

November 2002

Rajendra Singh Named Bryand Distinguished Engineer



Dr. Rajendra Singh was given the College of Engineering's Distinguished Engineering Award on October 25. Dr. Singh completed his Master's Degree in 1977. Prof. Steve Mittleman was Dr. Singh's advisor.

Raj was born and grew up in a rural setting. Whether a student has grown up on an island off the coast of Maine, or in a village in India, the results can be similar. We have seen how such an environment shapes the values of some of the world's most extraordinary people, informing how these people approach not only their education and careers, but their families, employees, and colleagues. They take little for granted, are astute observers of the world around them, and possess qualities of personal discipline and integrity which carry them far. Raj received an undergraduate degree from the Indian Institute of Technology (IIT) Kanpur before attending the University of Maine. He then received a doctorate degree in electrical engineering from Southern Methodist University.

Dr. Singh is probably best known for his extensive accomplishments in the wireless industry, an industry which has grown tremendously in recent years. Raj has worked very closely throughout his career with his wife, Neera, who deserves special recognition. Neera also attended the University of Maine, taking courses in Chemical Engineering. We are proud of both of these alumni/ae.

Raj has served as Chairman and CEO of Telecom Ventures, a private investment firm focused on the wireless communications and information technology industry since January 1994. He is also a board member of LCC International, Inc, which he co-founded with his wife, and where he served as president from 1983 until September 1994 and as CEO from January 1994 to January 1995. Raj serves on the board of several other companies.

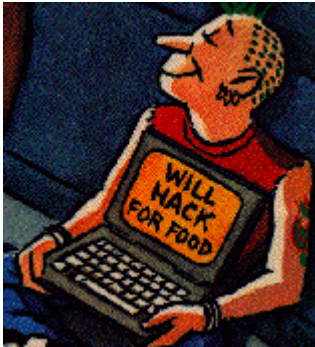
We offer our heartfelt congratulations to the Singh family!

Visiting Committee

The [Visiting Committee](#) is a group of industrial advisors that has been visiting the Department each Fall since 1990. They advise on educational needs in industry, the job market, our curriculum, and many other issues of interest. They visited us this October and have provided this [report](#) on the state of the Department.



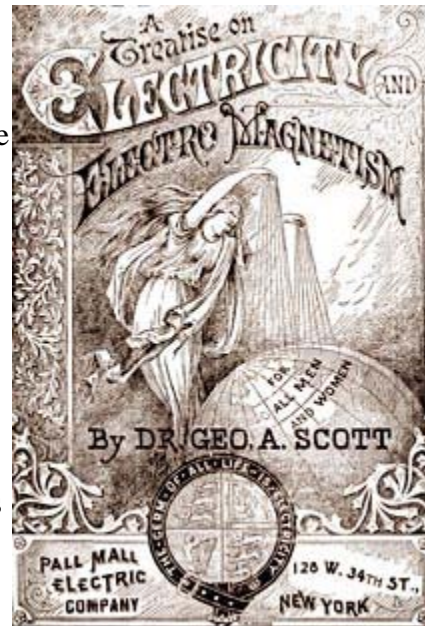
ECE Job Seeker Status Page



A few years ago, we began posting an [ECE Job Seeker Status](#) web page. We strongly encourage our alumni/ae who might be interested in hiring a co-op student to visit this page. Students provide their current job seeking status, as well as their interests. They also have the opportunity to post a link to a resume or

Consider NSF Research Experience for Undergraduates next summer!

As an undergraduate, have you wondered what it would be like to do research while pursuing a graduate degree? For over thirty years, the ECE Department has received funding from the National Science Foundation to operate the [Research Experience for Undergraduates program](#). Students come from all over the US. This program awarded the participating student a stipend of \$ 450/ week for a period of ten weeks last summer. Students live on campus will are eligible for a subsistence award which helps defray expenses for lodging, means and travel from the student's home to the University of Maine. This position is not merely a summer job but rather an educational experience where students are treated as junior colleagues. Three undergraduate credits are awarded to the student for his/her undergraduate research participation.



