From the Department Head

Dear Alumni,

This is the second newsletter coming to you. We hope to be able to continue to communicate with you on a regular basis through these newsletters. Thank you to the alumni who have communicated with us over the past month or so since the March newsletter went out. Like the story of Mr. Don Watson, which is included in this issue, we hope to be able to include more stories in the future and hopefully create a network among the ECE alumni.

It is too early to report on improvements on our enrollments and what we have achieved. However, early indications are that we are well on the way to reach greater heights in enrollments this coming fall. These include greater numbers in both graduate students admitted by the ECE faculty in Electrical Engineering as well as undergraduate students admitted by SDSM&T in the Electrical and Computer Engineering programs. I will report on those in the future newsletters. As we speak, we are interviewing faculty candidates for the area of power in the ECE department. We hope to be able to fill the open faculty positions in ECE very soon. In addition to visiting high schools in the Rapid City area, we would like to extend our regular visits to high schools within about 100 miles from the city. We are also planning visits to the Ellsworth AFB which includes members of the military interested in science and engineering fields. **We are starting a scholarship account called “ECE Alumni and Friends Scholarship” which will be led by the former president of SDSMT, Dr. Richard Gowen. Please contact him at: dick@dplwed.com if you wish to be involved in the organization of establishing this scholarship, and/or you would like to contribute.** Our goal is to reach at least a $40,000 amount that can be used to contribute to freshman students in the form of scholarships if they join ECE programs.

Please let us know whether you prefer to receive these newsletters in email, in postal mail (hard copy), or would like it to go to a web address and read them.

You can contact me at: Kazem.Sohraby@sdsmt.edu, ECE@SDSMT.EDU, or 605-394-1219.

Thank you.
Kazem Sohraby

Department Updates and Events

- ECE Advisory Board Spring meeting was held on Saturday, April 21, 2012.
- Professor Ian Akyildiz from the ECE Department at Georgia Institute of Technology visited on Friday, April 20, 2012 at SDSM&T and gave a presentation on Nanonetworks.
- ECE Department faculty, staff and students visited four Rapid City Area High Schools: Central High (2/26), Stevens High (3/1), Douglas High (3/15), and St. Thomas More (3/29). More visits to the local and regional high schools are scheduled for the future semesters.
- SDSM&T “Presidential Strategy Discussions” took place April12-16, 2012. SDSM&T President, the provost, and the administration interacted with the department heads about planning for the future.
- ECE department received an ONR and an NSF research award. These are 2-4 year research funds on deep space communications and on robotics.
- Go-To-Mines was held on Saturday, April 28, 2012 with departmental information and tours.
- Spring/Summer graduation was held on Saturday, May 5, 2012.
- ECE Department interviewed two candidates for the area of Power on campus.
- IEEE Electro/Information Technology (IEEE EIT) conference will be held in Rapid City on May 9-11, 2013.
Faculty Update

Senior Design is a two semester class and this is Ralph Grahek’s first semester teaching it. So far, it has been a challenging experience. Picking a project seems to consume the first month of the class because most students have trouble choosing. Students can work with professors to do a project related to their research, pick one from a list of possible projects compiled each semester, or pick a project they want to do with some guidance from one of the faculty. Now that projects have been selected, the class is moving on to working on the design process with the goal of getting an initial prototype working this semester. This will be easy for some of the students and more difficult for others. Multidisciplinary projects are more complex and seem to move slower. Grahek is looking forward to using his 20+ years of experience to help students move through the design process, document, and complete their projects.

Meet Our Graduate Students

Dale Brech
Graduate Degree Focus: Control Systems
Research: Computer Vision and Miniature Air Vehicles

Alex Brech
Graduate Degree Focus: Autonomous Systems, Robotics

Muhammed Hossain
Hometown: Dhaka, Bangladesh
Graduate Degree Focus: VLST

Arti Kafle
Graduate Degree Focus: Electrical Engineering

Md Nafis Khan
Graduate Degree Focus: Electrical Engineering

Jiayi Liu
Graduate Degree Focus: Robotics and Computer Vision
Research: Unmanned Autonomous Vehicle Team

Andrew Muxen
Graduate Degree Focus: Control Systems
Research: Autonomous Underwater Vehicle Team

Milan Shrestha
Graduate Degree Focus: Electrical Engineering

Rijvi Ahmed
Graduate Degree Focus: Electrical Engineering

Lal Bhowmik
Graduate Degree Focus: Applied Electromagnetics, Antennas, and RF Engineering
Research: Miniaturization of Ultra Wide-Band Antennas

