ELECTRICAL & COMPUTER ENGINEERING

ECE CONNECTIONS

NORTH DAKOTA STATE UNIVERSIY DECEMBER 2007

LETTER FROM THE CHAIRMAIN...

Welcome to our 2007 Electrical and Computer Engineering newsletter. We hope this newsletter will keep you, a member of our extended ECE family, informed about what is happening in the ECE department since you've gone out and made a career.

Currently, the ECE department has over 400 undergraduate students, over 50 graduate students (M.S. and Ph.D.), 16 faculty and offers two majors (Electrical and Computer Engineering) making it the 47th largest ECE department in the nation (ASEE 2004) out of over 300 departments. Our department offers specialization in biomedical, computer, controls, communication and signal processing, electronics, electromagnetics, power, and optics. Our Department offers Bachelor degree programs in Electrical Engineering and Computer Engineering. We offer M.S. and Ph.D. programs in Electrical and Computer Engineering. We graduate, on average, approximately 70 B.S., 5-10 M.S. and 1-2 Ph.D. degrees per year.

In this issue you'll get the details on a number of exciting new developments such as an EE student, Sarah Panzer, receiving an NCAA scholarship award, Dr. Lima received a four-year $200,000 grant from the U.S. Department of Education's Fund for the Improvement of Postsecondary Education (FIPSE). Dale Faust, a computer engineering major at NDSU, and a team of business and engineering students and faculty were among the five winners in the first round of Innovate ND, a business plan competition. Classroom innovation was portrayed in a NDSU magazine story entitled, "How do you mend a broken heart?" Dr. Chao You, received $82,000 worth of circuit parts from Micron Technology. An ECE student, Jordan M. Dahl received the prestigious Barry M. Goldwater Scholarship. A feature story in the February 2007 issue of the *IEEE Spectrum* highlights the (dream) jobs of ten electrical engineers, one of whom is 2002 EE graduate Andrew Paris.

Another major accomplishment this year was the successful reaccreditation of EE and a first accreditation of CprE program by ABET.

As you read this newsletter you'll realize these are but a few of the accomplishments of members of our ECE Department.

As a service to our alums we offer video recordings of our seminar series on-line for your perusal. We're continually upgrading our website with new recordings so check http://134. 129.123.46/vsts.htm often.

In sad news, we suffered the loss of a long time faculty member this fall, Floyd Patterson. We miss him.

Finally, we offer our best wishes for you in the new year and cordially invite you to email, phone or stop by when in the vicinity and tell us what's happening to you in your career. We want you to feel a part of the ECE family.

Thank you,

Daniel L. Ewert

NDSU College of Engineering and Architecture
ELECTRICAL & COMPUTER ENGINEERING

SPECIAL POINTS OF INTEREST:

Enrollment and Degrees Awarded

Enrollment Statistics
Fall 2007

Electrical and Computer Engineering
Doctor of Philosophy - 10
Master of Science - 23
Bachelor of Science - 403

Computer Engineering
Bachelor of Science - 74

Degrees Awarded
2006-07

Electrical and Computer Engineering
Doctor of Philosophy - 0
Master of Science - 5
Bachelor of Science - 54

Computer Engineering
Bachelor of Science - 12

ECE Faculty and Staff

Faculty

Dr. Dan Ewert, Professor, Chairman

Dr. David Farden, Professor
Dr. Rajendra Katti, Professor
Dr. Robert M. Nelson, Professor
Dr. Bapeswara Rao, Professor
Dr. David Rogers, Professor
Dr. Subbaraya Yuvarajan, Professor

Dr. Jacob Glower, Associate Professor
Dr. Roger Green, Associate Professor

Dr. Lingling Fan, Assistant Professor
Dr. Rajesh Kavasseri, Assistant Professor
Dr. Ivan Lima, Assistant Professor
Dr. Mark Schroeder, Assistant Professor
Dr. Sudarshan Srinivasan, Assistant Professor
Dr. Chao You, Assistant Professor

Staff

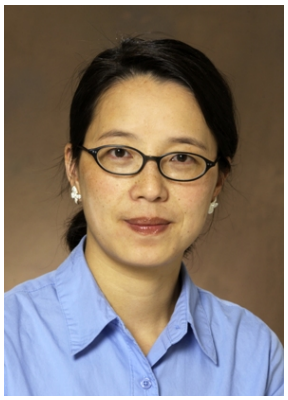
Laura Dallmann, Administrative Secretary
David DuShane, Computer Technician
Bart Kent, Electrical Technician
Priscilla Schlenker, Administrative Secretary

Emeritus Professors

Edwin Anderson, MSEE
William Bares, Ph.D.
Charles Collins, MSEE
Robert Gammill, Ph.D.
Daniel Krause, Ph.D.
Bob Longhenry, MSEE
Donald E. Peterson, Ph.D.
Donald Smith, Ph.D.
Don Stuehm, Ph.D.
Val Tareski, MSEE

Hails and Farewells

Lingling Fan



Lingling Fan

Dr. Fan has worked in Midwest ISO from December 2001 to August 2007 as a Senior Engineer in Expansion Planning before joining NDSU. She has also worked as Engineer III in Mid-Continent Area Power Pool from October 2001 to December 2001. She received her BSEE and MSEE degrees from Southeast University (Nanjing China) in 1994 and 1997 respectively. She received her Ph.D. from West Virginia University in 2001.

She is a registered Professional Engineer in the state of Ohio. Dr. Fan is an active member of IEEE and a reviewer of IEEE transactions on Power Systems/ Power Delivery. She is the recipient of Midwest ISO Outstanding Achievement Award in 2005, Rockwell Automation Scholarship of SEU in 1998 and Top College Entrance Exam Award of SEU in 1990.

Her research areas focus on renewable generation modeling, simulation and control, power system reliability and economics.

Dr. Fan would like to express her excitement to be in the department and joy to be at NDSU.

Sudarshan Srinivasan

Sudarshan Srinivasan

Dr. Srinivasan is currently an Assistant Professor with the department of Electrical and Computer Engineering. He received a Ph.D. and an M.S., both in Electrical and Computer Engineering from the Georgia Institute of Technology in 2007 and 2003, respectively.

He received a B.E. in Electrical and Electronics Engineering from the University of Madras in 2001.

His research interests are in Formal Verification, Hardware Validation, Computer Architecture, and Computer-Aided Design of Digital Systems. His current research focus is in the development and application of Formal Verification methods to hardware systems.

Floyd L. Patterson

Floyd M. Patterson died in his home, Saturday, November 17, 2007 at age 67 of congestive heart failure resulting from a June 1, 2006 heart attack.

"Floyd Patterson started his quest for higher education in 1958 as a freshman Electrical Engineering student at NDSU. He earned his B.S.E.E. in 1962 and his M.S.E.E. from NDSU in 1963. He has performed research in image processing and neurophysiology. His research specialty is image processing and recognition. He has worked for Westinghouse Corp. of Baltimore, MD: Autonetics, Anaheim, CA; and IBM, Rochester, MN. He was an active member of AAAS, SPIE, ASEE, and a Life Senior Member of IEEE.

"Floyd began his teaching career at NDSU in 1968. Throughout his teaching career of 39 years, he most often taught Digital Systems, Signal and Image Processing and Communications.

"Floyd's passion for teaching and his dedication and commitment to educating our students are an inspiration to all of us."

It was with enormous appreciation that the faculty, staff, and students of the ECE Department presented a plaque in honor of Professor Floyd Patterson.

Floyd L. Patterson

PROFESSOR VAL TARESKI RETIRES

It was the fall of 1966 when Val Tareski joined the faculty as an instructor for what was then named the Electrical and Electronics Engineering (EEE) Department. At that time he shared an office with Professor Charles (Cap) Collins on the first floor of the South Engineering Annex. That building was located in the area of campus that is now a green space between the South Engineering Building and the Agricultural Engineering Building. A couple of years later the department moved to its present building that was part of the new engineering complex north of Centennial Blvd just north the Student Memorial Union.