And finally ...



Computer Engineering vs. Computer Science

I am often asked to explain the difference between Computer Engineering and Computer Science. I talk about the differing emphasis on hardware/software versus "just software". Here is one person's opinion (not necessarily mine) ...

Once upon a time, in a city not far from here, a CEO summoned two of his employees for a test. He showed them both a shiny metal box with two slots in the top, a control knob, and a lever. "What do you think this is?"

One advisor, an engineer, answered first. "It is a toaster," he said. The CEO asked, "How would you design an embedded computer for it?" The engineer replied, "Using a four-bit microcontroller, I would

write a simple program that reads the darkness knob and quantizes its position to one of 16 shades of darkness, from snow white to coal black. The program would use that darkness level as the index to a 16-element table of initial timer values. Then it would turn on the heating elements and start the timer with the initial value selected from the table. At the end of the time delay, it would turn off the heat and pop up the toast. Come back next week, and I'll show you a working prototype."

The second advisor, a computer scientist, immediately recognized the danger of such short-sighted thinking. He said, "Toasters don't just turn bread into toast, they are also used to warm frozen waffles. What you see before you is really a breakfast food cooker. As the subjects of your kingdom become more sophisticated, they will demand more capabilities. They will need a breakfast food cooker that can also cook sausage, fry bacon, and make scrambled eggs. A toaster that only makes toast will soon be obsolete. If we don't look to the future, we will have to completely redesign the toaster in just a few years."

"With this in mind, we can formulate a more intelligent solution to the problem. First, create a class of breakfast foods. Specialize this class into subclasses: grains, pork, and poultry. The specialization process should be repeated with grains divided into toast, muffins, pancakes, and waffles; pork divided into sausage, links, and bacon; and poultry divided into scrambled eggs, hard-boiled eggs, poached eggs, fried eggs, and various omelet classes."

"The ham and cheese omelet class is worth special attention because it must inherit characteristics from the pork, dairy, and poultry classes. Thus, we see that the problem cannot be properly solved without multiple inheritance. At run time, the program must create the proper object and send a message to the object that says, 'Cook yourself.' The semantics of this message depend, of course, on the kind of object, so they have a different meaning to a piece of toast than to scrambled eggs."

"Reviewing the process so far, we see that the analysis phase has revealed that the primary requirement is to cook any kind of breakfast food. In the design phase, we have discovered some derived requirements. Specifically, we need an object-oriented language with multiple inheritance. Of course, users don't want the eggs to get cold while the bacon is frying, so concurrent processing is required, too."

"We must not forget the user interface. The lever that lowers the food lacks versatility, and the darkness knob is confusing. Users won't buy the product unless it has a user-friendly, graphical interface. When the breakfast cooker is plugged in, users should see a cowboy boot on the screen. Users click on it, and the message 'Booting UNIX v.8.3' appears on the screen. (UNIX 8.3 should be out by the time the product gets to the market.) Users can pull down a menu and click on the foods they want to cook."

"Having made the wise decision of specifying the software first in the design phase, all that remains is to pick an adequate hardware platform for the implementation phase. A Pentium 4 with 2GB of memory, and a 30GB hard disk should be sufficient. If you select a multitasking, object oriented language that supports multiple inheritance and has a built-in GUI, writing the program will be a snap. (Imagine the difficulty we would have had if we had foolishly allowed a hardware-first design strategy to lock us into a four-bit microcontroller!)"

The CEO had the computer scientist fired.

Publications, proposals, etc.

