

## Fall/Winter 1998

### A Message From the Chair...

As I write this note, 1999 is just beginning and we all have great hopes for another successful year. I want to share with you a few of our initiatives as well as some of the good things that 1998 brought.

Let me begin by acknowledging Mohamad Musavi's great job as Interim Chair last year while I was Interim Dean. Although it had to be stressful, he kept the Department going forward while keeping up with his research program and maintaining his pleasant demeanor.

Our enrollments are up again this year and we now have the largest undergraduate enrollment in the College. It is interesting to note that enrollments in computer engineering have risen each year since the program began in 1987 and now equal those in electrical engineering. Graduates from both programs are actively recruited and are receiving starting salaries above national averages; some are even receiving signing bonuses!

We continue to stress our undergraduate teaching while also increasing our research efforts. Last year faculty were principal investigators or co-principal investigators on grants totaling over \$2.5 million, a record for the Department. I have to point out that our undergraduates have a unique opportunity to participate in these projects. Unlike most schools where only graduate students work with faculty on their projects, our undergraduates have this chance. Some begin as early as their freshman or sophomore years.

As a result of increased research funding from the State of Maine, the ECE Department is currently recruiting three new faculty, one in intelligent systems and two in microelectronics. These hires will allow us to begin offering a Ph.D. in Electrical Engineering next year. This degree program was approved by the Board of Trustees in 1994, but was put on hold pending additional support. I am very pleased that this program, that has the potential to do so much for Maine, will finally become a reality.

As you are aware, our BS programs in electrical and computer engineering are both nationally accredited. However, for our next evaluation in 2000, the accreditation process will be markedly different and will emphasize outcomes assessment. As part of this process, we will be asking our graduates to respond to surveys aimed at evaluating their educational experience here. Although surveys can sometimes be a nuisance, I hope you will take the time to respond if you receive ours. It will be very helpful to us.

I want to close by saying that after twelve years as Chair, I will be stepping down at the end of June. I want to thank everyone, but especially our students, for making this job so much easier, rewarding, and even fun at times! Although the replacement process is underway, a successor has not yet been named. I can only wish my replacement the same cooperation and support that I have received.

Best wishes for a great 1999.

## JOHN C. FIELD

### WHAT'S INSIDE

John C. Field

[Johnf@eece.maine.edu](mailto:Johnf@eece.maine.edu)

Tel: 207/581-2233, FAX: 207/581-2220

See our WWW site at <http://www.eece.maine.edu>

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### THANK YOU!

Many thanks to those of you who have visited our web site at <http://www.eece.maine.edu> and registered on our [Alumni/ae page](#) after clicking on the link of the same name. HOWEVER, don't forget to update your entry whenever you change jobs or internet service providers. Why not [check now](#) to see if your entry is up to date or to register if you haven't already? There is a link to an on-line registration form at the top of the Alumni/ae page. It is a great way to keep in touch with your old classmates.

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### ENROLLMENT UPDATE

As of September 1998 we have 21 graduate students, 35 seniors, 37 juniors, 56 sophomores, and 63 first-year students for a total of 212. Included in these figures are 86 computer engineering majors and 6 ELE/CEN majors. We have 19 international students, 4 graduate and 15 undergraduate. The freshman class had an average SAT score of 1162.

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### PERSONNEL UPDATE

**Fred Irons** will be going on phased retirement starting this spring. He will continue to work in the Communications Lab but will be teaching only during the Fall semester. Fred received UMaine's most prestigious award last year when he was named the Alumni Association's 1998 Distinguished Maine Professor. We congratulate him on this latest recognition of his many contributions.

**Ryszard Lec** accepted a faculty position at Drexel University in Philadelphia starting this past fall. He is teaching and continuing his sensor research there. We all wish him and his family the best.

**Jim Patton** continued as Interim Director of UMaine's Department of Information Technologies through most of the Fall of 1998 but is now back full time.

**Ann Rundell**, who received her Ph.D. from Purdue in December of 1997, was a Visiting Assistant Professor during the Spring 1998 semester and worked with the Young Scholars Program last summer. She is currently working at Lincoln Laboratory in Massachusetts. We very much appreciated her contributions and hope that she will consider an early return to an academic career.

**Bruce Segee** was promoted to Associate Professor with tenure effective September 1998. Congratulations Bruce!

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### AWARDS RECEIVED

**Aaron Carter** from Hampden, Maine was named the 9<sup>th</sup> Castle student.

The following students received scholarship awards at the spring 1998 awards banquet. Scholarship name is in parenthesis.