Val Tareski

Over the ensuing years Professor Tareski has touched the lives of thousands of students via research and engineering projects and in the classroom. Classes he has conducted include the introduction to EEE, introduction to computing, circuits, digital systems, digital systems design and implementation (DSDI), embedded systems, assembly programming, computer organization, computer architecture, computer systems design and implementation (CSDI), engineering computing environments, computer data structures, computer systems operations, acoustics, machines, and senior design.

Professor Tareski was involved with countless committees during his tenure at NDSU. Three of the most rewarding committees were the Computer Planning & Goals (CPG) committee, which worked to improve the campus computing environment; the Technology Fee Committee, which directed student technology fee funds to technology projects on campus; and the Steering Committee for Advancing Science Excellence in North Dakota (ASEND), which succeeded in bringing in millions of dollars of funds to support faculty research in science and engineering. During his time at NDSU, Val has worked for five department chairs – Professor Edwin Anderson, Dr. William (Bill) Bares, Dr. Ed Bertnolli, and Dr. Daniel Ewert – and two interim chairs – Professor Ernst Anderson and Dr. Donald (Don) Smith (twice). At the college level, there have been five engineering deans – Dean Frank Mirgain, Dean Joseph (Joe) Stanislao, Dean Don Richard, Dean Otto Helweg, and Dean Gary Smith. At the university level Presidents at the helm have been Dr. H.R. Albrecht, Dr. L.D. Loftsgard, Dr. Jim Ozbun, Dr. Thomas Plough, and Dr. Joseph (Joe) Chapman (plus interim Presidents Dr. Robert Koob and Dr. Allan Fischer).

Although Val retired from teaching after spring semester 2007, he can still be found in the building several days a week working on various projects and providing course help for students in the department's teaching lab.

ECE SCHOLARSHIP NEWS

SCHOLARSHIPS AND AWARDS AVAILABLE

Here's a brief rundown about many of the scholarships and awards that are available in the ECE Department. Continued support for these scholarships from our friends and alumni allow the department to encourage our students to excel in our electrical and computer engineering programs.

Cody Feist Memorial Scholarship. This was established in 2001 in memory of Cody Feist, BSEE 2000. The award goes to a student who graduated from a North Dakota high school who is a junior or senior in electrical engineering.

Duane Nagle Memorial. Dr. Nagle was an adjunct professor of the EEE Department from 1967 to 1976 who had a special interest in biomedical engineering.

Eugene Aas Memorial. Established in memory of Eugene Aas, BSEE 1942.

Edwin and Kay Anderson Memorial. Established to encourage scholarship in the EEE Department. Professor Anderson was a faculty member in the department from 1949 to 1982 and served as the department

Continued on next page …

... continued from previous page.
chair from 1958 to 1978.

The **Ernest Anderson Memorial**. A faculty member of the EEE Department from 1947 to 1990, Professor Anderson encouraged students to strive toward their potential.

Ernest Hoaby Innovation Scholarship. Established by the Hoaby family in memory of Professor Hoaby, who was a faculty member in the EEE Department from 1957 to 1967. This scholarship is awarded to the student or group of students who show the most innovation in a design that has broad application and probable market value.

Frendberg Scholarship. Established about three years ago, this scholarship is awarded to a full time student in ECE who has maintained a GPA of 3.25/4.00 or higher for the semester preceding their application or for the senior year of high school if an entering freshman.

Garber Trambley Memorial. This scholarship was established by the Trambley family in memory of Garber Trambley, BSEE 1966.

Jordan Saharieff Memorial. Established in memory of Professor Jordan Saharieff, who was a faculty member in the EEE Department from 1962 to 1972.

Val Tareski Computer Engineering Scholarship. Established in 2007 by Professor Tareski when he retired. The award goes to a promising computer engineering student who is a sophomore or junior in the computer engineering program.

2007-2008 ECE Scholarship Recipients

Congratulations to the students listed for their achievements and thank you to the scholarship donors who promote and reward academic achievement in Electrical and Computer Engineering.

Scholarship	Recipient	Hometown
Aas, Eugene	Brad Ktytor	Cedar, MN
Anderson, Ed & Kay	Jeremy Fischer	Glenwood, MN
Anderson, Ed & Kay	Casey Roshau	Dickinson, ND
Anderson, Ed & Kay	Jacob Lien	Fergus Falls, MN
Anderson, Ernest	Micah Goldade	Williston, ND
Bushey, Robert R	Ajay Jyoti	Fargo, ND
Bushey, Robert R	Christian Winter	Canby, MN
Caterpillar Global Paving School	Ronald Cummings	Dakota, MN
Caterpillar Global Paving School	Joel Millage	Maple Grove, MN
Caterpillar Global Paving School	Robert Scheeler	Minot, ND
EE Scholarship	Christopher Wallin	Fergus Falls, MN
Hoaby, Ernest	Sarah Panzer	Burnsville, MN
Hoaby, Ernest	Niccole Schaible	Mott, ND
Hoaby, Ernest	Cyle Johnson	Fargo, ND
Kadrmas, Lee & Jackson	James Leingang	Fargo, ND
Kadrmas, Lee & Jackson	Aaron Massman	St. Cloud, MN
Nagel, Duane	Phillip Loy	Fargo, ND
Saharieff, Jordan	Brian Schwandt	Moorhead, MN
Saharieff, Jordan	Jordan Bakke	Finley, ND
Skarphol Scholarship	Aaron Vander Vorst	Bismarck, ND
Trambley, Garber	Josh Friesz	Flasher, ND
Ulteig, Mel	Ryan Cofell	Bismarck, ND
Xcel Energy Scholarship	Sheyann Dunn	Fargo, ND

ERNEST HOABY INNOVATION SCHOLARSHIP AND CENTER

In 2006 the Ernest Hoaby Scholarship was transformed from an award that recognized conventional scholarship into an award that recognizes innovation. The award now recognizes ECE student innovation for the development of a unique device or idea that exhibits originality, that is potentially a useful design with broad application, and that has probable market or commercial value. In the spring of 2007 the first innovation award was given to three students (Cyle Johnson, Sarah Panzer, and Niccole Schaible, shown below) for their design and prototype construction of a bioelectromagnetic chamber, a device designed for biological experiments that test the effects of specific electromagnetic parameters on living tissue cells. More information about this chamber can be found on the ECE Department Wiki site (http://saturn.ece.ndsu.nodak.edu/ecewiki/index.php/Group_SD0618).

The Hoaby family wants to nurture and inspire more engineering innovation among the ECE students, so they also agreed to develop the *Ernest Hoaby Innovation Center*. This center contains reference material and books that describe the innovation process and successful examples of innovation. The unveiling and ribbon cutting for this center was held on April 26, 2007, in the ECE Teaching Lab (located on the second floor of the Electrical Engineering building).

Hoaby Innovation Award winners with their project advisor (from left to right Cyle Johnson, Dr. Mark Schroeder, Sarah Panzer, and Niccole Schaible), standing in front of the new *Ernest Hoaby Innovation Center*.

NEW COMPUTER ENGINEERING SCHOLARSHIP

Upon retiring from active teaching in the ECE Department in May, Professor Val Tareski requested that any retirement gifts be directed to a newly established ECE scholarship for students majoring in computer engineering, the *Val Tareski Computer Engineering Scholarship*. While an active faculty member in the ECE Department, Professor Tareski devoted considerable time and effort towards developing campus computer capabilities and to improving the computer engineering option in Electrical Engineering. Interest in computer engineering grew to the point that the department changed its name to Electrical and Computer Engineering in June 1999, and a new, separate degree program in Computer Engineering was developed. (The new program was approved in December of 2000.)

As a new program on campus, there are no targeted scholarships for computer engineering. Professor Tareski wishes to continue to nurture the program by offering scholarship assistance to promising sophomores or juniors who are majoring in computer engineering. Friends and alumni who wish to share in this effort are encouraged to contribute to this scholarship fund.

MESSAGES FROM FACULTY

ECE FACULTY CONTRIBUTE TO THE 2007 ASEE NORTH MIDWEST CONFERENCE

David A. Rogers, Robert M. Nelson, and Ivan T. Lima Jr. attended and contributed to the 2007 American Society of Engineering Education (ASEE) North Midwest Section Conference that was held at Michigan Tech, Houghton, Michigan, from September 20 to 22, 2007.

