

ORANGE COMPUTING

Newsletter of the Department of Computer Science, Oklahoma State University

Issue 1, Fall 2007

Welcome Message from Dr Subhash Kak, Department Head

It gives me great pleasure to greet you. I am thankful to Johnson Thomas for agreeing to edit our newly launched newsletter, which here we would like to become a dialog with our alumni and students.

We are entering a period of enhanced opportunity at the CS Department and at OSU. The economy of the State is doing well and it is projected that Oklahoma will be one of the fastest growing centers of economy in the United States in the next few decades.

Since computer science is essential to knowledge discovery in all fields, ranging from life sciences, chemistry, engineering, and social sciences, it can only translate to increased importance being accorded our field in the coming years. We can expect more job opportunities for our graduates and also favorable conditions for entrepreneurship.



I have been here 5 months, having taken over from Woody Hedrick who was Head for several years. I take this opportunity to thank him for his leadership of the department and for continuing to provide counsel as we enter the next phase of the department's growth.

Coming here after spending many years at Louisiana State University at Baton Rouge, my wife, Naomi (who is a psychologist), and I have been captivated by the charm and beauty of the OSU campus and that of Stillwater. Although LSU Tigers are currently higher than the Cowboys in the Football rankings, I have no doubt that OSU campus comes out on top in architecture and ambiance.

Here's a bit of interesting history: The inventor of the personal computer was Henry Edward Roberts (born 1942), who was a graduate of OSU. He founded MITS that built Altair 8000, the first PC. He hired Bill Gates and Paul Allen to write a BASIC interpreter for the machine, and the rest is history. Ed Roberts sold MITS in 1977, entered medical school, and is now a doctor in Cochran, Georgia.

We are working hard to make our department one of the strongest in the nation by means of several initiatives in teaching and research. I will write more extensively on this in the coming months as our projects take firmer shape.

With best wishes for the holidays and a Happy New Year,

Subhash Kak

DR MAYFIELD BECOMES DIRECTOR

Dr. Blayne Mayfield recently accepted the position of director of the OSU Institute for Teaching and Learning Excellence (ITLE). The ITLE was formed a few years ago by combining Educational Television Services (ETS), Audio/Visual Services, and Faculty Development. The role of the ITLE is to provide support for faculty to help them provide a better learning environment for students. The services provided by the ITLE include such things as helping

faculty identify how new technologies can be used in the classroom, and presenting workshops on ways to exploit different learning styles. To learn more about the ITLE, visit their website, <http://itle.okstate.edu>.

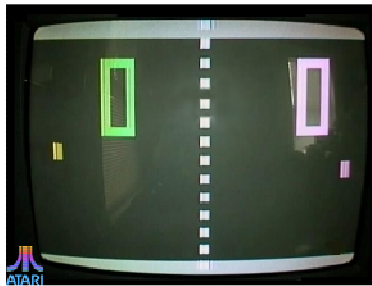
While his new position is a full-time endeavor, Dr. Mayfield retains his faculty status within the CS department and plans to teach an occasional class, such as the new video game design & development course.



NEW COURSE ON VIDEO GAMES

The CS department will offer a senior-level course next semester on the design and development of video games. Dr. Blayne Mayfield will teach the class, which will take a team-based approach. During the first part of the semester, the student teams will learn about and be expected to complete a game design. During the second part of the course, the teams will develop the games designed earlier for the Xbox 360™ platform using the C# programming language.

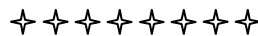
Dr. Mayfield hopes that the course offering in the area of video games will expand in future years. The first change he hopes to put in place is to split video game design and development into two courses. He also sees potential for a video game art and graphics course (cross-listed with the Art department), and a video game storyline development and presentation course (cross-listed with the English department).



Then (Pong) ...



... and Now (Halo 3)



WE NEED A GRAD STUDENT ASSOCIATION!

Abshek Ghale, MS student

The Computer Science Department does not have a representation at the Graduate and Professional Student Government Association (GPSGA). The first step towards this representation is to form an active Graduate Student Association (GSA). The GPSGA provides many benefits including travel grants for graduate students to attend conferences, meetings and other work-related travel such as visiting government and private research labs.