**Chris Bailey** (RCA Harold H. Beverage), **Alma Delic-Ibukic** (Walter W. Turner), **Jamie Guevara** (Robert N. Haskell, Henry & Grace Butler), **Aaron Johnson** (Walter Joseph Creamer), **Maurice Kinney** (RCA

Harold H. Beverage and Walter Joseph Creamer), **Raymond McAvoy** (Harold H. Beverage and National Semiconductor), **Rachel Morehouse** (Waldo M. Libbey), **Andrew Piper** (David Dulap Holmes), **Seth Pouwels** (Robert N. Haskell), **Bridget Rioux** (Robert N. Haskell), **Robert Reynolds** (Louis H. Morrison), **Scott Saucier** (David Dunlap Holmes), **Cory Voisine** (Robert N. Haskell), and **Daniel Walker** (Robert N. Haskell).

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## YOUNG SCHOLARS

The eighth annual Young Scholars Program was held last summer. It brought 26 (14 boys and 12 girls) academically talented high school students to campus for two weeks. This residential program is designed to give students an introduction to engineering and to encourage them to consider it as a career choice. During their time here, they learned about the various engineering disciplines, took part in career explorations, discussed engineering ethics, and took field trips to various engineering firms. The firms included Quadric Systems, Fairchild Semiconductor, National Semiconductor and WBRC-Architects. As part of the WBRC trip the students toured the new Filenes addition at the Bangor Mall several months prior to its opening.

During their stay the students built a "message wand" where motion of the wand, which has a linear array of flashing LEDs, together with the persistence of the eye allows a message to be perceived. The wand was controlled by a microcontroller programmed in C. The program culminated with a seminar on the final day where participants presented a summary of what they learned to parents and high school teachers. This year, the Young Scholars program had its highest enrollment, with students coming from as far away as Brunswick and Houlton.

There is a web site for the 1998 program at: <http://warthog.eece.maine.edu/ysp98/index.htm> with some pictures showing the students involved in a variety of activities.

We are planning to offer this program again during the summer of 1999. Please let any interested high school students know about this opportunity. Through University and industrial support, full and partial scholarships are available to help students who could not otherwise attend.

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## FACULTY ACTIVITIES

**Eric Beenfeldt** ([erich@eece.maine.edu](mailto:erich@eece.maine.edu)) continues to teach the ECE 101 course to the first year students and the ECE 400 sequence of senior project courses. ECE 101 is a hands-on project oriented course designed to give students a look at many different aspects of electrical engineering. Student teams build small cars controlled by a digital keypad connected to the car. At the end of the semester each team is required to make their own car perform a specific task that requires some design of their own.

In addition to this technical material, students in ECE 101 discuss ethics, various career paths, strategies for being a successful student and how to work as a team. This portion is led by **Jamie Guevara** and **Spider Williams**. Jamie is a junior ECE student and Spider is a recent graduate back to take some extra courses and help with the teaching load. One of the very important goals of this course is to improve retention of first year students.

**Rick Eason** ([eason@eece.maine.edu](mailto:eason@eece.maine.edu)) has continued work with a team of students on the development of an autonomous mobile robot platform. The goal of the project has been 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 for intelligence. This past year's work focused on reconfiguring the drive system, converting the operating system to Linux, and improving the software.

Following another interest Rick spent three months last summer at Kyushu Institute of Technology (KIT) in Japan performing research with a colleague on the development of a method of data hiding called steganography. Their method 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 talking storybooks.

Rick has also been active in getting an exchange agreement with KIT and in promoting a student exchange. Two University of Maine students have already been accepted and are now attending KIT with a full scholarship in their graduate program.

**Duane Hanselman** ([duaneh@eece.maine.edu](mailto:duaneh@eece.maine.edu)) and **Bruce Littlefield** ([brucel@eece.maine.edu](mailto:brucel@eece.maine.edu)) their text, *Mastering MATLAB 5*, has been in print since the beginning of the year. This text, a second edition, contains 638 pages of tutorial and reference material on the software program MATLAB. The first edition of the text sold over 10,000 copies and the current edition has sold over 4,000 copies in its first six months of publication. The text has been adopted by numerous Universities around the country for use in introductory engineering classes as well as in a number of upper level engineering, computer science, and mathematics classes. For example, the text is being used by 2,000 first-year engineering students at Texas A&M.

In addition to the text, Duane and Bruce have created the Mastering MATLAB Website (<http://www.eece.maine.edu/mm>) where people can freely download approximately 140 MATLAB M-files collectively called the Mastering MATLAB Toolbox. The functions in the Toolbox add features to MATLAB that are useful in a wide variety of applications. Some Toolbox users choose to pay \$20 for the source code of all functions in the Toolbox. To date, all proceeds from these payments have added over \$1500 to the ECE Undergraduate Scholarship Fund held in trust by the University of Maine Foundation.