Rogers presented the paper "Teaching Technology and Society" in session 5B: Educating Engineers and the Extras. He also served as moderator in session 1B: Educating Engineers for a Sustainable Future.

Nelson presented the paper "Computational Electromagnetics in Electrical Engineering at NDSU" in session 5A: Innovations in Electrical Engineering and Computer Engineering Education.

Lima served as moderator in the session 4A: Innovative Curricula, and he actively participated in the workshop in session 2C: Addressing the Social Dimension of Sustainability in Engineering Education.

FACULTY PRESENTS ECE DEPARTMENT SEMINAR AT MICHIGAN TECH

Robert M. Nelson

Faculty member Robert Nelson gave an invited presentation entitled "Perspectives on Antenna Design for Radio Frequency Identification (RFID) Systems" at the March 1, 2007 Electrical and Computer Engineering Departmental Seminar at Michigan Technological University (MTU), Houghton, MI.

While at MTU Nelson met with NDSU ECE alum Bruce Mork (who is currently an Associate Professor of Electrical and Computer Engineering at MTU) to discuss potential collaboration between the two universities in common areas of research and teaching. Watch for updates on this topic in next year's newsletter!

ECE FACULTY, STUDENTS AND ALUMNI CONTRIBUTE TO THE 2007 IEEE INTERNATIONAL SYMPOSIUM ON EMC

The paper "The Effects of ESD in Multiple Testing Environments on Adhesive-Label RFID Tags", written by graduate students Cherish Bauer-Reich and Dustin Vaselaar (employed by the NDSU Center for Nanoscale Science and Engineering – i.e., CNSE) and faculty member Robert Nelson, was presented by Bauer-Reich and Nelson at the 2008 IEEE International Symposium on Electromagnetic Compatibility (EMC). This year's conference marked the 50th anniversary of the IEEE EMC Society and was held in Honolulu, Hawaii from July 8-13, 2007. The paper reflected on-going work done in the ECE department in the area of RFID (see articles written by Dr. Jacob Glower). Nelson also serves as Chair of the Education and Student Activities Committee (ESAC) of the IEEE EMC Society. While on that topic, if any alumni are interested in promoting the educational aspects of EMC you are welcome to check out the ESAC website at http://www.ewh.ieee.org/soc/emcs/edu/index.html. Note in particular that ESAC sponsors development of new EMC courses through the University Grant program, and also supports a wide range of student activities such as the annual Student Design Competition and Student Paper Competition. In addition to the Student Design Contest, alums Harold Rudnick (Nonin Medical) and Ahmad Fallah (Cisco Systems) have been coordinating the Student Design Competition for many years, and also attended the 2007 Symposium. Mike Reich (alum, current Ph.D. student and engineer at CNSE) also attended this year's symposium – rounding out a very nice NDSU contingent. Perhaps you would like to join us this year at the 2008 IEEE EMC Symposium in Detroit (August 14 - 22, 2008)!

A WIND TURBINE GENERATOR SYSTEM GRACES ECE

ECE Seniors Design a Roof Mounted 1 kW Wind Generator System

The first ever wind turbine generator system on NDSU campus was made operational through an ECE capstone project with a modest budget of under $1200. An interdisciplinary team consisting of two Electrical Engineering seniors (supervised by Dr. Rajesh Kavasseri) and three Mechanical Engineering seniors successfully designed, built and tested a functional one kW wind turbine generator system. The unit consists of a permanent magnet NdFeB (Neodymium Iron Boride) - three phase AC generator driven by 10 foot diameter blades at a hub height of 20 feet (from the roof top).

The unit is designed to deliver one kW at a wind speed of 18 mph. The generator, rectification and braking system were designed by ECE students while the tower, blades, nacelle, mounting and hoisting system were designed by ME students. The effort is part of the department's long term goal of building a sustainable renewable energy infrastructure.

Currently, the department has a 1200 W solar panel system (also roof mounted) and a 1200 W proton exchange membrane (PEM) fuel cell which are being used by the photovoltaic/power electronics research group. It is planned to improve the designs with subsequent senior design projects and incorporate the systems in to the renewable energy course offerings within the Department.

For further details, contact Rajesh Kavasseri at rajesh.kavasseri@ndsu.edu or (701) 231-7614.

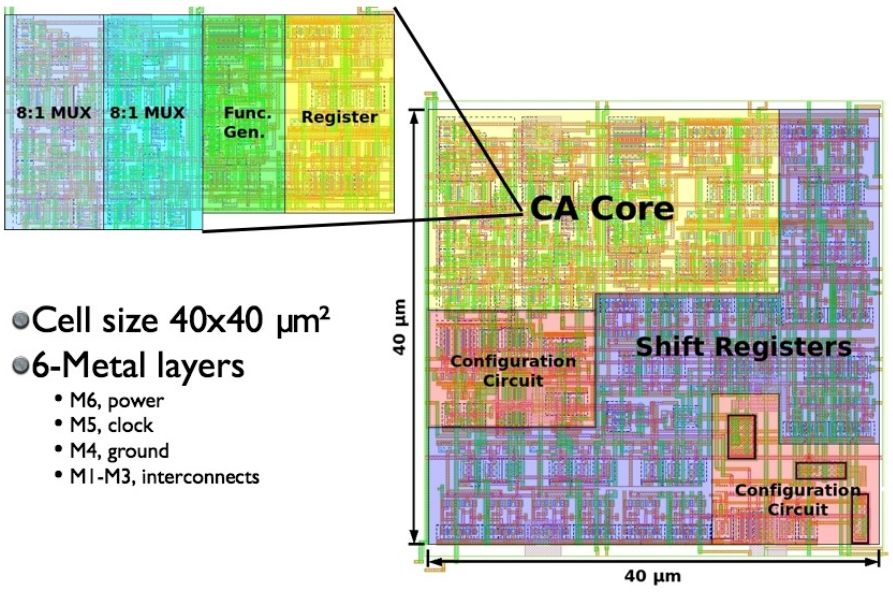
ECE CONTRIBUTES TO THE CONFORMAL COMPUTING PROGRAM AT CNSE

Chao You and Ivan T. Lima Jr. are contributing to the Conformal Computing Program at the NDSU Center for Nanoscale Science and Engineering (CNSE), where they have been faculty associates since the summer of 2007. The Conformal Computing Program is a collaboration between CNSE and MIT's Center for Bits and Atoms (CBA). Mark Pavicic, an ECE adjunct faculty member, is the CNSE Senior Research Scientist who directs the program at NDSU.

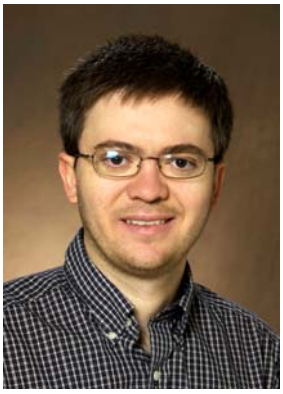
Lima is developing a new tactile display that will be controlled by a conformal computer that consists of an array of processors. He has already developed a test-bed for development of tactile actuators that consists of an array of microcontrollers in the master-slave configuration and an array of sensors. This development test-bed provides biofeedback to assist the process of evaluating the effectiveness of the tactile actuators under investigation.

You developed a 4x4 cell array as part of the collaborative research on cell arrays. MIT's focus was on theoretical studies and software development. NDSU's goal was to develop a prototype chip layout and simulation.

You's array is programmable with four functionalities in each cell. The design was targeted to IBM's 0.13 µm CMOS technology. Each cell measures only 40×40 µm, so tens of thousands can fit onto a single chip. Two invention disclosures have been submitted to NDSU's Technology Transfer office.



Lima to Serve as Co-instructor of Short Course



Ivan T. Lima Jr. was invited to serve as co-instructor of the short course SC210: Hands-on Polarization Measurement Workshop, which will be offered in San Diego, California, on February 25th, 2008, at the Optical Fiber Communication Conference & Exposition and National Fiber Optic Engineers Conference (OFC/NFOEC) 2008. OFC/NFOEC is the largest and the most influential conference in the field of optical fiber communications.