If any graduate student is interested in forming or joining a Computer Science GSA, please email Dr Thomas at jpt@cs.okstate.edu. Dr Thomas will be convening a meeting early next semester with the intention of forming a GSA. All graduate students are strongly encouraged to take an active role in this endeavor as the primary beneficiaries will be graduate students in Computer Science.

A STUDENT GETS HIS PHD

John Chandler, Faculty

Dr. Chin-Chieh Chiang completed his doctoral dissertation in November 2007 and received the degree of Ph.D. in Computer Science from Oklahoma State University in December 2007. Dr. Chiang's research involved improving an existing algorithm for the scaling of matrices and then proving that the algorithm always converges and that the resulting matrix is optimally scaled in a certain sense. He is preparing a manuscript for submission to a journal.

Concerning his background, Dr. Chiang had this to say: "My name is Chin-Chieh Chiang. I was born in Taiwan. I had a wonderful childhood living in a serene area with my parents, sister and brother. My hobbies are camping, mountain climbing and listening to soft music. I finished my undergraduate studies in Applied Math and underwent an obligatory military service in Taiwan; I then worked as a Math teacher in high school for a few years."

Dr. Chiang did graduate work in mathematics at the University of Connecticut and at Michigan State

University. He worked for a time at a company in Oklahoma developing CAD programs. He came to OSU in 2002 to pursue doctoral work in computer science.

Dr. Chiang has accepted a faculty position at the University of Maryland, Eastern Shore, and has already taken up his duties there. Dr. Chiang is a devoted family man. He and his wife Susan have one child, a daughter, Irene.

Concerning his career goals, Dr. Chiang said, "For my long-term career goal, I wished to be in an academic position. My time at OSU has been fun and I am glad that I have been able to achieve one of my life's goals.

We wish Dr. Chiang all the best in his future career and life.

John Chandler
Dr. Chiang's research advisor



Chin-Chieh with his PhD committee

DR HEDRICK STEPS DOWN AS DEPARTMENT CHAIR

Dr Hedrick stepped down as department chair this summer two terms for a total of 21 years. The editor talked with Dr Hedrick to find out a little bit more about him.

Orange Computing: Dr Hedrick, it is indeed a honor and a privilege to interview you for the departmental newsletter. Thank you. Tell us a little bit about yourself.

Dr Hedrick: I received my B.A. degree in mathematics from Adams State College in Alamosa, CO. After working as a mathematician, primarily doing computing work, I enrolled in the graduate program in applied mathematics at the University of Colorado. After a year at CU, I transferred into the computer science program at Iowa State University in Ames. (The University of Colorado did not have a Computer Science degree at the time.) I received both my M.S. and Ph.D. degrees from Iowa State.

Orange Computing: What did you do before you came to OSU?

Dr Hedrick: I taught mathematics at Del Norte (Colorado) High School, then I worked as a mathematician at Kaman Nuclear, a division of Kaman Aircraft Corp., and as a mathematician at the Ames Laboratory of the USAEC (now the US Department of Energy). I also taught part time at Iowa State University for a year.

Orange Computing: When did you come to OSU?

Dr Hedrick: I started work here on July 1, 1970

Orange Computing: That is a very exact date. What are the changes you have seen at OSU and in the department since you have been here?

Dr Hedrick: The department has grown from a very small department having only an M.S. degree program with four faculty members into a medium sized department that grants all three degrees (BS, MS, PhD) with 14 full time faculty

Orange Computing: You were head of Department for quite some time. When were you head of Department?

Dr Hedrick: I have been chair for two periods spanning a total of 21 years - from 1980 to 1994 and from 2000 to 2007.

Orange Computing: That is a long time. What did you like about being Head of Department and what were the things you are glad you no longer have to do?

Dr Hedrick: The best things about being department head include seeing the faculty blossom and grow from novice assistant professors into excellent teachers and

researchers who contribute both to the university and to the profession. One also gets to see the faculty's ideas come to fruition. Of course there are things one does not like that go with any position; you just accept those as part of the job. Right now, I just I am enjoying my teaching without any administrative duties.

Orange Computing: A very diplomatic answer. I guess you will be retiring within the next few years. What do you plan to do with your retirement?