Duane's first textbook, *Brushless Permanent-Magnet Motor Design*, is now out of print after five years of publication. As a result, Duane is working on revising and expanding the material for a new text tentatively entitled, *Design and Control of Brushless Motors*. Following in the footsteps of the first text, the new text is aimed at providing engineers a fundamental understanding of how brushless DC motors work, how to design them using magnetic circuit concepts, what the design tradeoffs are, and how to build electronic circuits to control them.

Because of his expertise in brushless DC motors, Duane regularly presents short courses on their design, consults with companies on the design and application of them, serves as a governing board member of the Electric Motor Education and Research Foundation (EMERF), is an advisory board member for the publication Power Conversion and Intelligent Motion, and is a member of the Small Motor Manufacturer's Association (SMMA).

Over the past year Duane has been responsible for teaching both ECE 210 and ECE 211 (which includes ECE 212). Because these courses have been substituted for the discontinued service courses ECE 215 and ECE 224, Duane teaches ECE 210 and ECE 211 both semesters. In addition, in the Spring 1999 semester Duane will also be teaching a televised graduate course on the numerical methods used in circuit simulation programs such as SPICE.

**Don Hummels** and **Fred Irons** ([irons@eece.maine.edu](mailto:irons@eece.maine.edu)) continue their work in the Communication Devices and Applications Lab. Currently, 3 graduate and 5 undergraduate students are involved with on going CDA Lab research efforts. Work is continuing on the ARPA digital receiver program, which involves the integration of high-speed (>3 Gsps) data converters into digitally implemented receivers. Distortion introduced by the converters is the dominant performance degradation for receivers of this architecture. This project involves the development of real-time algorithms and hardware which can compensate for much of this distortion. One student is working on high-speed calibration methods which will allow an operational receiver to be recalibrated in a reasonable amount of time in a non-lab environment. Two other graduate students are addressing the issue of DAC calibration and compensation. An evolving aspect of our work is that we designed and fabbed a multilayer PC prototype circuit to evaluate DAC error compensation techniques for an ADC that runs up to 250 MSPS. The design enabled us to lower noise and distortion by as much as 12 dB and provided extremely encouraging results for dynamic DAC calibration and signal generation in adaptive systems such as the above digital receiver application. The hero for this layout work was **Scott Saucier** who mastered high frequency layout techniques last summer while working as an NSF/REU student in our lab. Another interesting development in our work is the implementation of VLSI design for the prototyping procedure through MOSIS. **Shawn Upton**, was successful in laying out a folding amplifier architecture and this has just successfully gone through fabrication and packaging. After learning how to do the VLSI design, Shawn was fortunate to be able to spend last summer doing a design evaluation at Quadic, Inc in the Portland, ME area. We look forward to testing the final result this spring semester. Recent graduates from the laboratory include **Eric Swanson** and **Kirk Riley**, who are now both employed at Analog Devices in its High Speed ADC Group located in Wilmington, MA. A financial boost for the laboratory was received from Texas Instruments Inc. in Dallas, TX. The company has given UMaine \$50,000 for new student scholarships and equipment within the CDA facility. The gift establishes the TI

Scholarship Project. One undergraduate and one graduate student are eligible for support, according to criteria established by the department. In addition, these students will be eligible for summer internships and possibly permanent employment at Texas Instruments. This gift was a result of TI's satisfaction with having recruited a former lab member, **Ioannis Papantonopoulos**, who is now working in an ADC design group at the Dallas, TX plant. Currently, two TI scholars have been selected and are in the pipeline. They are: third year student, **Russell Drazek** from Dexter, ME and first year student, **Janelle Tonti** from Essex Junction, VT. Russell is looking forward to a summer job in the ADC Test Group at TI, Dallas this year and Janelle is getting acclimated to UMaine and Engineering and will learn about TI testing and products in our lab this summer.

Work also continues on the DSP hardware/software project for NUWC. With help from ECE undergraduates **Aaron Johnson** and **Ray McAvoy**, Don Hummels is involved in a number of DSP related projects to support Naval test ranges throughout the world. The UMaine contribution includes algorithm development, simulation, implementation in real-time, and system performance qualification. To support the project, NUWC has loaned the University one of its DSP development platforms. The system includes a UNIX-based development environment with C and assembly-language tools interfaced to an array of eight TMS320/C40 signal processors. Work in the coming year will likely focus on alternative processor architectures. The system has been integrated into our DSP course, so these undergraduate students interested in the DSP area gain exposure to a professional quality DSP development system. This is also true for students in field theory who are required to do homework projects using sophisticated Spectrum and Network Analyzers and Synthesizers that are connected to computers for downloading data. Generally the department tries to expose students to modern techniques wherever possible.

