February 2001

What do engineers do?

What did you know about engineering before you chose it as a course of study, and why did you choose to study engineering? This is not a rhetorical question. If you have an answer, send it to me. I'd like to know. I think many of us chose engineering with very little information on which to base the decision. And why is that? One possible answer is that many high school teachers and counselors need help in understanding just what engineers **do**. Secondary school teachers have a good grasp of science and mathematics, but who teaches them engineering? Well, starting this summer, we're going to start..

ECE 105, Explorations in Electrical and Computer Engineering is a course for non-ECE majors and is primarily directed toward College of Education pre-service high school physics and math teachers. We believe current high school teachers will be interested as well. This course represents our attempt to influence the infrastructure of K-12 education to better reflect the realities of people living in an increasingly technical and technological world.

The course itself is very hands-on and project-oriented. The course will use MIT's Handyboard System as the brain of student-designed lego-based robotic machines. It is a step-up in complexity from Lego's popular Mindstorms. The course is being designed in recognition of the Maine State Learning Results for K-12 education.

We would very much like to hear your opinion regarding this effort. If you are interested in learning more, please contact me directly (musavi@eece.maine.edu). If you're an engineer and your company is interested in promoting engineering, we would very much like your help in offering sponsored "scholarships". The robotics kits themselves cost on the order of $400 to $500 each, and these scholarships would support these purchases. Let me know if you would be interested in purchasing a kit that we would then loan to students who can't otherwise afford one.

ECE "sleep-over" - a hit!

Wow! While we didn't have huge numbers (10 prospective students and a corresponding number of parents), everyone had a great time. Our ECE students took them to Pat's Pizza, and four faculty took the parents out to dinner. I heard glowing reports all around. We'll definitely do it again! Let me know if you would like to participate next time.

Faculty Focus - Professor Rick Eason ...

Rick Eason (eason@eece.maine.edu) joined the Electrical and Computer Engineering Department in 1988 after receiving his Ph.D. from the University of Tennessee, Knoxville. Rick's academic and research interests are in the areas of Robotics, Image Processing, Microprocessors, and Logic Design. On the academic side, the courses he teaches on a regular basis include the undergraduate and graduate robotics and microprocessor courses as well as "Introduction to Sequential Logic". He has also been known to teach a class in C++, due to his deep interest in programming. In addition, early this summer he will begin teaching ECE 105, the Explorations in Electrical and Computer Engineering course described above, with Andy Sheaff.

Outside the classroom, Rick's main focus is in the areas of robotics and image processing. As for robotics, he has enjoyed working with students on an ongoing project which is known around the department as "the Mobile Robot Project." This effort centers around the design of an autonomous mobile robot platform for entry in the annual Intelligent Ground Vehicle Competition which is usually held in Rochester, Michigan, but has twice been held a Epcot, Walt Disney World, in Orlando, Florida. The goal of the competition is to develop a robot which can navigate autonomously around a track marked by white lines and containing obstacles and hairpin turns. Their vehicle is based on a Honda Odyssey dune buggy frame. To this they have added hydraulic motors powered by a propane engine, cameras for sensing white lines, ultrasonic sensors for detecting obstacles, and a Pentium PC running Linux for intelligence.

Since last fall Rick has done some continuation software work with Dexter Shoe Co. Some of you may recall that he and faculty member Eric Beenfeldt with help from (then student) Andy Sheaff designed and built a prototype shoe sole trimming robot for Dexter Shoe around seven years ago (US patent number 5,485,643). Dexter Shoe then built 14 of these machines and have since used them to trim over a million pairs of shoes a year. The recent software work provided a modification for trimming a new style of bowling shoe, a job that required controlling a second cutter which was added to the machine.

In recent years, Rick has been collaborating with Dr. Kawaguchi of Kyushu Institute of Technology (KIT) in Japan on research in steganography (aka data hiding). They have developed a technique which allows one to embed a large amount of information in an image without visible changes to the image. Applications range from the secure exchange of information over the Internet to digital photo albums with an embedded database and smart cards which are difficult to forge. Since coming to Maine Rick has made five trips to KIT totaling nearly nine months, four of them in the last three years. A sixth visit is planned for late this summer. He and Dr. Kawaguchi now have five pending and provisional patents on this work. In addition to their joint research, they have set up a student exchange. Three UMaine students have recently gone to KIT under a full graduate scholarship which covered tuition, fees, room, board, and travel expenses for several years of study.

