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School of Engineering

Santa Clara University
The Jesuit university in Silicon Valley

HORIZONS

A quarterly newsletter for alumni, students, parents, faculty, staff, and friends
www.scu.edu/engineering/horizons

SPRING 2005

Tribute to Dr. Al Hoagland: "Pioneer of Modern Information Storage Technology"

Special Points of Interest

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Inside This Issue:

Dr. Albert S. Hoagland, one of principal driving forces behind the development of magnetic storage technology, will retire from Santa Clara University by the end of this summer. A distinguished member of the Electrical Engineering faculty for the past twenty-one years, Hoagland is internationally recognized as the "godfather" of modern digital storage technology.

He received his B.S., M.S., and doctorate degrees all in Electrical Engineering from U.C. Berkeley. He worked as a consultant for IBM while a graduate student, and then later joined their staff. With key magnetic head design and recording responsibilities for the Random Access Method of Accounting and Control (RAMAC) disk drive, the first disk drive, he made major contributions to magnetic disk storage technology and the design of magnetic disk drives.

In 1982, IBM asked Hoagland to organize a consortium of disk drive companies that would agree to fund one or two data storage centers in academia. In 1983-84, he worked to establish one at U.C. San Diego and the other at Carnegie Mellon University. However, people in the industry were disappointed that there was no "center" in Santa Clara valley, the heart of the disk drive industry. Since IBM, the largest disk drive company, was situated in south San Jose, Hoagland decided that SCU would be the ideal location.

In 1984, Hoagland founded the Institute for Information Storage Technology (IIST) at SCU. "The IIST mission was essentially to provide the current professionals in the disk drive field a set of graduate courses, short courses, symposia, workshops, etc. so they could keep abreast of the leading-edge technical advances as well as educate new graduates for positions in this field," explains Hoagland. "IIST support primarily derived from industry in two ways: gift grants from companies and the registration fees generated from our offerings and coming via the technical professional that we served."

In 2001, Hoagland established the Magnetic Disk Heritage Center (MDHC) to preserve the history of the field. "Magnetic disk storage is the most important technical achievement ever in San Jose. I discovered the original building still existed at 99 Notre Dame, and suddenly saw that an incredible opportunity existed for San Jose: to establish a technology museum featuring magnetic disk storage in the original building where RAMAC was created." Through his efforts, MDHC succeeded in making the site a City Landmark, achieved an agreement by the city to preserve the original building, and convinced the current lessee, the Superior Court, to approve the placement of large posters in the lobby reflecting the early magnetic disk work that occurred in that building.

In addition, Hoagland is a past president of the IEEE Computer Society and the American Federation of Information Processing Societies. He has served on the IEEE Board and is a member of the Magnetic Recording Conference Administrative Committee and also the Storage Committee of the Computer History Museum. He is the author of *Digital Magnetic Recording* and other numerous publications, including an IEEE award-winning paper on magnetic data recording theory and head design. He has received several awards for his work in the field, including the IEEE Centennial Medal and the IBM RAMAC Pioneer Award.

Through the efforts of MDHC the IEEE recently made the RAMAC an IEEE Milestone. A special event celebrating this major honor was held on May 26 at the San Jose City Library. For more details, go to: www.magneticdiskheritagecenter.org.

Hoagland has been an Electrical Engineering faculty member at SCU since 1984, and will be retiring in September 2005. Nevertheless, he is not planning to spend his retirement relaxing. "My plan when I leave the University is to pursue the RAMAC restoration project as well as try to bring about a technical museum featuring magnetic disk storage at 99 Notre Dame...Beyond that, I have for some time intended to write a book covering the first 50 years of magnetic disk storage…" For more information on Dr. Hoagland, visit: www.scu.edu/engineering/ee/people/hoagland.cfm.

From the Dean's Desk by Dean Daniel Pitt

Lessons from Senior Design

On May 5 our seniors once again dazzled all comers at the Senior Design Conference. At Santa Clara, we require all of our seniors to complete a senior design project, either singly or as part of a team, and at the annual Senior Design Conference they present their projects to a panel of judges comprising alumni and industry practitioners. This year we had ten sessions running in parallel the entire afternoon, and the judges, numbering more than 70, selected a best project for each session.

William Meissner, advised by Professor Steve Chiesa, designed a pumping station to bring fresh water from California's Hetch Hetchy delivery system to a high-ground reservoir on the San Francisco Peninsula. Working with the consultant employed to come up with the final design for the water authority, William satisfied some especially difficult constraints in his award-winning design.

Lance Takehara, advised by Professor Mark Aschheim, studied the use of bamboo as an alternative to steel rebar in reinforced concrete beams. Escalation in the price of steel due to demand in China has hit the developing world especially hard, so our ongoing collaboration with El Salvador motivated Lance to seek alternative materials that are available in developing countries. The result: bamboo-reinforced concrete. Is that not cool?

