the project, Professor Jeff Forbes hosted REU students and faculty over the summer from HBCUs in the alliance. The three students Forbes hosted at Duke collaborated on developing low-cost robot architectures for use in research and education. Michael Robertson, from Winston-Salem State University, constructed and tested a robot platform. Julius Smith, from Winston-Salem State University, wrote software for detecting and approaching objects within simulated and physical environments. Rachel-Mikel Arcejaozer, a rising junior at Harvey Mudd College, developed a system to determine a robot’s position and orientation within an environment.
ANITA LUNGU joined Duke’s Department of Computer Science in Fall 2004, after completing her undergraduate education at the University of Craiova, Romania. She is currently pursuing her PhD degree in the area of computer architecture under the supervision of her advisor, Dan Sorin.

Anita’s research interests lie at the intersection of computer architecture and formal verification techniques. The motivation of her work is the challenge of verifying that increasingly complex processors are functionally correct in all situations. Anita addresses this challenge by considering verification effort to be a primary design constraint and proposing processor design techniques specifically targeted at decreasing this verification effort.

Using model checking and theorem proving techniques, Anita explored various processor design aspects—such as the organization of caches, pipelines, and translation lookaside buffers—to identify which designs contribute disproportionately to the verification effort. Based on her observations, Anita developed design guidelines for minimizing verification effort. This work represented her Masters Project which was given the departmental outstanding MS Thesis Award in May 2007.

This work on microprocessor design for verification was extended in a collaboration between Duke and Pradip Bose’s group at IBM’s TJ Watson Research Center. Anita spent her 2007 and 2008 summers at IBM extending the scope of her research to multicore processor designs. Her project proposed designs for verification in the area of dynamic voltage and frequency scaling power management techniques. She evaluated tradeoffs between verification effort and other established metrics such as performance and power consumption, and she identified better points in the design space. As a result of her achievements at IBM, Anita was awarded an IBM PhD Scholarship for the 2008-2009 academic year.
RECENT GRADUATES

PHD DEGREES

Allister Bernard
Advisor: Alexander Hartemink
Modeling Biological Systems from Heterogeneous Data

Emilia Buneci
Advisor: Daniel Reed
Qualitative Performance Analysis for Large-Scale Scientific Workflows

Badrish Chandramouli
Advisor: Jun Yang
Unifying Databases and Internet-scale Publish/Subscribe

Albert Meixner
Advisor: Daniel Sorin
Low-Cost Methods for Error Detection in Multi-Core Systems

Dmitry Morozov
Advisor: Herbert Edelsbrunner
Homological Illusions of Persistence and Stability

Leelavati Narlikar
Advisor: Alexander Hartemink
Towards a Complete Transcriptional Regulatory Code: Improved Motif Discovery Using Informative Priors

Fareed Zaffar
Advisor: Gershon Kedem
Foresight: Countering Malware Through Cooperative Forensics Sharing

MS DEGREES

Songyun Duan
Advisor: Shivnath Babu
Automated Forecasting and Diagnosis of System Failures

Raluca Gordan
Advisor: Alexander Hartemink
Incorporating Informative Priors into a Gibbs Sampler for de novo Motif Discovery

Erik Halvorson
Advisor: Ronald Parr
Planning Aims for Counting and Searching with Overhead Sensors

Christopher LaPilla
Advisor: Carla Tomasi
An Audiovisual Interface for Offline Data-Driven Music Synthesis

Kuan-ning Lin
Advisor: Lawrence Carin
Combining Feature Selection Strategies with Bayesian Learning Models to Categorize Gene Expression Profiles

Neeti Wagle
Advisor: Ronald Parr
Simultaneous Localization and Mapping Using Line Segments

Dongdong Zhao
Advisor: Shivnath Babu
An Evaluation of Techniques for Self-Healing in Application and Database Servers

*Certificate from Computational Biology and Bioinformatics program

UNDERGRADUATE DEGREES

MAJORS

Nii Ako Ampa-Sowa
Nicholas Sergios Barbas
Adam David Barrer
Tomas Rafael Barreto
Michael Edward Bauer
Kshipra Uday Bhawalkar
Brenton James Blakeley
Jason Matthew Bosko
Kamaria Amora Campbell
Jimin Choi
Lauren Joyce Cohen
Daniel Kaya Cook
Audrey Elizabeth Drummond
Matthew Douglas Edwards
Adam James Finkelstein
Quinn Benard Guzman
Robert Sean Goodlatte
Gareth Sacha Guvansen

William Frederick Horning
Matthew Robert Johnson
Keith Wayne Leiter
Whitney Reneé Mickens
Emmert Nicholas
Dametrious James Peyton
Alexander Addison Scheurer
Joanna Chu-In Shih
Stephen Lee Sarley
Youssef Maged Tawfik
David Matthew Wagner
Andrew Shell Waterman
Owen Paul Wendland
Aaron Michael Wise

MINORS

Alexandra Marie Balaban
Patrick Joseph Eibl
Charles Edgar Staats III

UNDERGRADUATE AWARDS

FRIENDS AND colleagues of the late Alex Vasilos donated the Alex Vasilos Memorial Award to the Department of Computer Science to recognize deserving students