During the short course, Lima will be the instructor of the lab station that will demonstrate the impact of polarization mode dispersion (PMD) in a 40 Gbit/s non-return-to-zero optical waveform and the difficulties associated with PMD compensation. PMD is one of the effects that limit the upgrade of optical fiber communication systems to 40 Gbit/s and beyond.

Lima has been serving as co-instructor of the short course SC210 at OFC/NFOEC every year since 2004, when the conference was held in Los Angeles, California. The conference and the short courses, which are instructed by experts from industry, government, and academia, are sponsored by the IEEE Laser & Electro-Optics Society and by the Optical Society of America.

Attendance in the four-hour-long short course SC210 at OFC/NFOEC 2008 will cost $305 for members of one of the sponsoring societies and $380 for non-members.

Additional information about the short course can be found in the web page: http://www.ofcnfoec.org/conference_program/Short_Course/SC210.aspx.

A message about David A. Rogers

This year Dr. David A. Rogers has served as advisor for two master's students and as co-advisor to one Ph.D. student. He also serves on ten other M.S. or Ph.D. student committees. He advised two senior design teams working in the area of RF design. This fall he presented a paper on "Teaching Technology and Society" at the American Society for Engineering Education (ASEE) North-Midwest Section Meeting at Michigan Technological University, Houghton, MI. He also served as moderator of the session "Educating Engineers for a Sustainable Future." Nationally he served as a reviewer for the *Proceedings of the 2007 ASEE/IEEE Frontiers in Education Conference* and is currently serving as a reviewer for the *Proceedings of the 2008 ASEE Annual Conference*. He is also a reviewer and member of the Editorial Board of the *International Journal of Microwave and Optical Technology*. He is member of the NDSU faculty committee that is currently working to revise the promotion and tenure policies of the University. He also serves on NDSU committees for local selection of candidates for the Goldwater Scholarship and for the Jack Kent Cooke Memorial Scholarship. He chairs the ECE Promotion, Tenure, and Evaluation Committee and serves on the College of Engineering and Architecture Promotion, Tenure, and Evaluation Committee as ECE Department representative.

He was recently elevated to Life Member in the ASEE. He also was recognized for 25 years of membership in the American Geophysical Union with the award of a silver anniversary pin. In May he was recognized for 40 years of membership in the American Scientific Affiliation, a society devoted to the study of the relationships between science and religion.

In the community he is an active participant in the Fargo-Moorhead Brazilian Connection and serves the Red River Radio Amateurs as a volunteer instructor and as a volunteer license examiner. He serves First Lutheran Church as a member of the Men's Choir and as a Lay Reader.

RFID Ear Tags by Jacob Glower

One of the cooperative projects between ECE, CNSE, and DREC (Dickinson Research and Extension Center) deals with developing a method to identify cattle in a way which is accurate and transparent to the user. Towards this end, we are developing a high-frequency (914MHz) RFID tag.

Aaron Reinholz of CNSE set up a demonstration on November 8th, 2007 at a sales yard. Prior to viewing, RFID ear tags developed at NDSU in conjunction with Y-tex were placed on 188 cows. At the sales yard, RFID readers over the were placed over the alleys where cattle are brought out for viewing. Each cow was then identified and read by a computer as it came and went during the day.

This day, 186 of the 188 cows were successfully read as the cows were brought out for viewing. Moreover, the process of identifying the cattle was transparent to the operators of the stock yard: The horseback riders were able to move the cattle as they normally would without having to pause, stop, or sort the cows while they were being read. In general, they seemed to be impressed that we were able to read the tags so quickly.

As a result, this demonstration was considered to be a major success. The potential for using high-frequency for accurately identifying cattle in a way that is transparent to normal operation was shown in the field.

Future studies are currently looking at reducing the size of the RFID tags to fit on smaller ear tags, manufacturing techniques, and incorporating this information into existing data bases.

Smart Nose

Another cooperative activity in ECE is between Agriculture and Biosystems Engineering and Animal and Range Sciences. In this program, we are working with their researchers to develop a smart nose: an electronic system which can quickly and unobtrusively detect spoiled beef.

Researchers in ABE are developing the sensors which are sensitive to the gasses produced by Salmonella as well as the software to decipher its signature relative to these sensors.

Dr. Glower is helping with the development of the electronics to drive these sensors as well as miniaturization to a size compatible with normal retail use.

A Message about Roger Green

Dr. Roger Green continues to teach courses in the signal processing area, including communication theory, applied digital signal processing, and signals and systems. Opportunities for hands-on learning continue to grow with the continued addition (such as a recently acquired "Telecommunications Learning System" from Emona Instruments Pty Ltd) or update (such as new TI TMS 320C6713 DSKs) of laboratory equipment.

The Digital Signal Processing Scholar Team (DSP-ST), which is headed by Dr. Green, is now in its fourth year. Although participation is entirely voluntary and does not count toward ECE graduation requirements, the DSP-ST has consistently maintained a solid membership. Currently, a group of nearly ten students are working on the development of a DSP-based desktop inverted pendulum, with a prototype anticipated in spring 2008.

During the past year, Dr. Green has also acquired external funding for student research, completed as two senior design groups. The first group, working under a

Continued on next page…

… Continued from previous page.

$45,000 Army subcontract, developed a battery-powered stand-alone portable electrochemical impedance spectroscopy (EIS)-based coating health monitor; device performance exceeded expectations, and the students are now in the process of submitting their work to an international corrosion conference to be held in Tampa, Florida, this spring. The second group, which began in this fall, is working with Gamry Instruments in Warminster, Pennsylvania, to implement and assess various algorithms developed at NDSU on a commercial instrument.

In the upcoming spring and summer semesters, Dr. Green will concentrate his efforts on completing a digital signal processing textbook, which is a collaborative effort with a co-author in California. Currently, over 100 pages are complete out of a target of 600 to 800 pages. A complete draft is anticipated for review by September 2008.

SCHOLARSHIPS AWARDED TO COMPUTER ENGINEERING STUDENTS VIA NSF GRANT

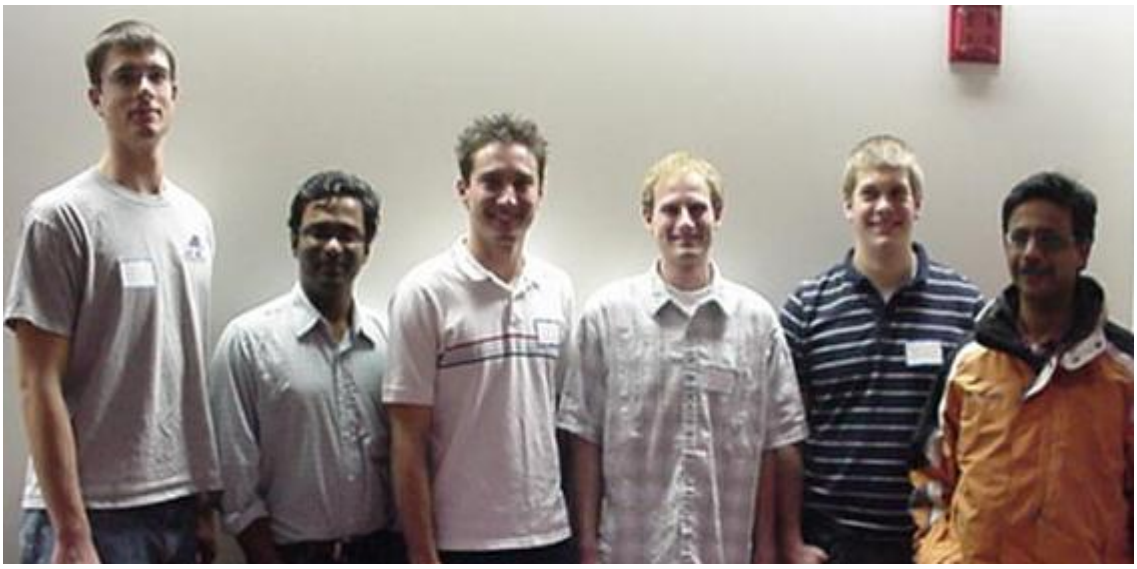
Dr. Raj Katti along faculty members in the Computer Science and Management Information Systems department received a National Science Foundation (NSF) grant titled, "Collaborative for Scholarships in Computing, Information Sciences, and Engineering" (CoCISE). This award of over $460,000, is designed to provide scholarship support and academic mentoring to talented and financially disadvantaged computer engineering, computer science, and management information systems students at NDSU. The CoCISE scholarship awards will begin in Fall 2007 and approximately 30 scholarships will be awarded each year for the next four years.