Dr Hedrick: My tentative plans are to retire in July, 2009. Right now I am taking a class in another department on campus. I would like to take additional classes so I can satisfy my eclectic interests. I also hope to have more time to engage with my volunteer work with the mentally ill and with the Boy Scouts. I might also like to do some traveling if I can find time with everything else that I want to do.

Orange Computing: Rumors flying in the department have it that you were a championship swimmer. This sounds very interesting. Please tell us more about this and any of your other interests and passions.

Dr Hedrick: I have not been a competitive swimmer in quite some time, but I always have enjoyed swimming, and I still do. I try to swim 3 or 4 times a week at the Colvin Center. I was awarded trophies and ribbons from my competitive swimming days, but I have no idea where they are now or even whether I still have them. My last competitive meet was when I was a student at Ft. Knox High School in KY.

Orange Computing: Finally, given your wisdom and experience, do you have any advice for our Computer Science students?

Dr Hedrick: Work hard in your classes to keep your grades high so you can find a good position with one of the many companies that recruit our graduates. It seems that many of these companies come back to OSU every year looking for more CS graduates to work for the.

Orange Computing: Thank you

There you have it folks.

August 23, 2007

**A Thank You gathering for Dr Hedrick
at Hideaway Pizzeria**

← Dr and Mrs Hedrick enjoying pizza while
keeping Drs Samadzadeh and Sarangan amused!



The whole group (or most of it) in action ⇒



← Dr Kak sits enthralled, while Terry Wright is focusing
on his food. What is Dr Jonyer upto?



Dr Hedrick admiring his appreciation gift ⇒



BEAU TURNER WINS AWARD



Beau Turner, the department secretary received a staff award for being one of the outstanding staff in the College of Arts and Sciences. Nominations for all departments in the College of Arts and Sciences were submitted and a committee chose the winners. The department would not function without Beau and we are all very proud of her accomplishment. Congratulations to Beau!!



FACULTY RESEARCH PROFILES

In each newsletter, we profile the research activities of 2 or 3 faculty. In this issue the research interests of Drs Dai, Kak and Park are outlined.

DR DAI

Dr. Dai received a Ph.D. from the University of Washington in computer science in 1991. He joined the department in 1998. His research interests include theoretical computer science and parallel computation, and recently expanded into algorithmic bioinformatics and computer networks.

A thread that underlies most of his work is the attempt to identify and analyze the mathematical structures embedded in the problems. This involves the applications of combinatorics, graph theory, optimization, probability theory, and algorithm design/analysis.

A sampling of Dr Dai's research activities:

1. Universal Traversal Sequences and Parallel Computation

Reflecting sequences are variants of universal traversal sequences on undirected graphs, whose study is motivated by the complexity of graph traversal. Dr Dai introduced a computational method for finding better lower bounds on the lengths of reflecting sequences, which translates into tighter length lower bounds for universal traversal sequences.

2. Algorithmic Bioinformatics and Parallel Computing

Biological sequence analysis is a fundamental problem in computational biology. When analyzing nucleic acid or protein sequences, the identification

of biologically significant/unusual subsequences is an important task. A common framework for solving the maximal scoring subsequence problem is to assign a real-valued score to each residue, and devise efficient algorithms to find contiguous subsequences with high (total) scores. Dr Dai's group developed a linear-work (work-optimal) logarithmic-time parallel algorithm on parallel random access machine model that finds all maximal scoring subsequences of a given real-valued sequence. This work provides researchers fast algorithms to identify features that are novel and biologically significant.

3. Discrete Space-Filling Curves and Multi-dimensional Index Structures

A discrete space-filling curve is a linear indexing/traversal of grid points in a multi-dimensional space. Dr Dai's theoretical research obtained the exact formulas for some important

statistics for their applicability as index structures for multi-dimensional databases.

4. Routing in Computer Networks

Since multi-media applications often require guaranteed and stringent quality-of-service, the basic work of quality-of-service routing is to find a path that satisfies multiple constraints such as bandwidth and delay. Dr Dai's group designed and implemented an improved heuristic algorithm for solving the problem, which employs bounded-size buffers for properly maintaining competitive cost-delay combinations for feasible-path extension and offers a better chance to find optimal/quality solutions than the known heuristics.

Dai supplements his teaching duty and research interests with games and "spherical" sports where enthusiasm can compensate for a lack of talent.