UNIVERSITY/COLLEGE/DEPARTMENT SERVICE

- R. Eason helped administer a one week "Summer Explorations Camp" for middle school students in which the students learned to build LEGO robots and explored puzzle solving, June 24-28.
- R. Eason, A. Sheaff, E. Williams, D. Kotecki, and S. Turner hosted lab tours for the Engineering Open House, Oct. 7
- R. Eason gave lab tours to six groups of 6th graders on campus for the Gear Up program on Oct. 15.
- R. Eason, D. Hummels and D. Kotecki gave tours to a group from Hampden Academy

GRANTS RECEIVED

- M. Da Cunha, "Testing New Acoustic Wave Materials for High Temperature Chemical Sensors," Maine Space Grant Consortium, \$15,049, November 1.

DONATIONS

- R. Eason received a donation of \$3300 worth of mechanical puzzles for "Summer Explorations Camp" from Binary Arts, May 8

PROPOSALS SUBMITTED

- R. Lad (30%), B. Frederick (20%), C. Tripp (20%), J. Vetelino (15%), M. Cote (15%), "NIRT: Critical Improvements in Selectivity of Metal Oxide Gas Sensors," NSF, \$1,979,140, October 24.

PUBLICATIONS

- R. Eason, "A Model of Anonymous Covert Mailing System Using Steganographic Scheme," 12th European-Japanese Conference on Information Modeling and Knowledge Bases, Krippen, Germany, (with E. Kawaguchi, H. Noda and M. Niimi), May 2002.
- R. Eason, "Digital Steganography: A Perspective," keynote paper for the Pacific Rim Workshop on Digital Steganography, 2002, Kitakyushu, Japan, Proceedings of Pacific Rim Workshop on Digital Steganography, 2002, pp. 1-6, July 2002.
- M. Niimi, R. Eason, H. Noda, and E. Kawaguchi, "A BPCS Based Steganographic Method for Palette-Based Images Using Luminance Quasi-Preserving Color Quantization," Proceedings of Pacific Rim Workshop on Digital Steganography, 2002, Kitakyushu, Japan, pp. 84-92, July 2002.
- J. Vetelino, "Defect Morphology of Tungsten Trioxide Thin Films," Thin Solid Films 406, pp. 79-86, 2002 (co-authored with L.J. LeGore, R.J. Lad and B.F. Frederick).

PRESENTATIONS

- M. Pereira Da Cunha, D.C. Malocha, D. Puccio, J. Thiele and T. Pollard, "High Coupling, Zero TCD SH Wave on LGX," 2002 IEEE Ultrasonics Meeting, Munich, Germany, October 5.
- L. French, J. Vetelino, T. Pollard, G. Bernhardt and M. Da Cunha, "A Metallic Glass Surface Acoustic Wave Device," 2002 IEEE Ultrasonics Meeting, Munich, Germany, October 5.

PROFESSIONAL ACTIVITY

- R. Eason spent the month of July at Kyushu Institute of Technology in Japan collaborating in steganography research.
- R. Eason attended the Pacific Rim Workshop on Digital Steganography, 2002, where he gave the keynote speech, July 11-12.
- R. Eason hosted a visit from Dr. Kawaguchi, a colleague from Kitakyushu Institute of Technology in Japan, Sept. 25-28.
- M. Da Cunha attended MSGC/NASA Workshop, "Advanced Materials Research and Engineering for Space-Related Applications," Sebasco Estates, Maine, October 3-4.
- M. Da Cunha and John Vetelino each chaired a session at the 2002 IEEE Ultrasonics Meeting, Munich, Germany, October 5-12.
- M. Da Cunha administered the Technical Committee Meeting at the 2002 IEEE Ultrasonics Meeting, Munich, Germany, October 5-12
- B. Segee visited Maine Technology Institute and reviewed proposals, October 31.

PATENTS

- E. Kawaguchi and R. Eason, "Large Capacity Steganography," U.S. Patent 6,473,516, issued October 29, 2002.

UPDATE

- J. Vetelino will be attending a NSF GK-12 Project Director's Meeting in Arlington, Va, October 30-November 3.