The objectives of the CoCISE program include:

- Providing financial support to disadvantaged undergraduate students,
- Providing academic mentoring for each scholarship recipient that
  - helps insure the successful completion their degree,
  - improves and/or maintain their GPA, and
  - helps achieve success in obtaining a reward career in their chosen field.

Increasing the numbers of women and minority group students, particularly Native Americans, in the computer engineering, computer science, management information systems, and pre-management information systems programs.

Seen in the picture below are (from left to right) Adam Hoffert (scholarship recipient), Dr. Rajesh Kavasseri (Faculty Mentor) Josh Friesz, Christopher Baumler, and Andrew Ouradnik (scholarship recipients) and Dr. Raj Katti (faculty mentor).



ECE RECEIVES DONATION

The Department of Electrical and Computer Engineering (ECE) has received $82,000 worth of circuit parts from Micron Technology. The donation is made through Dan Ewert, chair and professor of electrical and computer engineering, and Chao You, assistant professor of electrical and computer engineering.

The parts include various inductors, capacitors, resistors, oscillators, logic chips, programmable boards, memories and microprocessors. The parts will be used for student labs, senior design projects, scholar team practices and graduate students' research.

Having the "world's most valuable patent portfolios and most powerful patent pipeline," according to IEEE Spectrum, Micron has invested heavily in technology innovation.

Micron has continuously funded NDSU through donations, student internship, full-time recruiting and summer visiting faculty program as part of their support of higher education. Many NDSU alumni work at Micron, including three top ECE students who accepted job offers from Micron last year.

-Courtesy of University Relations

NDSU FACULTY RECEIVES GRANT FOR INT'L ENGINEERING EDUCATION

Faculty members in NDSU's College of Engineering and Architecture have received a four-year $200,000 grant from the U.S. Department of Education's Fund for the Improvement of Postsecondary Education (FIPSE). NDSU and its project partners will be pursuing course and degree equivalence in the areas of electrical engineering and mechanical engineering with emphasis in renewable energy sources, as well as offering select engineering students the opportunity to study in Brazil as part of an exchange program. One of the program goals includes preparing engineers to solve energy problems from a trans-continental perspective.

Ivan T. Lima Jr., assistant professor in Electrical and Computer Engineering and faculty associate in the Center for Nanoscale Science and Engineering, serves as principal investigator and project director. Robert Pieri, professor in Mechanical Engineering and Applied Mechanics; Rajesh Kavasseri, assistant professor in Electrical and Computer Engineering; and Kerri Spiering, director of the Office of International Programs, are collaborating on the four-year project titled "U.S.-Brazil Engineering Education Consortium on Renewable Energy" as co-principal investigators.

The project is aimed at creating a self sustainable exchange of faculty and students between U.S. and Brazilian institutions that have the potential to contribute toward diploma and professional registration equivalence in engineering and lead to an increase in the trade between both countries.

Participating institutions in the consortium in the U.S. are NDSU as the lead institution, and Michigan Technological University, Houghton, Mich. In the U.S., 100 percent of the $200,000 project is financed with federal funds from the U.S. Department of Education FIPSE program.

The project's participating institutions in Brazil include Universidade Federal do Pará in Belém, State of Pará, the largest and the most influential institution in the Amazon region, and Universidade Estadual de Campinas (Unicamp), in Campinas, State of São Paulo. Unicamp is a lead research university in Brazil that is responsible for 11 percent of the Ph.D. degrees awarded and 15 percent of the scientific production in Brazil. The Brazilian partners in the consortium are being funded by a $200,000 (U.S. dollars) provided by the Brazilian Ministry of Education to support their institutions in this bi-national project.

For more information, contact Lima at 701-231-6728 or *Ivan.Lima@ndsu.edu*

ECE GRADUATE SPOTLIGHTED IN *IEEE SPECTRUM*

From *IEEE Spectrum*, February 2007, vol. 44, No. 2

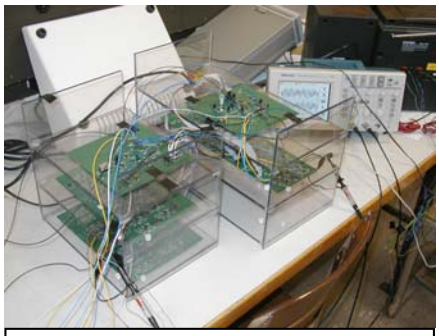
A feature story (http://spectrum.ieee.org/feb07/4893) in the February 2007 issue of the *IEEE Spectrum* highlights the (dream) jobs of ten electrical engineers.

The *IEEE Spectrum* cover and the first article in the story describes the job of an NDSU 2002 EE graduate. The article is titled, "Andrew Paris: Electric Detective" (http://spectrum.ieee.org/feb07/4894).

SENIOR DESIGN PROJECTS

This semester has a total of 29 design projects, eight in ECE 403 Design II and eleven in ECE 405 Design III. The Design II projects include two projects that are sponsored by Bobcat Co., an electrochemical impedance spectroscopy (EIS) instrument project with Gamry Instruments, Inc., a thrombectomy catheter with St. Paul-based Enova Medical Technologies, a second project with Ulteig Engineers, Inc, and a microchip fiber laser amplifier funded by NASA. Additionally, engineering student Chad Mason and two other students are working on a project that Chad proposed to investigate efficient production of hydrogen for hydrogen-based energy devices such as fuel cells. Chad's project is being funded after winning the Student Innovation Project Contest. Numerous other interesting topics are being investigated and developed including an electric surfboard, energy harvesting from distribution lines and wireless substation monitoring.

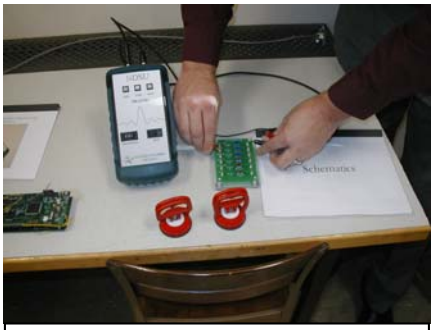
The Design III groups are currently in the process of completing their final documents and wrapping up their projects. Most projects were successfully demonstrated at the end of semester.



Analog Time-Division Multiplexer

The projects include a NASA sponsored extra-planetary exploration suit physiological sensor system, a high brightness LED lighting system, and three multidisciplinary projects, including a wind-powered generator and a diesel tractor engine injected with a hydrogen mixture.

Drs. Farden and Green each had a signals-based project which included an analog time-division multiplexer and a portable EIS instrument, respectively. Two National Science Foundation (NSF) sponsored Projects to Aid Persons with Disabilities were also conducted.



Portable EIS Instrument

One NSF project was an electronic drink assistant device for a client in Dickinson, ND who wants to be able to get a drink independently.

RF Learning Modules

The other NSF project was for two separate clients who each have an advanced form of multiple sclerosis. This device enhances the control of each client's environment by providing voice activated control of infrared remote controlled TV's and radios, a wireless door deadbolt, and a fully embedded telephone.

You can access more detailed information on these and other design projects at the department's wiki site located at: http://saturn.ece.ndsu.nodak.edu/ecewiki/index.php/ECE_Senior_Design_Groups.

The ECE department encourages individuals and companies to sponsor student design projects. Sponsorship is generally $3,000 per two-semester project and is a great way to develop a closer relationship with the ECE department and graduating students, provide skill-set development for students, obtain preliminary designs and prototypes, and help support student design activities within the department. If you would like to sponsor a project or have questions, please can contact Prof. Mark Schroeder at (701) 231-8049 or mark.j.schroeder@ndsu.edu.