DR KAK

Born in Srinagar, Kashmir, India, Dr Kak was educated in various places in Jammu and Kashmir. He completed his Ph.D. in Electrical Engineering from Indian Institute of Technology, Delhi, (IIT-Delhi) and then joined IIT-Delhi as a professor. During 1975-1976, he was a visiting faculty at Imperial College, London, and a guest researcher at Bell Laboratories, Murray Hill. In 1977, he was a visiting researcher at Tata Institute of Fundamental Research, Bombay. During 1979-2007, he was with Louisiana State University, Baton Rouge where he served most recently as Donald C. and Elaine T. Delaune Distinguished Professor of Electrical and Computer Engineering. He joined OSU as Professor and Department Head of Computer Science in July 2007.

His research has spanned the fields of information theory, cryptography, neural networks, and quantum information. He developed the theory of d-sequences for applications to computing and cryptography and he has worked on a variety of problems on data and network security. The inventor of a family of instantaneously trained neural networks (also patented), which could be a model for short-term memory, for which a variety of artificial intelligence applications have been found, he has argued that brain function is associated with three kinds of language: associative, reorganizational, and quantum. He has written on philosophy of mind and showed how recursion plays a fundamental role in art, music and aesthetics.

Dr Kak was the first to look for an information metric in a quantum state over thirty years ago. His work on

quantum information includes the only all-quantum protocol for public-key cryptography. He has found bounds on the capabilities of quantum computers and recently proposed a new measure of information for quantum systems.

He has written on science for the general public and his own work has been showcased in the popular media including Discovery and History channels and on PBS as well as Dutch Public TV. He has also had connections with industry, and he has served on the board of several companies.

Applying cryptographic theory to the study of ancient scripts, he showed that on probabilistic grounds the Indus script must be the originator of the later Brahmi script. He also found a long-forgotten astronomy of the ancient world that has been called "revolutionary" and "epoch-making" by scholars and which has had considerable influence on the understanding of the rise of science in the ancient world.

Dr Kak is the author of 11 books of which the most recent is "The Architecture of Knowledge." He is also the author of 6 books of verse. These books have been translated into French, German, Italian, Spanish, Korean, and Serbian.

Amongst his awards include British Council Fellow (1976), Science Academy Medal of the Indian National Science Academy (1977), Kothari Prize (1977), UNESCO Tokten Award (1986), Goyal Prize (1998), National Fellow of the Indian Institute of Advanced Study (2001), and Distinguished Alumnus of IIT Delhi (2002).

DR PARK

Dr Park was born in Raleigh, NC; and went to a kindergarten in Botswana, Africa where he picked up his British accent. He received B.S. and M.S. degrees both from Seoul National University, Seoul, Korea. He received his Ph.D. from the Department of Computer Science at Texas A&M University. He is currently an associate professor in the Computer Science Department at Oklahoma State University and has been at OSU since 1999.

His research interests include defect and fault tolerance in VLSI and Nano Circuits and Systems, and also risk modeling and analysis. He is currently working on problems such as how to compute and realize maximum circuit speed; and how to tolerate defects when the circuits are not practically testable, both with a focus on emerging technologies such as nanoelectronics-based computing devices.



NEW ROBOTICS ACTIVITY

Xiaolin Lee, Johnson Thomas, Venkatesh Sarangan, Istvan Joyner, Faculty

Today's \$11 billion robot sector will double by 2010, and it should exceed \$66 billion by 2025. Most of the growth will be in areas such as toys, transportation, and health and senior care. Imagine a robot helping a recovering heart-attack patient get some exercise by walking her down a hospital corridor, carrying her intravenous medicine bag, monitoring her heartbeat and other vital signs, and supporting her weight if she weakens. The International Federation of Robotics predicts that 5.6 million robots for domestic, entertainment, and leisure applications will be sold from 2006 to 2009, and right now the field is wide open [Source – IEEE Spectrum August 2007]

With the increasing interest in this field a new robotics lab is slowly taking shape in the department with support from the National Science Foundation and the Department of Defense. The robots currently deployed include 7 I-Robot Creates, 1 Pioneer3-AT, 1 Pioneer3-DX, 1 Surveyor, 1 Vex, 1 Lego MindStorms, 2 Parallax SumoBot and 1 Parallax BoeBot (1). Some of the proposed research include:

1. Sensor-Actuator Networks: Using sensors to monitor environmental surroundings and system states, using robots as actuators for feedback control and adaptation. Typical scenarios include: (a) sensor-actuator for better network topology (balanced network traffic and power consumption); (b) network coverage optimization. (c) robot-assisted delay-tolerant networks.