This image is a scaled down copy (for web display) of an image that was converted from a 933,408 byte "bmp" image which had the following embedded in it: a 66K picture of Lincoln, the Gettysburg Address, the Declaration of Independence, the Constitution (with amendments), the Magna Carta, and the full text from eight of Shakespeare's plays. The total embedded information is 505,502 bytes (1,212,744 bytes before compression). Even with this much information embedded in the image, the embedded and original images look nearly identical when viewed on a monitor.

Introducing Prof. Mauricio Pereira da Cunha ...

As I mentioned last month, our newest faculty member has arrived. We feel very fortunate to have Dr. da Cunha on board. I think it's worth mentioning, that Mauricio came with wrtten references from five Fellows of the IEEE. This is quite a testament to his outstanding reputation.

Dr. da Cunha is working on portable, lightweight, low-power systems that sense and communicate vital environmental information. Examples include sensors that telecommunicate indications of temperature, the presence of chemical agents, or low-level acoustic information at high frequencies. As such, his work is seen as particularly important to the defense industry.

And finally ...

Some of our most "profound" thinkers make predictions about technology...

"Computers in the future may weigh no more than 1.5 tons."
> Popular Mechanics, forecasting the relentless march of science, 1949

"I think there is a world market for may be five computers."
> Thomas Watson, chairman of IBM, 1943

"I have travelled the length and breadth of this country and talked with the best people, and I can assure you that data processing is a fad that won't last out the year."
> The editor in charge of business books for Prentice Hall, 1957

"There is no reason anyone would want a computer in their home."
> Ken Olson, president, chairman and founder of Digital Equipment Corp.,1977

"This 'telephone' has too many shortcomings to be seriously considered as a means of communication. The device is inherently of no value to us."
> Western Union internal memo, 1876.

"The wireless music box has no imaginable commercial value. Who would pay for a message sent to nobody in particular?"
> David Sarnoff's associates in response to his urgings for investment in radio in the 1920s.

"Airplanes are interesting toys but of no military value."
> Marechal Ferdinand Foch, Professor of Strategy, Ecole Superieure de Guerre.

"Everything that can be invented has been invented."
> Charles H. Duell, Commissioner, U.S. Office of Patents, 1899.

"640K ought to be enough for anybody."
> Bill Gates, 1981

Publications, proposals, etc.

INDUSTRY/SCHOOL VISITS: DATE(S) INDUSTRY SCHOOL
Faculty/Description:
B. Segee Feb. 1, 15 GE, Bangor
Attend Digitization Council Meeting

DONATIONS
Analog Devices has donated DSP Hardware and software to support ECE486 Digital Signal Processing, the ECE401/402/403 Senior Design Project, and NUWC Related Research at University of Maine. The gift included: 10 ADSP-21065L Evaluation boards (ADDU-21065L-EZLITE) which have an educational institution price of $200 each. A full implementation of the Visual-DSP++ Development tools for the above processor, which has an educational institution price of $1095. We will be using the hardware software in ECE486 this semester.

PROPOSALS SUBMITTED
H. Ressom, "Neural Network Modeling of Chlorophyll-A Concentrations from Remote Sensing Data," NASA, $22,000, February 1.

PUBLICATIONS
"Overhanging Separator for Self-Defining Discontinuous Film," U.S. Patent 6,191,469, D.E. Kotecki and W.H. Ma, Feb. 20.

PROFESSIONAL ACTIVITY
F. Irons reviewed papers for the IEEE Transactions on Instrumental and Measurement, January 25.

M. Musavi reviewed a paper, for the IEEE Transactions on Neural Networks, January 31.

J. Vetelino served as an expert witness to Milbank patent law firm regarding SAW filters in cellular phones, New York, February 9.

J. Field reviewed two papers for the 2001 National ASEE Conference, February 7.

J. Patton and D.E. Kotecki participated in the Microelectronics Consortium Meeting with high school students/parents, Portland, January 27.

Segee met with representatives of Ayers Island LLC to discuss a precision manufacturing incubator, Feb. 21.

Segee attended a Maine Technology Institute meeting to discuss a request for proposals that MTI will soon release, Feb. 23.