Another graduate from the lab this year is **Fred Irons** who is rather past retirement age now. He has gone on partial phased retirement for the next couple years, which means that he only teaches in the Fall semester and is around doing whatever comes to mind the rest of the time. When you have senioritis that is a risky procedure since not much comes to mind naturally!

**Mohamad Musavi** ([musavi@eece.maine.edu](mailto:musavi@eece.maine.edu)) has been actively participating in research and teaching in the area of Neural Networks. Mohamad's main research responsibilities are in the *Intelligent Systems* project that is being funded by the Department of Energy EPSCoR Program, Maine Science and Technology Foundation (MSTF), and state industries. This project, that started in July of 1996, will continue until year 2001 and has a total budget of more than \$1.7M. The objective of this project is to assist Maine industries to become more competitive by applying intelligent system technologies in their daily operations. Other members of the intelligent system research include **James Patton** and **Bruce Segee** of the Electrical & Computer Engineering Department and **Hemant Pendse** of the Chemical Engineering Department. The research team has been able to obtain research grants from organizations, such as National Science Foundation, Department of Energy, Argonne National Laboratory, and several industries in support of their efforts in this area. One of the main achievements of this project has been development of the Intelligent Systems Laboratory in the ECE Department. This laboratory is equipped with more than a dozen powerful computers including Pentium 450 MHz processors, Silicon Graphics, and Alpha workstations, scanners, printers, and a variety of commercial and in-house designed neural networks and fuzzy logic software package. Specifically, the laboratory's latest neural network models have been incorporated into a user-friendly software package, named *Axon*, which provides intelligent system software for use by students and industry engineers. There are currently one postdoctoral, 5 graduate and 5 undergraduate students working in the Intelligent Systems Laboratory.

Mohamad is continuing his effort with the Northrop Grumman and Rome Laboratory in developing an automatic image registration system. The result of his work has been quite successful and is being integrated into a system for use by Rome Laboratory. In addition, Mohamad has also developed a collaborative research effort with the DNA sequencing scientists at the University of Maine and The Jackson Laboratory. The aim of this new effort is to develop accurate algorithms for identification of DNA bases.

**Jim Patton** ([patton@eece.maine.edu](mailto:patton@eece.maine.edu)) served as the University's Interim Director of Information Technologies from July of 1997 through November of 1998. While he continued to teach in the Department, most of his ECE activities were curtailed. Graduate student, **Jason Bard**, successfully completed the development of a neural network-based kraft refiner freeness monitor for Champion International, and CMP continues to use the portable data acquisition system we developed for them. Rockwell management is still reviewing the proposed new power lab designed by graduate student **Todd Ward**, **Scott Dunning** of the EET Program, and Rockwell engineers.

**Bruce Segee** ([segee@eece.maine.edu](mailto:segee@eece.maine.edu)) continues to be active in teaching as well as developing the Instrumentation Research Laboratory. This Laboratory is dedicated to research, development, and education in instrumentation. Areas of particular interest include fuzzy logic, neural networks, and hierarchical control systems. Applications include industrial automation, intelligent instrumentation, neural networks for sensor array calibration, and assistive technology for children with disabilities. PCs, PLCs, and embedded controllers have all been used to create solutions.

Graduates from the Instrumentation Laboratory are in hot demand in a wide variety of industries. A concentration of "Room 1 Alums" played a major role in National Semiconductor's modernization effort in South Portland. Also, the work in the lab has captured the interest of a major PLC manufacturer, Modicon. After tracing a number of highly successful employees back to U Maine, Modicon made a very substantial donation of hardware and software. It also named the laboratory as a Beta test site, allowing it to get first crack at new products.

Current work in the lab involves several Maine industries and includes the development of high-tech sensors using neural networks and fuzzy logic. These sensors have the potential to be used for monitoring and controlling smokestack emissions, as well as for monitoring chemical or biological agents in the air. The number and variety of future applications is huge.

Various projects are underway or have been completed that help to modernize and streamline production in more traditional manufacturing processes. Of particular note is an on-going project with Acorn Products for monitoring the production of shoes at their facilities in Hampden and Lewiston. The system is hierarchical. Barcode equipment at operator stations record the location, time, and operator, for each operation done on a case of shoes. Information from each line is collected and placed in a global database. The information is retrieved using a standard web-browser, such as Internet Explorer. The Web-based interface means that no special software is necessary on the user's machines, the user requires no special training, that updates are much easier, and that information is available (with the proper security of course) anywhere in the world.