2. Precision Agriculture: Robots can help shepherd cattle, control irrigation for farmland.

3. Secure Robot-Robot and Robot-Human Communications

The robotics activities include plans to partake in robotics competitions at the university, state and national levels. The competitions would be selected by the students, and may include interdepartmental collaboration with Electrical Engineering and/or Mechanical Engineering. Each contest will be student driven from concept to implementation to execution

The faculty members jointly propose to offer a new course on robotics. This course will provide hands-on learning and experience and will draw from the different disciplines of computer science to investigate areas such as robotic intelligence, robot sensor fusion and analysis, and robotic networking and collaboration.



2 I-Robots I-ing (eyeing) each other

FACULTY-GRADUATE COMMUNICATIONS WHAT THEY REALLY MEAN

The following by Roderick M. Kramer and Joanne Martin, both professors at Stanford University, lists what faculty and graduate students REALLY mean when they communicate (or is it miscommunicate?) Has this been your experience? Anything missing (ed – I am sure you can think of something)?
Source: http://www.planetmike.com/jokes/school/how_graduate_students_and_faculty__miscommunicate.shtml

WHAT FACULTY SAY /WHAT FACULTY REALLY MEAN	WHAT STUDENTS SAY /WHAT STUDENTS REALLY MEAN
❖ I understand why this is late./ <i>No I don't</i>	❖ Here's my draft; it's still a little rough./ <i>I wrote it last night.</i>
❖ Take your time./ <i>Do it now.</i>	❖ Do you happen to know anything about this topic?/ <i>Give me the citations so I don't have to do a literature search</i>
❖ Call me if you have any questions./ <i>Try to find me if you can.</i>	❖ What do you think of the theory?/ <i>The results stink</i>
❖ The ideas are good./ <i>The methods stink.</i>	❖ What do you think of the data?/ <i>The theory stinks</i>
❖ Interesting methods./ <i>The ideas stink.</i>	❖ That's a good point that I didn't think of./ <i>I have no idea what you're talking about</i>
❖ The results are interesting./ <i>The theory is terrible.</i>	❖ That's a REALLY good point./ <i>You have no idea what I'm talking about.</i>
❖ You might want to do a literature search./ <i>This study was done about 100 years ago.</i>	❖ These are really good suggestions./ <i>What a pain.</i>
❖ I'm looking forward to reading this latest draft of your dissertation./ <i>How many is that anyhow?</i>	❖ I misunderstood your comment./ <i>I thought we agreed on this</i>
❖ I could use your help analyzing these data./ <i>I can't make heads or tails out of this mess.</i>	❖ I guess I didn't reason that way./ <i>If you think it through, it doesn't make sense.</i>
❖ I think we are getting close to a final draft./ <i>You've got a long way to go.</i>	❖ I guess I wasn't clear about it./ <i>Didn't you read it?</i>
❖ I'm glad you brought me up to date on your dissertation./ <i>Where have you been since last March?</i>	❖ If you sign off so I can just file it, I'll make the changes right away./ <i>See you same time next year.</i>



Editor's Note

Welcome to the first edition of Orange Computing. The purpose of the newsletter is to inform students, faculty, staff, our alumni and the general public about events and activities in the Department of Computer Science. The editor would also like to hear about issues that are of concern or interest to all those involved with the department, in particular from alumni and students. Suggestions on items to include in the next newsletter are most welcome and needed; these may be personal or professional in nature. Please email me at jpt@cs.okstate.edu It has been fun putting everything together. My sincere thanks to all those who contributed to this inaugural edition. I look forward to your suggestions and feedback – remember, it is not a faculty newsletter, it is OUR newsletter; its success or failure depends on all of us.

A Happy Christmas to all and with best wishes for the New Year

Johnson P Thomas

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Faculty, classmates as well as current students are interested in you and your career after finishing at OSU. Any information that you can send us will be circulated to departmental faculty and staff and will be printed in the next issue of Orange Computing. Please let us hear from you.

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