From Left to Right: Jiayi Liu, Dale Brech, MdNafis Khan, Lal Bhowmik, Arti Kafle, Alex Brech, Dr. Sohraby, Rijvi Ahmed, Wafi Danesh, Milan Shrestha, Muhammed Hossain

Not Pictured: Paxton Alsgaard, David Huft, Andrew McGuire, Andrew Muxen, Chad Tambornino, Edward Waliczek

Rijvi Ahmed
Graduate Degree Focus: Electrical Engineering

Lal Bhowmik
Graduate Degree Focus: Applied Electromagnetics, Antennas, and RF Engineering
Research: Miniaturization of Ultra Wide-Band Antennas
Order of the Engineer

Seventeen electrical and computer engineering students participated in the 2012 Order of the Engineer induction ceremony. The Order of the Engineer is an organization that seeks to promote professionalism and ethics among engineers and graduates of accredited engineering programs. It is a fellowship of engineers trained in science and technology, and is dedicated to the practice, teaching, and administration of the profession. Order of the Engineer inductees receive a stainless steel ring to wear on the little finger of their working hand as a visible reminder of the oath of integrity and ethics that they have taken.

EE Team Involved in Wind Energy Project

Eight seniors from the department have been participating on a team which is investigating problems associated with the 20 KW wind turbine system located on Fraternity Hill. The system consists of a wind – driven alternator, a rectifier, several DC – AC inverters and a controller. The alternator provides three phase AC of variable frequency and voltage level produced by the turbine blades. The rectifier takes in the 3 phase voltage from the alternator and generates a variable DC voltage. The inverter converts the variable DC voltage to 240 volt single phase AC which is synchronized with the power grid. Energy produced by the system is then coupled to the power grid. The team’s goal is to investigate frequent inverter failures, and to propose a more robust system configuration. This project presents numerous examples of principles studied in the department’s Power Electronics, Power Systems, and AC Motor Drive classes. The team also includes employees from local Rapid City companies Black Hills Power, Phase Technologies and Power Plus.

The system was installed in 2009 as an “off the shelf” system, but has been experiencing problems which result in the damaged inverters. Investigations are being made into the design of the inverters, the system over – voltage protection scheme, and the control system which regulates the power flow to the grid as a function of wind speed.
Student Accomplishments

Five electrical and computer engineering students were recognized at the 61st Annual Honors Convocation for their academic achievements. **Ian Carlson** was recognized as the Computer Engineering Outstanding Junior. **Jefferson Olsen** was recognized as the Computer Engineering Outstanding Senior. **Sean Bestgen** received the Ronald J. Schmitz Award. This award was established in Dr. Schmitz’s memory for students who demonstrate excellence in the activities to which Dr. Schmitz had contributed so much. **David DeHaai** received the William A. Hixson Award. This award is presented annually to a senior electrical engineering student whose work has reflected in special ways the traditions of scholarship and service fostered by Dr. Hixson. Furthermore, **Jimmy Higgins** received the Frank and Marilyn Richardson Scholar Program Award as a rising senior. The Richardson Award is given to the top three rising sophomores, juniors, and seniors at Mines. The Richardson Scholars are an elite group, and the Richardson scholarship is among the most prestigious awards offered at SDSM&T. Additionally, Jimmy Higgins and Sean Bestgen will be receiving a Tau Beta Pi Scholarship for the 2012-2013 school year. Tau Beta Pi is an honorary engineering society organized to recognize those students showing distinguished scholarship and exemplary character.