The integration of the Web as a standard tool has far-reaching implications. Bruce is hopeful that the Instrumentation Research Laboratory will have the opportunity to further develop this process by helping other manufacturers find solutions to some of their needs.

**John F. Vetelino** ([vet@eece.maine.edu](mailto:vet@eece.maine.edu)) and his research group which currently consists of 2 post doctoral students, 4 PhD student, 5 MS students and 12 undergraduates, continue to work on basic and applied research in gas sensors, biosensors, corrosion sensors and water quality sensors. Each area involves collaboration with physicists, chemists, chemical engineers, civil engineers, environmental engineers, food scientists, microbiologists or medical doctors. The sensor work is supported by NSF, BIODÉ Corporation, Sensor Research and Development Corporation, Office of Naval Research, DARPA, EPA, Dept. of Commerce, Department of Energy, National Institute of Health, and Argonne National Laboratory.

Dr. Vetelino was on the organizing committee for the 1998 IEEE Ultrasonics Symposium held in Japan in October 1998, and the International Chemical Sensor Meeting held in Beijing, China in July 1998. Dr. Vetelino was also a guest associate editor of the special issue of IEEE Ultrasonics, Ferroelectrics and Frequency Control (UFFC) Transactions on sensors and actuators.

Two small businesses, BIODÉ and SRD Corp., which were incubated from the sensor research at the University of Maine, have recently been successful in obtaining several small business innovation (SBIR) grants totaling over 8 million dollars from ONR, NSF, Dept. of Energy, National Institute of Health, Dept. of the Army and the State of Maine. These companies, which are located in Hermon and Orono respectively, employ several former and current UMaine students on a part time or full time basis.

Dr. Vetelino received an NSF grant that supports undergraduate research in the Electrical and Computer Engineering Department. This ten-week summer program involves undergraduates from the University of Maine and other U.S. universities in departmental research activities, some of which are industrially sponsored. At the end of the summer, students write reports describing their research activities and also make presentations. This award represents the seventeenth award Dr. Vetelino has received from NSF to support undergraduate students in research. Dr. Vetelino has also received an NSF equipment award and Environmental Protection Agency Grant. The NSF grant will upgrade the photolithography laboratory to a state-of-the-art facility for the fabrication of a large class of state-of-the-art microsensors. The EPA grant involves the development of a nitric oxide/ammonia sensor for application in fossil fuel combustion processes.

**Al Whitney** ([whitney@eece.maine.edu](mailto:whitney@eece.maine.edu)) for many years has been solely in charge of teaching our electronic course sequence. His strong teaching skills and devotion to this area have resulted in students that are heavily recruited by many electronics companies. Al's principal goal in the electronics portion of the curriculum is to reach a satisfactory balance of a sound understanding of the basic device and circuit theory with the practical application of that theory to the design of working circuits. The belief that a good understanding of analog circuit behavior is important to both digital and analog design permeates the program. However, the demands of an ever increasing interest in digital systems, coupled with a desire to give students more options in designing their own curriculum, has resulted in the reduction of required electronics courses to one. In the latest revision, the sophomore semiconductor devices course is being replaced by a course which combines logic fundamentals with basic digital system design. An upper level elective course is being developed which discusses semiconductor device fundamentals and progresses into some of the modeling compromises utilized in modern simulation techniques. There still exists the non-trivial challenge of how to efficiently introduce into the undergraduate curriculum a sound appreciation for, and understanding of, the design constraints imposed by layout and processing limitations. This challenge is being partially addressed by encouraging co-op experiences for those with an interest in this area. On a much broader scale, co-op opportunities are being encouraged in all aspects of the electrical and computer engineering programs as we try to forge closer ties between the classroom and the practicing engineer.

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## ALUMNI/AE NEWS

**Carver Washburn '54** is President of Signs of Design, Inc. an electronic publishing company in New Jersey. One of his current projects is a four-color weekly local paper he is working on with a newspaper professional. This old time publisher is teaching him about the newspaper business while Carver covers the technical side. He just purchased a new PC with all sorts of bells and whistles to support the large amount of data (around 800 MB) needed for projects like this.

**John DaCorte '85** is teaching physics at Mount Desert Island High School in Bar Harbor. After graduation he worked for Raytheon developing an "Over the Horizon Radar System", specifically writing firmware for transmitter control. Three years later, John took a physics teaching job at Cushing Academy, a private school in Massachusetts. At that time he also bought some land on MDI and started to build a house during the summer months. In 1995, John accepted a job teaching physics at MDI HS and moved back to where he grew up. He and his wife, Ellen, are expecting their first baby in the middle of this January. As probably an all-time understatement, John says "I am sure things will be changing around here!"