Ioi Lam, advised by Professor Rachel He, developed a signal synchronization system for one of the notorious Bay Area expressways. Ioi's intelligent data-collection and decision methods demonstrated the increasing use of advanced information technology in civil engineering.

Sargon Benjamin, Thomas Van Buskirk, and Kevin Weiler, advised by Professor Chris Kitts, produced an Enterprise-class mission-control software suite for the NASA Genesat-1 spacecraft. Building on our long-term collaboration with NASA, Sargon, Tom, and Kevin developed a real-time modular software package incorporating advanced control -system mechanisms. When the satellite is launched, our students will actually control and monitor it using the system.

Chaitanya Agarwal, Tomas Bulka, and Pavel Pozdnyakov, advised by Professor Dan Lewis, developed a secure mobile fingerprint identification system. The system's capabilities included image capture, remote database access, and rapid matching.

Michael Agarwal, Keenan Iwamura, Andrew Luchsinger, Kevin Sweeney, and Kevan Hollenback, advised by Professor Shoba Krishnan, developed an emergency vehicle alert system that the university will deploy.

Ryan Escobar, Jonathan Hsu, Ashley Kramer, and Yelena Pesic, advised by Professor Shoba Krishnan, collaborated on a field-programmable analog array-based RFID reader for use in inventory and security systems that are just now emerging.

Alfredo Cuaresma, Joseph de la Fuente, Kevin Kerns, Adam Moreland, and Vivek Reddy, advised by Professors Tim Hight and Chris Kitts, built a collaborative dual-robot object transportation system using the absolutely amazing Omnibot robots built here earlier. These three-wheeled robots can move in any direction while rotating in any direction. In this project, a slave robot tracked a master robot by monitoring a payload.

Piya Chindaphorn, Shao En Huang, Tran To, Brian Tully, and Sinsak Young, advised by Professor Chris Kitts, built an experimental testbed for collaborative multi-robot navigation. Developed as an open development platform on which others can implement various algorithms, the system is unique in that it is scalable without intrinsic limit and operates on robots of diverse manufacture.

Michael Downing, Brian Edlefsen, David Hague, Nicholas Lochridge, and Steven Perry, advised by Professors Jorge Gonzalez, Tim Healy, and Tim Hight, developed a solar water delivery system specifically designed for an isolated island community in El Salvador. One of six senior design project done in conjunction with El Salvador (and as an outgrowth of the conference on sustainable development for Central America that our faculty organized and conducted there last August), this project uses multiple solar panels and multiple pumps with an intelligent power-control system to vary the number of pumps running depending on the instantaneous amount of solar radiation.

What are the many lessons these students learn from the experience? Since these projects, which many students begin working on at the end of their junior year, enable the students to integrate what they have learned in many courses in a variety of disciplines. They certainly learn to work against a deadline, to get things to actually work, to share responsibility, and to communicate, not just with each other but with the judges and observers as well. I think the judges are most surprised by the professional presentations the students give, as some of the questions they ask the students are quite challenging. Some of them learn how long they can go without sleep. And all of them learn the satisfaction that comes from successfully completing a difficult task. Among the most awed spectators were this year's juniors, but every year we tell them that next year they will do the same thing because they are capable of rising to the challenge when they are expected to. That might be the most valuable

Student Awards

Lincoln Arc Welding Foundation Awards

The Lincoln Arc Welding Foundation Awards Programs began back in 1938 with the first contest for the best technical papers on the application of arc welding to design and production. Today, the college and school shop award programs have continued in the United States with an invitation to global participants as well. Several 2004 Engineering graduates won awards from the Foundation based on their senior design work last year. In addition, SCU won the **School Award** for outstanding performance by this year's submitted projects.

These projects received the **Silver Awards***:* "Haptic Integration of an IBM Robotic Manipulator" (Adrian Cuadra, Colson Criffith, Scott Gunther, Krista Hirasuna, Matt Kalkbrenner, Carol Reiley) and "OBSIDIAN: Design of a Microsatellite" (Vanessa Cuenca, Christina Jimenez, Jennifer Lundquist, Sara Nazemian).

NNIN Summer Internship Award

The highly competitive National Nanofabrication Infrastructure Network (NNIN) Research Experience for Undergraduates (REU) Summer Research Program has selected Minh Dao, electrical engineering junior, to work as a research intern at Stanford University's Stanford Nanofabrication Facility this summer. Out of 505 applications, 81 were awarded summer internships at the member NNIN institutions. Minh was one of the twelve chosen to work at Stanford. His summer project is titled "Microfabrication for Nanotube and Nanowire Electronics." For additional information about the NNIN REU program, please visit: www.nnin.org/nnin_2005reu.html.