Demonstration Day

How to Mend a Broken Heart

About a year ago at course registration time, fifteen students signed up for an elective in cardiovascular engineering, expecting to be lectured, given assignments and exams, to be taught in the usual way. It's a 400-level course, open to seniors and graduate students, so these are students savvy in the ways of picking good classes. But when the semester began and they arrived for the first day with new notebooks and sharp pencils, they were surprised. Instead of the usual introductory lecture, the professor is urging them to drop the course. Get out while you can, he says. This is not a normal class. You'll teach yourselves. You'll be in charge of how to grade yourselves. This will be different. The six graduate students took the advice and cut bait. But the nine brave undergraduate students stayed. And it was a very good thing

The professor in this story is Dan Ewert, and though you'd never guess from looking at him, he's been teaching for 25 years. He is a man jazzed about being a teacher, which means he's probably pretty good at it. In fact he has gotten high marks from his students over the years, graduates keep in touch with him as the person who changed their lives, colleagues bestow teaching awards, and other signs of success. So it's worth noting when Ewert says this particular class was the most amazing experience he's had as a teacher. He can't break it down or draw you a graph -- one of his favorite ways to explain a thing -- but every Monday, Wednesday and Friday from noon to one he was one happy instructor. He loved to watch the students participate freely, and see that the chemistry among them helped them all learn from one another. He calls it magic.

This class in cardiovascular engineering meets in a generic classroom in the electrical engineering building. A tiny teacher's table sits at the front next to an old metal folding chair, and there's even an old style hand crank pencil sharpener. Someone has drawn eyes, a handlebar moustache and a smile with its tongue sticking out in blue marker on the standard-issue clock. On this day, the two women and seven men arrange the little chair-desks in a semicircle. Two are eating something from Taco Bell, another is working on a cup of coffee. Ewert arrives early, comfortably lolls in the old folding chair, and sips from a big bottle of Coke.

At the top of the hour, they start on the question of the day: How to measure left atrial pressure in an artificial heart. One of the guys has some thoughts. He starts in on his description, his hands awhirl as he talks, and then he is up at the white board, drawing this device he's imagined. He asks if there's a pharmaceutical option to handle the immune system response, and Ewert nods for him to assume there is, and they're off. His classmates ask and answer a few questions and Ewert jokes with them about who gets credit on the patent. That's follow up from the previous class meeting. They move on to the new subject, self-calibrating pressure transducers. For a few seconds, the room is quiet, and then six or seven of them start talking at once, mostly mumbling, but they seem to be making sense to one another.

He had to nudge them at first -- they are engineers, after all, even if drawn to cardiovascular engineering. At first, they'd qualify their ideas with a "this is probably wrong" but Ewert works to squelch that impulse. He likes a batting average analogy. A good baseball player is "right" three out of 10 times at bat, and scientists are lucky to be right once in 100 tries, he says. So get up there, draw us an idea, the important thing is to ask questions and figure out how to test hypotheses. And so they learn from one another and teach themselves and get fired up about their own curiosity and begin to synthesize a whole lot of information, the very things this teacher loves most about teaching. Which is nice, because a student who learns from a curious person who is not afraid to make mistakes is a lucky student. How Ewert came to be the human he is -- the teacher, researcher, engineer, person -- is another story.

The story begins in 1983, in a room of Station 55 at the University of Minnesota Hospital. A 25-year-old Ewert watches for four months as his infant daughter gets sicker, is tested and treated and tested again, with no diagnosis to explain her condition. From her room, Ewert can see the square nurses' station, surrounded by a square of hospital rooms with windows all around so the nurses can see everything from everywhere. Sometimes the bigger kids ride trikes through the halls, pulling their IV stands along beside. The walls, the light, the furniture, he remembers as a hazy yellow. He knows that's probably not so, but that's how he sees it. He remembers a baby boy in the next room, just old enough to pull himself to a standing position in his crib. Ewert and his wife play peek-a-boo through the window with him, because the boy had no visitors, his family brought him to the hospital and did not return. All the while, this young couple hopes each day to figure out what's making their own baby so sick, watch her suffer through tests and treatments. Ewert always carries her from the room when there is a procedure, even though she comes to understand the pattern and learns to fear him

Kristin Ewert died when she was seven months old, still without a definite diagnosis. Doctors assumed she suffered an autoimmune disease, which destroyed her body from the inside. Eleven years later her youngest sister, Sara, suffered the same disease, but lived a longer and better life, and enough advances had been made that this time a specific diagnosis was possible. Sara was four years old when she died, like Kristin, of familial erythrophagacytic lymphohistiocytosis, which means

Continued on next page…

...Continued from previous page.
the destruction of red blood cells and is known as FELS. Two girls born between Kristin and Sara -- Heather and Megan -- were not born with the genetic disease.

Ewert was not prepared for these massive losses. As a boy, he learned from Grandma Ewert that where there's a will there's a way, and he believed it. "Kristin was the first experience where will didn't matter," he says. "I couldn't affect the outcome no matter how hard I worked. It was the first time I felt powerless. It completely shakes your foundation." To honor the memories of his girls, he is an optimist. For a guy who has watched two children die, and endured the almost inevitable dissolution of the marriage to their mother, he's a happy man because he's decided to be so. "Your choice is to give something back, or be angry the rest of your life. It's pretty simple." It wasn't simple, though. He'd lived a good life, mostly on the straight and narrow, with the idea that bad things don't happen to good people, so his worldview was shattered.

Eight months after his second child died, he was called to donate a kidney to his sister, who was diabetic. He'd been working on a summer fellowship in San Antonio for only two weeks when the call came, so he got on his motorcycle and started driving north. The closer he got to the hospital in Minnesota, the sicker he felt. It was his physical reaction to going back to the hospital where he watched his daughters die.

When Kristin was sick, he was working on his master's degree in mechanical engineering, and during all those hours and days and weeks in hospitals he saw plenty of examples where engineering could make a difference, could make those sick kids' lives less awful, if not better. He had a lot of time to think, and he thought about what his life should be about, and decided he wanted his life to be about helping other people. He considered medical school, but that profession seemed too limiting for him, so he decided to pursue a doctorate in neurophysiology. He had hoped to steer his career toward the neuro side of things -- working on the body's computer is considered pretty sexy in engineering circles -- but the opportunities that kept coming his way had to do with the plumbing -- and so cardiovascular engineering became his area.

As it's turning out, the plumbing isn't so dull. After graduate school, Ewert had a research fellowship at the Biodynamics Research Unit of the Department of Physiology and Biophysics at Mayo Medical School, Rochester, Minn., and he loved working with all the best at Mayo, but the job did not include teaching, and he missed students. Truth be told, though, when he came to North Dakota State for a job interview in 1990, he wasn't very serious about it. He agreed to come because there was a curling tournament he wanted to be in on the weekend. He liked the place and the people and got a job offer on the spot.

He's the type to downplay his abilities, and claims any success comes from being a hard worker. Either way, he's done some amazing things. Just lately, he conceived, modeled and helped develop a new ventricular assist device. These devices, known as VADs, are familiar to anyone who watches medical dramas on television, and are thought of as a bridge to transplant. But only half as many hearts become available as are needed, so researchers keep looking for better solutions. Ewert's VAD capitalizes on the fact that some patients' hearts actually were healing while the device was in use, so he decided to try to create something intended to give the heart a rest, the way you'd rest any other sore muscle. "I'm a simple guy," he says, "so I thought about it in a simple way."

Last year his colleagues honored him with the university's Faculty Lectureship. With this campus award, the tradition is for the recipient to suggest a snappy title used to promote his or her lecture. Some years this is a struggle, as one's hard-earned academic career often doesn't lend itself to a catchy phrase. Ewert knew his title right away, because he knows his Bee Gees song titles: "How do you mend a broken heart?"