**Glen Riley '85** is on the move again! This fall he was promoted to Vice President of Sales for Lucent Microelectronics Asia-Pacific Region. This means he and his wife Judy, and children Erica, (9 years old) and Austin (8 years old) will be living in Tokyo, Japan for at least the next two years. You can still reach Glen at his Lucent e-mail address: [glenriley@lucent.com](mailto:glenriley@lucent.com)

**Kevin Fournier '87** is a patent attorney for IBM UK Ltd. Upon leaving UMaine, he worked as a patent examiner at the U.S. Patent and Trademark Office in Washington, DC. After receiving his law degree from George Washington University in 1992 he worked for a Washington, DC law firm and later for a Boston law firm. He is now living in Chandlers Ford (near Southampton, Hampshire) UK. He and his wife, Samantha (of Bournemouth, Dorset, UK) are expecting their first child in February 1999. Kevin and Samantha enjoy going to their local health club and walking along the beaches of England's south coast.

**Jeff Laverty '88** Jeff is now living in Rye, NY. After graduating Jeff immediately enrolled in UMaine's MBA program concentrating in finance. After obtaining his MBA in December '89 he went to work for Value Line, the investment research firm, as an equity analyst where his engineering background helped in his analysis of a variety of industries, including the aerospace and defense sectors. He then moved to Salomon Brothers, where he covered the retailing sector. After a few years with Salomon he took a slightly different tack, as a credit officer with Tokai Bank. His job was to analyze industries and companies suitable for lending, and make recommendations to the credit committee about which loans the bank should or should not make. He then took a position as Senior Analyst at High View Capital, a hedge fund set up to manage money for mostly high net worth individuals. They did a lot of investing in private companies, putting up private equity or debt financing. His engineering training was put to work again, since a lot of the fund's investing took place in telecommunications companies. Jeff is currently a senior research analyst for McMahan Securities in Stamford, CT. The firm specializes in research and trading of convertible bonds. He was hired to be the technology analyst - and he says his EE degree was a major reason for his getting the

position.

Jeff wants to send the following message along to any prospective electrical or computer engineering students. "Having both a BS in electrical or computer engineering and an MBA are incredibly valuable credentials in this business... Wall Street is an EXTREMELY lucrative career choice, but it's not for everyone. I would also tell them that coming from UMaine is not a drawback - but actually helps set you apart, since nearly everyone else in this business is from Columbia or NYU." He also adds, "The only problem with this business is that it's based in NY City. If Wall Street was in Maine, I'd be in Maine. Since it's not, I'll have to wait awhile before moving back home. A lot of Wall Street firms are moving to Connecticut, however, so I may stick around a while longer. My wife and I are expecting our first baby in April - so the roots are starting to develop!"

**Eric Daigle '89**, has just been promoted to Control System Engineering Supervisor for Petrofac LLC. He and his wife April have three children, Hannah (7), Sophie (2), and Walker (3 weeks).

He has been based in Tyler, Texas (about 100 miles east of Dallas) for the past three years but has traveled extensively. Last year he spent time in London, Venezuela, Ecuador, and California. He just finished working on a Gas Sweetening Unit and a Sulfur Recovery Unit in Venezuela.

Below is a brief explanation of how a sweetening plant and sulfur recovery plant works:

Hydrogen sulfide (H<sub>2</sub>S) must be removed from natural gas and converted to elemental sulfur due to safety and environmental concerns. The sweetening plant uses an amine solution to absorb the H<sub>2</sub>S that is in the feed gas. The amine is then regenerated, and results a H<sub>2</sub>S rich gas called Acid Gas. This Acid Gas is sent to the Sulfur Recovery Unit. The Acid Gas is partially oxidized (partially burned) at about 1600 degF and sent through a catalyst bed to convert it to elemental sulfur. The small amount of unrecovered sulfur is burned in an incinerator. Eric was responsible for the design, construction, and start-up of over a million dollars worth of control system and emergency shutdown systems for these units.

This project was located on a large offshore platform for Shell Oil Company. The offshore location required a two-hour boat ride each way, seven days a week, for about four months. Eric reports "I don't care if I ever ride on a boat again in my life!"

**Jeff Chicoine '90** has been working on the Combat Systems Team, Supervisor of Shipbuilding, USN, in Bath, ME since graduation. He finds working for the Navy challenging and rewarding, and plans on a long shipbuilding career in Maine. He finds being able to stay in Maine is a big bonus. He and his wife, Kristin, have two boys, Alex and Benjamin, ages 6 and 5. They reside close to family in Lewiston, Maine.