Alumni

Lee Hornberger: Answering the Siren Call of Industry

The Mechanical Engineering Department is sad to note that Lee Hornberger (BSME '69) and ME faculty member since 1992, has left the university to return to industry. She has now joined the staff at United Defense (just across the railroad tracks). Lee has been valued as an innovative teacher, a trusted mentor, and an outstanding leader as Associate Dean for Graduate Studies from 1998-2002.

Lee was among the second group of female engineering students entering Santa Clara University, where she received her B.S. degree in 1969.

In 1976, she returned to SCU as an instructor and developed new courses in Plastics and Materials and an outreach program to encourage more women to enter engineering. This program helped increase the SCU proportion of female engineering students from 5% to 20%. It was also the prototype for nationally recognized SWE outreach programs, such as the NASA-funded Higher Education Outreach Program (HEOP) and the long-running SCU-supported *Get-SET* program.

In 1980, Lee returned to industry and worked for several companies, including Acurex and IBM. In 1992, she rejoined the ME faculty as Associate Professor. During her long association with SCU, she has contributed in many ways to the growth and stability of the ME Department. She has provided a vital link between generations of students and alumni, and between the post-war and the newer faculty members. We wish her good luck and happy trails in her new position.

Below are just a few of the many Santa Clara University engineering alumni graduates. We hope you enjoy reviewing this list and please look for more of your classmates in our next edition of Horizons.*

Alumni All-Stars

Mark M. Boitano	Chief Operating Officer	Granite Construction Company
John C. Fitzpatrick	President, Chief Executive Officer	Pepsi-Cola Bottling Company
David A. Fry	Chief Information Officer	Fry's Electronics
William R. Fry	President	Fry's Electronics
Patrick P. Gelsinger	Senior Vice President and General Manager , Digital Enterprise Group	Intel Corporation
Richard J. Justice	Senior Vice President, Worldwide Field Operations	Cisco Systems, Inc.
Anne T. Katz	Vice President, U.S. Assembly & Test Operations	Integrated Device Tech, Inc.
Dr. Tina L. Panontin	Chief Engineer	NASA Ames Research Center
John Quilici	Chief Engineer	United Technologies Corporation
Wiliam J. Scheid, Jr.	Vice President, Operations	Acoustic Technologies
Gordon L. Stitt	President & Chief Executive Officer	Extreme Networks
Dirk R. Thomas	Vice President of Business Development	Hitachi Global Storage Technologies

**Every effort was made to ensure the accuracy of this list. However, if you note errors, please visit the alumni community website: www.scu.edu/alumni/services/community.cfm to help us correct the information.*

Faculty & Staff

2003 IEEE ICCE Best Paper Award

Professor and Associate Dean Nam Ling and his former computer engineering Ph.D. student Dr. Gunnar Hovden recently received the 2003 IEEE ICCE Best Paper Award (First Place Winner) for their paper, "MPEG-4 FAP Generation as an Optimization Problem." The award was presented at the 2005 Institute of Electrical and Electronics Engineers (IEEE) International Conference on Consumer Electronics (ICCE) in Las Vegas on January 11, 2005. The conference was conducted jointly with the Consumer Electronics Show (CES), which attracted about 140,000 participants in Las Vegas this January. The winning paper was presented at the ICCE conference in Los Angeles, California, on June 18, 2003. ICCE is the flagship conference of the IEEE Consumer Electronics Society. All papers were published in the Digest of Technical Papers for ICCE.

In Ling and Hovden's work, a method for automatic generation of facial animation parameters (FAPs) is produced. These FAPs are used to animate an artificial face, resembling a real human face in video. The method produces an optimized set of FAPs for the MPEG-4 synthetic natural hybrid coding (SNHC) standard by minimizing the differences between the animated face and the original face in a video sequence, so as to produce a truthful and lifelike face and its expressions, resembling the original ones. The work was used by CBS Sports in the animation of the eyes and eyebrows of co-median anchor Thurston Long in NFL's "Outside The Huddle." It was also used in animating the eyes and eyebrows of the Ernest character in the Ernest commercials.

Dr. Nam Ling (left) received the award from Dr. Peter H. N. de With, the conference program chair, on January 11, 2005. Dr. Gunnar Hovden is currently a research engineer with Sony America, conducting research on content-based image retrieval. For more information on Dr. Ling, visit: www.cse.scu.edu/~nling.

Publisher's Note by Dr. Cary Yang

This is a combined issue covering activities and events in the Winter and Spring quarters of 2005. It is published between two major events for the School of Engineering, Senior Design Day on May 5 and Engineering Achievement Awards 2005 on June 8. The latter is jointly organized by the Engineering Alumni Board and the School of Engineering, and replaces the former Engineering Awards Banquet. In our next issue, we plan to include articles on both events. On behalf of the entire Horizons editorial staff, I wish you all a wonderful summer and happy travels.