Ewert and some of his engineering buddies lunch at the Memorial Union most days, and this is clearly their mental break in the day, judging by their goofy repartee. But even as they make fun of each other and themselves, the humor is very much engineering minded, so, for example, if they get started on the differences between the genders, one pulls out a pen and another hands over a napkin to graph how male and female moods swing in opposite directions. Perfectly logical to them. This goofball side adds to the impression that Ewert is just a regular guy, just happy to enjoy a little hot lunch, not an intellectual who can dream up new ways to save human hearts. But if you get him away from the guys and talking, he'll start in on the importance of liberal arts in the education of engineers. Galileo. And wanting to be a better writer. Which book on tape he's listening to on his hour-long drive to his lake home. He likes to talk about how the beauty of engineering is the creative part. "If you get to the synthesis level, all things become art."

You could know Ewert for years and never guess he's had hard times. He does not like to tell about his life. He doesn't want pity or allowances. He's developed a "lite" version he can hurry through when pressed to tell his story. But he is a different guy than he would have been. He'd have continued to be a straight and narrow type, more likely to dog after the things guys like him are supposed to want -- power, prestige, position -- and he thinks he probably would not like that guy. These days, he's happiest when he's at a table full of smart people who want to figure things out, and no one is worried about who gets the headline. Or when his students are teaching themselves. Or when he's out on his all terrain vehicle which is kitted out with some new kind of tracks. Or wrestling with his

Continued on next page...

... Continued from previous page.

stepson, and that at 49, he can still prevail over a 6-year-old. Ewert and Darcie, his wife of four years, married just a few months after their first date, and he says she has helped him heal "in ways no one else can." His daughters are not, despite some efforts on his part, pursuing engineering careers. But he clearly is, in the great way of a dad, proud of them, and enjoys their company. Megan is just back from a year of study in Japan, and Heather is about to begin study in linguistics and foreign service in Washington, D.C. The girls remain very close. Ewert has a favorite snapshot of them when they were little girls asleep, holding hands, one wearing a bunny ears headband.

He's teaching the cardiovascular engineering class again this year. Ironically, word got out that it's a great class, so the size made it harder to recreate the chemistry from last year, but as the semester goes, the class is catching the wave, so much so that by mid-March, a guest speaker from industry felt pinned to the front wall by the students' questions and ideas. Ewert is teaching them to do that -- not to just regurgitate what they are told, but to ask bigger questions, come up with ideas. This is how he decided to deal with his losses, what he found when he dug deep and wondered how to recover. He found a deeper commitment to teaching. "Education and freeing people's minds is a worthy endeavor."

And while he's helping to create thoughtful, inventive engineers, he tries to give his students a little life wisdom. Students, he says, expect their lives to unfold in a straight line, just as he did, but it's more like the children's board game Chutes and Ladders, in which you'll suddenly hurtle down a slide or drop down a chute and lose your place in the game. But you pick up the dice and roll again, and once in a while you get to go up the ladder. The negatives and the positives contribute to who you are in the end. It's not about the knowledge, he says, it's the pursuit of knowing.

INNOVATE ND KICKED OFF

Gov. John Hoeven and Commerce Commissioner Shane Goettle kicked off the second round of the Innovate ND program at the NDSU Center for Technology Enterprise on Sept. 20. Innovate ND is a statewide initiative designed to help entrepreneurs turn innovative concepts into business ventures.

Last year, Dale Faust, a computer engineering major at NDSU, and a team of business and engineering students and faculty were among the five winners in the first round of Innovate ND. Faust and his team, Life Pump Innovations, were conducting research into building a standardized testing format for cardiac devices.

"What we got out of Innovate ND was a good business structure, exposure to angel capital and a good feel for the viability of the product," said Faust, noting the team is now working on licensing its intellectual property.

With a $100 entry fee, Innovate ND participants gain access to entrepreneurial tools such as online education, business planning tools and coaching and mentoring from successful entrepreneurs and proven business owners. A panel of private investors will receive business ideas submitted to Innovate ND and select the top winners to receive up to $10,000 in cash prizes and a variety of business services.

Current and former North Dakotans and entrepreneurs who want to relocate to North Dakota are eligible to enroll in Innovate ND. Participants from round one of the program may re-enter at no cost. Deadline to participate in the program is Nov. 15, with more information online at www.innovatend.com.

"North Dakota's future depends on our ability to cultivate entrepreneurs and grow businesses," said Hoeven. "We invite anyone with a business idea--big or small--to enroll in Innovate ND and get help developing that idea into a business plan and ultimately, we hope, into a viable new North Dakota business."

The Innovate ND Working Group involved in the program includes Karen Froelich, associate professor of management, marketing and finance, and Tony Grindberg, executive director of the NDSU Research and Technology Park.

ECE Department receives Seed Grant from NASA EPSCoR

Ivan T. Lima Jr. (PI), assistant professor of electrical and computer engineering , and Orven F. Swenson (co-PI), associate professor of physics, received a $13,196 seed grant from the ND NASA EPSCoR program to carry out the project titled "Microchip laser seeded Yb-doped photonic crystal fiber amplifier MOPA laser for MPLNET atmospheric LIDAR systems." The goal of the project, which is being funded from October 2007 to August 2008, is to develop a new MOPA (master oscillator power amplifier) optical fiber based laser source that can be a viable alternative to the bulk laser sources that are currently used in the NASA's Micro-Pulse LIDAR (light detection and ranging) network (MPLNET). This grant will be used to purchase a piece of state-of-art photonic crystal fiber and additional optical parts and supplies that will be used to set up the system in the ECE Photonics & Bioengineering Laboratory. The grant will also support a nine-month research assistantship for Anshul Kalra, who is a Ph.D. student of electrical and computer engineering, to work in this project in collaboration with the PI's and with three senior electrical engineering students: Matthew T. Sharpe, Brady L. Schultz, and Christopher W. Horne. We will also use the nanosecond pulsed MOPA optical fiber laser source that we will build in the project to demonstrate efficient second-harmonic and higher harmonic generation in nonlinear crystals, including periodically-poled lithium niobate (PPLN), and multi-photon absorption in photonic nanocrystals.

Panzer Earns NCAA Scholarship

North Dakota State soccer defender Sarah Panzer was awarded a $7,500 scholarship from the NCAA for post-graduate study at the university or professional school of their choice.

Panzer, a senior defender from Burnsville, Minn., started 71 of 71 games during her career as a Bison, carrying the team to a 40-26-5 record during that span. She was named to the ESPN The Magazine Academic All-America® third team in 2005 and 2006 after capturing second-team all-district honors in 2004. Named as Division I all-independent honorable mention in 2005 after guiding the Bison to an 11-5-1 record, this season she was named United Soccer Conference Defensive Player of the Week, helping the Bison to a perfect 3-0 record in conference play. From the central defender position, she scored five goals and seven assists during her career, with two of those goals going down as game-winners. She holds a 3.93 grade point average in electrical engineering.

According to the NCAA's Web site, the NCAA awarded 58 postgraduate scholarships of $7,500 each to 29 male student-athletes and 29 female student-athletes who participated in fall sports. To qualify for an NCAA post-graduate scholarship, a student-athlete must have an overall grade point average of 3.2 (on a 4.0 scale) or its equivalent and must have performed with distinction as a member of the varsity team in the sport in which the student-athlete was nominated. The student-athlete must have behaved, both on and off the field, in a manner that has brought credit to the student-athlete, the institution and intercollegiate athletics. The student-athlete also must intend to continue academic work beyond the baccalaureate degree as a full-time or part-time graduate student.

ECE Student Receives Goldwater Scholarship

NDSU student Jordan M. Dahl has received the prestigious Barry M. Goldwater Scholarship. He was among 317 undergraduate sophomores and juniors from across the United States to receive the award for the 2007-08 academic year.

Dahl is a junior from Streeter, N.D., majoring in electrical engineering. His career goal is to earn a doctorate in electromagnetics, and then teach and conduct research to apply advances in physics disciplines to engineering, including the possibility of developing new energy sources.

Considered the premier undergraduate award of its type, the Goldwater scholarship covers the cost of tuition, room and board, fees and books up to $7,500 per year. The program encourages outstanding students to pursue careers in the fields of mathematics, the natural sciences and engineering.

The Goldwater Scholars were selected on the basis of academic merit from a field of 1,110 mathematics, science and engineering students nominated by the faculties of 441 colleges and universities nationwide.