**Dean Smith BS '89, MS '91** is a Senior Staff Scientist at Sensor Research Development (SRD) Corporation in Orono, ME. SRD is a company that was co-founded by John Vetelino in 1993. It now employs over 25 people and is doing close to \$5,000,000 per year in contract research. Dean is living in Dover-Foxcroft with his wife Laurie and their son, Hunter, who is 15 months old. He is planning on pursuing a Ph.D. at UMaine in the sensor area. Dean continues to keep in shape and is still dazzling his noontime basketball teammates with his playing and shooting skills.

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## OUTSTANDING GRADUATE STUDENT

The following item is excerpted from a story that originally appeared in the January 8, 1999 Maine Perspective, a UMaine news and information publication. It was written by Margaret Nagle, the Perspective's Executive Editor, and concerns Vincent Allen, ECE's 1998 Outstanding Graduate Student.

For the past five years, Vincent Allen has been studying electrical and computer engineering in the classroom, in manufacturing plants, and in high-tech research laboratories. His on-site learning has led to contributions benefiting one of Maine's most traditional manufacturers, Dexter Shoe Co., and one of the state's newest high-tech firms, Orono-based Sensor Research and Development Corp. (SRD).

"At Dexter Shoe Co., we helped create a more efficient (computer-automated assembly line) system. The company's productivity went up significantly because of our project," says Allen,



who started a new job as a software engineer in January. "As a result of the work being done at SRD, soldiers in the infantry may one day be wearing nerve gas sensors on their lapels that will alert them to dangerous chemicals in the area. It's really great to know that the work I did may actually help save lives. It's a good feeling - and pretty exciting."

Allen, who grew up in Falmouth, went to Notre Dame, his Father's alma mater for a year. However, to save money and be closer to home, in 1993 he enrolled at UMaine where his older brother, Chris, was already pursuing a bachelor's degree in electrical engineering. That year, Allen began working in the Department's Instrumentation Research Laboratory with Bruce Segee and a team of undergraduate and graduate student engineers (see Bruce's Faculty Activities write-up for a description of the Lab).

When Allen first joined the team, software had just been developed for a computer-automated conveyor line customized to meet the special needs of Dexter Shoe's Milo plant as it moved from a manual system. The next step was to install the computer technology along four assembly lines. Eventually, similar systems were installed in other Dexter Shoe plants. Allen was involved in the integration of the technology which relied heavily on the development of a PLC-PC interface. "It was an incredible experience," says Allen. "One of the coolest things was getting started in code development and making it more efficient with each Dexter project. We were able to develop simulators to do more debugging in-house and make the integration go better. Another high point was travelling to the different sites, getting out of the lab and interacting with upper-level management and operators to get the system to work."

"We were working there in Dexter Shoe as undergraduates - two of us - and there were times when we were there integrating the system line by line. There was a lot of responsibility. It seemed like all of Dexter Shoe was on our shoulders. The kind of experience UMaine offers undergraduate students is huge."

After graduating with a BS in electrical engineering two years ago, Allen started working towards a masters in computer engineering. His thesis was based on work with SRD developing biosensors that use neural networks to "crunch data and give readings" comparable to neurons providing information to the brain. In his work, Allen developed reusable software modules that implement the neural network functionality while providing a standard software interface. "A few years ago, students doing neural network research usually had to write their own code or adapt it from other applications and tailor it to their needs," says Allen. "Today, they can take one programming package that is proven and tested, and have neural network functionality at the click of a button."

"The biggest lesson I learned at UMaine is that hard work pays off," says Allen. "The engineering program is a very good one and you need to work hard to do well in it. It helped me prove to myself that I can work that hard and succeed in this field. As a result, I have had a real good job waiting for me - since August." Allen is now continuing his work in programming and design as a software engineer with Modicon, an industrial automation company in North Andover, Mass.



Things are looking up for Cory Voisine '98, Analog Design Engineer at National Semiconductor in South Portland. Is this how he dreams up his great designs? Photo, courtesy of Bangor Daily News.

### EXTERNAL FUNDING

The following is a list of external funding available for expenditures between July 1997 and June 1998. Descriptions of many of these projects can be found in the Faculty Activities section. If you would like to know more about any of these grants, please contact us.