ALEX VASILOS MEMORIAL AWARDS

Kamaria Campbell
Matthew Edwards

GRADUATION WITH HIGH DISTINCTION

Matthew Edwards
Advisor: Alexander Hartemink
Gibbs Sampling for Motif Discovery: Algorithmic and Data-Driven Extension

BEST STUDENT PAPER

JEFF PHILLIPS’S PAPER, Algorithms for $\varepsilon$-Approximations of Terrains was selected as Best Student Paper at the 35th International Colloquium on Automata, Languages, and Programming, where he recently presented it.
STUDENT PUBLICATIONS/PRESENTATIONS

Badrish Chandramouli, Albert Yu, and Ying Zheng
ProSem: Scalable Hide-Area Publish/Subscribe, 28th International Conference on Management of Data (SIGMOD ’08)

Songyuan Duan
Processing Diagnosis Queries: A Principled and Scalable Approach, 24th International Conference on Data Engineering (ICDE 2008)
Guided Problem Diagnosis Through Active Learning, 5th IEEE Conference on Autonomic Computing (ICAC 2008)

Britanny Fasy
Exploring Computational Mathematics: Unfolding Polyhedra, MathFest 2008

Ivelin Georgiev
The Minimized Dead-End Elimination Criterion and its Application to Protein Redesign in a Hybrid Searching and Search Algorithm for Computing Partition Functions over Molecular Ensembles, Journal of Computational Chemistry, February 2008
Algorithm for Backrub Motions in Protein Design, 16th International Conference on Intelligent Systems for Molecular Biology (ISMB 2008)

Raluca Gordan
Using DNA Duplex Stability Information to Discover Transcription Factor Binding Sites, Pacific Symposium on Biocomputing (PSB 2008)

Raluca Gordan and Leelavati Narlikar
A Fast, Alignment-Free, Conservation-Based Method for Transcription Factor Binding Site Discovery, 12th Annual International Conference on Research in Computational Molecular Biology (RECOMB08)

Mingyu Guo
Better Redistribution with Inefficient Allocation in Multi-unit Auctions with Unit Demand, 9th ACM Conference on Electronic Commerce (EC-08)

Dmitriy Morozov and Amit Patel
Kernel and Image Persistence, DARPA Topological Data Analysis Conference (TDA)

Dmitriy Morozov and Amit Patel
Probabilistic Perspective on Persistent Homology (poster), Topological Learning workshop of Neural Information Processing Systems conference (NIPS 07)

Dmitriy Morozov

Amit Patel
Reeb Spaces of Piecewise Linear Mappings, 24th Annual Symposium on Computational Geometry (SoCG’08)

Jeff Phillips
Algorithms for ε-Approximations of Terrains, 35th International Colloquium on Automata, Languages, and Programming (ICALP 2008), Best Student Paper Award

Josh Robinson and Allister Bernard
Non-Stationery Dynamic Bayesian Networks, 21st Annual Conference on Neural Information Processing Systems (NIPS-07)

Gavin Taylor and Christopher Painter-Wakefield

Bei Wang and Jeff Phillips
Spatial Scan Statistics for Graph Clustering, 8th SIAM International Conference on Data Mining

Lirong Xia
Determining Possible and Necessary Winner under Common Voting Rules Given Partial Orders, 23rd National Conference on Artificial Intelligence (AAAI-08)
Generalized Scoring Rules and the Frequency of Coalitional Manipulability, 9th ACM Conference on Electronic Commerce (EC’08)
A Sufficient Condition for Voting Rules to be Frequently Manipulable, 9th ACM Conference on Electronic Commerce (EC’08) and 3rd World Congress of the Game Theory Society (GAMES’08)
Voting on Multiattribute Domains with Cyclic Preferential Dependencies, 23rd National Conference on Artificial Intelligence (AAAI-08)

Jianyang Zeng and Chittaranjan Tripathy
A Hausdorff-Based NOE Assignment Algorithm Using Protein Backbone Determined from Residual Dipolar Couplings and Rotamer Patterns, 7th Annual International Conference on Computational Systems Bioinformatics

Jianyang Zeng and Anthony Yan
High-Resolution Structure Determination Starting with a Global Fold Calculated from Exact Solutions to the RDC Equations (poster), 7th NIH/NIGMS Protein Structure Initiative “Bottlenecks” Workshop
WE ARE PLEASED to welcome Renee Brown, Program Coordinator for Duke’s Scientific Visualization Initiative. Working closely with Director Rachael Brady, Brown coordinates activities and resources for the Visualization Technology Group’s education and training programs, and manages the software licenses and visualization facilities. The visualization technology group is dedicated to promoting the use of visualization and virtual reality technologies for improved understanding of scientific data and human cognition. Want a tour of the DiVE (Duke immersive Virtual Environment), a 6-sided virtual reality theater? Brown will be happy to show it off to you or your group.

Brown has been with Duke for eighteen years. A native of Durham, she is happiest when planning and producing special events, or reading a good book.