The Barry M. Goldwater Scholarship and Excellence in Education Foundation is a federally endowed agency honoring Sen. Barry Goldwater. In its 19-year history, the foundation has awarded 5,202 scholarships worth approximately $51 million.

ARTICLES, PUBLICATIONS, PRESENTATION AND REPORTS

D. Farden and L. Sharf, "A Unified Framework for the Sussman, Moyal, and Janssen Formulas are Fourier Transform Consequences of a More Fundamental Identity," IEEE Signal Processing Magazine, May 2006.

John D. Enderle, David C. Farden, and Daniel J. Krause, "Basic Probability Theory for Biomedical Engineers," Synthesis Lectures on Biomedical Engineering, published 2006

John D. Enderle, David C. Farden, and Daniel J. Krause, "Intermediate Probability Theory for Biomedical Engineers," Synthesis Lectures on Biomedical Engineering, published 2006

John D. Enderle, David C. Farden, and Daniel J. Krause, "Advanced Probability Theory for Biomedical Engineers," Synthesis Lectures on Biomedical Engineering, published 2006

Aaron Reinholz, Dustin Vaslaar, Jacob Glower, Michael Riesinger, Doug Freeman, "Animal Identification with UHF RFID Technology," RFID Live Academic Convocation, Orlando, FL June 2006.

Jacob Glower, Agrosecurity presentation to Senator Dorgan, November 6, 2006.

Xiaoyu Ruan and Rajendra Katti, "Using an innovative coding algorithm for data encryption," accepted by the IEEE Transactions on Computers, 2006.

Xiaoyu Ruan and Rajendra Katti, "Patterson Run-Length Compression and Software-Based Decompression for Reducing the Volume of Test Data in Systems-on-a-Chip," Accepted by the IEEE Transactions on Computers, 2006.

Kumar Mangipudi and Rajendra Katti, "A Secure Identification and Key agreement protocol with user Anonymity (SIKA)", accepted by Elsevier Computers and Security.

Xiaoyu Ruan, Rajendra Katti, and David Hinkemeyer, "Algorithm and implementation of signed binary recoding with asymmetric digit sets for elliptic curve cryptosystems," invited paper for the Special Session on New Generation Architectures/ Implementation for Security Protocols & Cryptography Applications, *The International Symposium on Circuits and Systems,* Kos, Greece, 2006.

Xiaoyu Ruan and Rajendra Katti, "An Efficient Data Independent Technique for Compressing Test Vectors in Systems-on-a-Chip," accepted by the 2006 IEEE International Symposium on VLSI.

Xiaoyu Ruan and Rajendra Katti, "Using Improved Shannon-Fan-Elias Codes for Data Encryption," 2006 International Symposium on Information Theory, pp 1249-1252.

Ivan T. Lima, Jr., "Tunable optical parametric generators and oscillators pumped by microchip-laser seeded optical fiber amplifier," Air force SFFP in October 2006.

R.M. Nelson, "'Electromagnetics is Fun!' – Is this an Oxymoron?" Proceedings of the 2006 ASEE North Midwest Regional Conference, Univ. of WI, October 2006.

Y. Feng, B. Braaten and R. Nelson, "Analytical Expressions for Small Loop Antennas – With Application to EMC and RFID Systems," Proceedings of the 2006 IEEE International Symposium on Electromagnetic Compatibility, Portland, OR, August 2006.

B. Braaten, Y. Feng and R. Nelson, "High-Frequency RFID Tags: An Analytical and Numerical Approach for Determining the Induced Currents and Scattered Fields," Proceedings of the 2006 IEEE International Symposium on Electromagnetic Compatibility, Portland, Or, August 2006.

R. M. Nelson, B.D. Braaten, M.A. Mohammed, "An Extended Quasistatic/Full-Wave for Electromagnetic Scattering Problems," in review process with IEEE Transactions on Antennas and Propagation.

ANS S. Islam and R. M. Nelson, "MES – A Web-Based Design Tool for Microwave Engineering," IEEE Transactions on Education, Vol. 49, No. 1, pp 67-73, February 2006.

S. Yang, F. Dai, M. Cardei, J. Wu, and F. Patterson, "On Connected Multiple Point Coverage in Wireless Sensor Networks," Intl. Journal of Wireless Information Networks (IJWIN), Vol. 13, No. 4, pp. 289-301, Oct. 2006.

G. Padmanabhan, W. Lin, R. Pieri, F. Patterson, E. Khan, "A Weekend STEM Enrichment Program for Tribal High School Teachers and Students," 2006 ASEE Conference and Exposition.

D.A. Rogers and R. F. Ribeiro, "Foundations of Engineering Ethics," Seminar Presentation, Department of Electrical and Computer Engineering, NDSU, October 17, 2006.

Mark Schroeder, "The Scholar Team Initiative: A Two Year Retrospective Running," Submitted to Journal of Engineering Education. Rejected.

Mark McDonald, M.D., Stephanie J. Webb, Ph.D., Steven C. Koenig, Ph.D., Mark J. Schroeder, Ph.D., Mary Anne Hauck, B.A., Lonnie C. Roy, Ph.D., "Myocardial Apoptosis Forty-Eight Hours After Brain Death: Implications in Donor Heart Dysfunction," Submitted to the Annals of Thoracic Surgery.

Shirui Wang, Chao You, "Using Piezoelectric Materials and Impedance-based Circuit to Monitor Structural Health," Submitted to IEEE Sensors Journal.

Shirui Wang, Chao You, "Impedance-based Structural Health Monitoring Circuit Design for Piezoelectric Structures," Submitted to Journal of Intelligent Materials.

Devendar Mandala, Xiaojiang Du, Fei Dai, and Chao You, "Load Balance and Energy Efficient Data Gathering in Wireless Sensor Networks," Wireless Communications and Mobile Computing, published online Jan. 2007.

Jongru Guo, Chao You, Mike Chu, Peter Curran, Jiedong Diao, Brian Goda, Peng Jin, Russell Kraft, John McDonald, "Silicon Germanium Programmable Circuits for Gigahertz Applications," IET Circuits, Devices and Systems, Volume 1, Issue 1, Feb. 2007, pp. 27-33.

Shilesh Malliyoor, and Chao You, "Comparison of hardware implementation and power consumption of low-power multiple output linear feedback shift register," Submitted to Scientific Journal.

Chao You, et al "A 11 Gb/s Demultiplexer implemented by SiGe FPGAs," IEEE Transactions on Very Large Scale Integration Systems, accepted.

Greetings from staff and faculty

Front (left to right)**: Rajesh Kavasseri, Roger Green, Ivan Lima, Robert Nelson, Rajendra Katti, Chao You**
Back (left to right)**: Subbaraya Yuvarajan, Sudarshan Srinivasan, David DuShane, Lingling Fan, David Rogers, Floyd Patterson, Priscilla Schlenker, David Farden, Daniel Ewert, Mark Schroeder, Bapeswara Rao, Jacob Glower, Laura Dallmann, Bart Kent**

Your Donations Make a Difference

We want to express our sincere appreciation for those donations received by the department over this past year. Those funds help faculty and students travel, buy special equipment, purchase educational materials and bring in speakers, to name just a few of the benefits that your donations provide.

For your convenience, you can make your donation online at www.ndsufoundation.com and select "Make a Gift Online" or go to https://www.ndsualumni.com/NetCommunity/SSLPage.aspx?&pid=206&srcid=193.

When you make your donation, you may direct it to the Electrical and Computer Engineering department, so the funds go directly to the department. To do this simply go to the Web site

previously listed and select **<Other>** from the drop down menu in the **Designation** field and type "**Electrical & Computer Engineering**" in the field directly below the Designation field. Alternatively, if you select College of Engineering and Architecture in the designation field, it benefits the College as a whole.

Again, we appreciate your generosity!

CHECK US OUT ON THE WEB AT
WWW.ECE.NDSU.NODAK.EDU

North Dakota State University

ELECTRICAL & COMPUTER ENGINEERING
1411 Centennial Blvd
Fargo, ND 58105-5285