Engineering Achievement Awards 2005

The School of Engineering and the Engineering Alumni Board at SCU are proud to announce an upcoming event, Engineering Achievement Awards 2005, to be held on June 8, 2005 in Mayer Theatre, from 3:00 to 6:00 p.m. This event consists of presentations of various awards to individuals affiliated with the School of Engineering in the past and/or present, who through their contributions to the School and the professions, have distinguished themselves in their individual achievements as well as made a difference in the lives of others. We are fortunate to have Dr. T.J. Rodgers, Chief Executive Officer of Cypress Semiconductor, as this event's keynote speaker. A well-known leader in the integrated circuit industry, he will speak on "Silicon Valley Attacking New Problems: Renewable Energy." An outdoor reception will immediately follow. The event is free of charge and open to the public. Updates on this event can be viewed at: www.scu.edu/2005awards.

Engineering
Achievement Awards
Mayer Theatre
Wednesday, June 8
3:00-6:00 p.m.

Research Achievements in 2004

For the calendar year, January 1 to December 31, 2004, the scholarly achievements of the School of Engineering are summarized below. These numbers **re**present the various means to quantify the research output from the 35 full-time tenured and tenure-track faculty members.

Grants: over $1.6 million.
Journal articles: 30 Journal articles were published, many in the most prestigious.
Conferences: 70 conference papers were presented by the faculty; most of the conferences print the proceedings or transactions.
Journal Articles and Conference papers: 36 were accepted in 2004. 38 more were submitted and acceptance is pending.
Code Standards: 4 contributions to the content of building code standards were made.
Invited Talks: 23 invited presentations were given by faculty at conferences and symposia.
Technical Reports, **Books, and Manuals:** there were 2 technical reports published, 1 book published, 1 book contract awarded, and 3 manuals published by the faculty.

While many universities regard funded research as the primary measurement tool for research, the Santa Clara School of Engineering casts the net more broadly. Most of the Journal articles and Conference presentations listed above are the results of unfunded research; they are products of the intellectual curiosities and passions of the faculty. To put in perspective the contributions to building code standards, it is a significant achievement for an engineer to influence a single building standard during a career.

The grants awarded, however, reflect peer recognition and confirm the quality of the research produced by SCU Engineering faculty. In addition, one must also consider the efforts made by the faculty in writing the proposals not only for the successful awards, but also for the unsuccessful ones, as part of their scholarly contributions among others in teaching and service.

Moreover, $163,000 of the grant money was awarded by Santa Clara University as part of a program to use university resources to promote faculty research. This highly effective program provides a small amount of funding to a researcher in an area which appears to have great potential. An illustration of the success of this program is the recent large award given for seismic applications on the grid. The administration of the School of Engineering recognized the importance of the proposed work and supported the granting of seed money for the original research--research which resulted in the awarding of this recent grant.

Finally, in recognition of the quality of both the faculty's research and teaching achievements, over $1.3 million in gifts and pledges have been received from alumni and the community at large.

Kudos to the members of the faculty; their research efforts show that they truly achieve Santa Clara's standard of the teacher-scholars. Kudos to the students who participated in the research. Kudos to the staff that helped to support these efforts. Finally kudos to the administration of the School of Engineering for helping to institute the seed money grants and for providing an environment which respects and fosters research.

Graduate Services Update

Beginning this year, the School of Engineering's graduate program has significantly been enhanced through the hiring of new faculty, strengthening the curriculum, and revamping the graduate website: www.scu.edu/engineering/graduate/. In addition, a new **"Visit US Program"** is now being offered to attract prospective graduate students to SCU.

On-Campus Information Sessions: On-campus information sessions on Engineering Graduate Programs will be held on Wednesdays during the Spring 2005 Quarter. During the 45-minute program, an admissions representative will provide a detailed overview of the school's distinctive features, discuss the degree and non-degree programs, and offer tips on admissions procedures. After the presentations, there will be a question and answer period.

Off-Campus/Company Information Sessions (To be arranged): If you can gather a minimum of five prospective students from your company who are interested in Engineering Graduate degree and non-degree programs (e.g. M.S., Ph.D., Certificates, and Open University), we will offer an information session at a time and location that is most convenient for you.
School of Engineering Tours: This tour will allow prospective students and new students who are beginning their studies in the Fall to see the School's state-of-the-art facilities, labs, and classrooms. The tour will include the Robotic Systems Lab, the Nanoelectronics Lab (Clean Room), the Machine Shops, and, also, the Design Center.

For additional information, contact Diana McDonald , Assistant Director of Graduate Admissions, at dmcdonald@scu.edu or (408) 554-4313.

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Editorial Assistants: Andrew Luchsinger , Chris Tichenor, and Carlos-Gil Tuzon