PRINCIPAL INVESTIGATOR(S)	TITLE	SPONSOR	AMOUNT
Eason	SST Software Enhancement	Dexter Shoe	\$315
Hummels	Ping Detection Sample Rate Modification	DoD/Navy	24,956
Hummels, Irons	Distortion Compensation for Digital Receivers	ARPA	84,283
Lec	Feasibility Study of Acoustic Sensing Tech	Control Devices, Inc.	37,028
Musavi	Image Registration Sensitivity Analysis	Northrup Grumman	52,841
Musavi, Segee	Intelligent Control System for Pulp & Paper Industry	Argonne/DOE	49,000
Musavi, Patton	Development of Intelligent Systems Expertise in Maine	DOE/EPSCoR	206,885
Segee, Vetelino	Development of a Hybrid Sensor	ONR	1,815,041
Segee, Vetelino	A Nitric Oxide/Ammonia Sensor	EPA	98,673

Vetelino	Undergraduate Research Participation in ECE	NSF	62,945
Vetelino	International Planning Visit	NSF	3,741
Vetelino	Development of a Nitric Oxide Monitor	DARPA	224,984
<b>TOTAL</b>			<b>\$2,660,692</b>

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July 1, 1997 - June 30, 1998

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Hanselman, D.C., "Effects of skew, pole count and slot count on brushless motor radial force, cogging torque and back EMF," IEE Proceedings, *Electric Power Applications*, Vol. 144, No. 5, Sept. 1997, pp. 325-330.

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Eason, R., Kawaguchi, E., Nozaki, K., Niimi, M and Noda, H., "A Concept of Digital Envelope for Internet Communication," 8<sup>th</sup> European-Japanese Conference on Information Modeling and Knowledge Bases, Vammala, Finland, May 1998.

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R.M. Lec, X.J. Zhang and J.M. Hammond, "A Remote Acoustic Automotive Engine Oil Quality Sensor," Proceedings of the 1997 IEEE Ultrasonics Symposium, Toronto, Canada, pp. 419-422.

J.M. Hammond and R.M. Lec, "A Novel Non-contact Piezoelectric Torque Sensor," Proceedings of the 1998 IEEE Int'l Frequency Control Symp., Pasadena, CA (in press).

Hanselman, D., "Cogging Torque Relationships for Skewed and Unskewed Brushless DC Motors," Proceedings 26<sup>th</sup> Annual Symposium on Incremental Motion Control Systems and Devices, San Jose, CA, pp. 123-128, July 1997.

Rundell, A., DeCarlo, R., Doerschuk, P. and HogenEsch, H., "Parameter Identification for an Autonomous 11<sup>th</sup> order Nonlinear Model of a Physiological Process," *Proceedings of the 1998 American Control Conference*, pp. 3585-3589, June 1998.

### **BOOKS**

Hanselman, D.C. and Littlefield, B., "Mastering MATLAB 5: A Comprehensive Tutorial and Reference," Prentice Hall, 638 pages, 1998.

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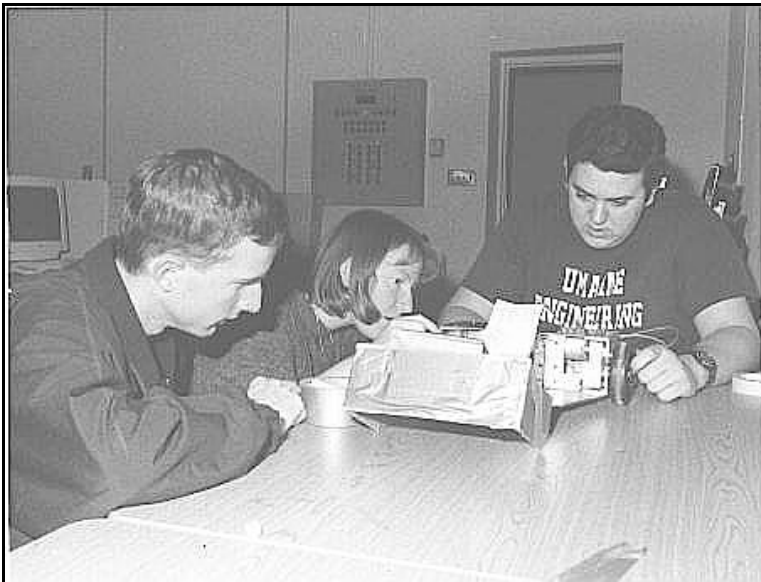
### **Photos from Eric Beenfeldt's 1998 ECE 101 Remote-control Vehicle Design Contest**



First Place: Clayton Mathews (L), of Buckfield and Prasanth Chandrasekar (R) of Bangalore, India.



Runners-up: Andy Soucy, (seated) of Frenchville, Isaac Record (L) of Windsor and Jessica Wentworth (R) of Dover-Foxcroft.



Shown working on their vehicle are Steven Tibbetts (L) of Eastport, Lisa Wellman of Kennebunk, and Nicholas Clark (R) of Oakfield.