Senior Design Spotlight

Lunabotics

The SDSM&T Lunabotics Team is designing a robot to compete in this year’s Lunabotics Mining Competition sponsored by NASA. This annual competition happens down at the Kennedy Space Center in Florida in late May and attracts teams from all over the world. The object of this competition is to see who can mine the most lunar regolith (dirt) simulant in a ten minute window. To accomplish this proposed task the multidisciplinary team has designed and built a robot from the ground up over the last two semesters, opting to go with a frontloader design similar to those used in small construction vehicles. The robot will also be using April tags to implement a SLAM algorithm for autonomous operation with a backup manual mode in the case of failure. This is a challenging design task due to the constraints imposed. All parts on the robot must be lunar feasible, meaning no combustion, hydraulics, or pneumatics are allowed. Also, the environment can become extremely dusty and so the many dust sensitive parts must be shielded or sealed to ensure reliable operation. The end goal for this project is to explore the possibility of establishing permanent lunar bases by harvesting essential materials like oxygen from the existing regolith. The Lunabotics Team is seniors Laddie Hickson (ME), Doug Colbert (ME), Eric Husmann (ME), Blake James (CENG), Trenton Stein (EE), Michael Cowan (CSC/Physics), and Kevin Israel (CSC), as well as undergraduate members Carly Sandin (ME) and John Ziadat (ME). Advisors are Jason Ash (ME) and Professor Emeritus Mike Batchelder (ECE).
Every year, School of Mines seniors apply their accumulated skills and experiences on a variety of design projects. The SDSM&T IEEE Student Branch works closely with the IEEE Black Hills Subsection to provide grants to IEEE student members working on their capstone design projects. This year two projects were chosen. The first project is an Oscilloscope Spectrum Analyzer designed by Joshua Champlin, Karl Diekevers, and Dennis Lantgen. This device is designed to give an oscilloscope some of the functions of a vector network spectrum analyzer at a drastically reduced cost. The second project is a High Voltage Direct Current Transmission System designed by Shashi Dulal, Ryan Lower, and Megan Mahowald. This system is intended to show that, with modern advances, direct current transmission is a valid alternative to alternating current transmission. Both teams will receive reimbursement from the SDSM&T IEEE Student Branch for some of the electrical components required for their projects. To learn more about the SDSM&T IEEE Student Branch and their activities, please visit www.IEEE.SDSMT.edu.

The following individuals are currently serving on the ECE Advisory Board: Ian Akyildiz from Georgia Tech, Cathy Anderson from Western Dakota Tech, Jon Anderson from QualCom, Brian Angqin from Equistar Chemicals, Mark Bsharah from L-3 Communications, Bob Case from Black Hills Corporation, Anoop Chadaga from Wurth Electronics Midcom, Lydell Frasch from Boeing, Richard Gowen from Dakota Power, Gary Hansen from Knology, David Janovy from Precision Air & Energy Systems, David Lankutis from Black Hills Corporation, Don Lefevre from Saphire Electronics Corp, Brian Matherly from Sencore, Larry Meiners from Phase Technologies, Trent Melum from Raven Industries, Sankaran Menon from Intel Corporation, James Meyer from Nucor, Daniel Mulally from AIRDAT, Roger Musick from Innovative Systems, Nick Newell from EchoStar, Tom Padmore from Symcom, John Preheim from Raven Industries, Justin Rey and Susan Venhuizen from Sencore, Alf Riisnaes from First Step Engineering/Tri-Tech Manufacturing, Scott Robidart from Sencore, Angelo Ruggeri from Rockwell Collins, Jacqueline Sargent from Austin Energy, Scott Shields from P&H Mining Equipment, Herschel Smartt from Idaho National Laboratory, David Springhetti from Innovative Systems, Duane Steichen from Black Hills Corporation, and Jon Titus.

If you have any questions or would like more information about the ECE Advisory Board, please mail ECE@SDSMT.edu.

SDSM&T hosted the 57th Annual High Plains Regional Science and Engineering Fair. This fair is affiliated with the Intel International Science and Engineering Fair. Students from grades 6-12 are invited from the High Plains are schools to participate. The four categories for the fair are biological science, physical science, social science, and engineering. Brandon Burchkard and Dan Stanfield from West Middle School won the science fair award sponsored by the ECE Department for the wind turbine they built.
Alumni Update

It’s especially good news to me that SDM again has an active "Power" undergraduate option; I’m sure Bill Hughes would share my feeling in this regard. I entered SDSM&T in September 1946 and finished with two programs: BSME ’50 and BSEE ’51. In the Spring of 1946 Robert B. Protheroe, VP & Chief Engineer for the Black Hills Power & Light Company, hired me for survey work in the hills. Through my five school years I remained with the company as a draftsman, estimator, then project engineer. I spent one more year with the company developing skills in power plant repairs and performing heat balance analysis at the Osage WY plant. Neil Simpson, Bob Asheim, Herman Fuhlbrugge, and other SDM graduates were my compatriots at BHP&L through 1952. 87 years of age now, I look back on a happy engineering career with patents in industrial graphic production, digital systems design, mail distribution, and book manufacture - most of the patents with the Xerox Corporation from which I retired in 1980. Heartfelt appreciation goes to SDM&T for a really great education and to Uncle Sam for GI Bill financing. Lastly, I spent a few years as a DJ at the old Wildcat radio station, managing for a year or two. I was elected to Sigma Tau and Eta Kappa Nu honoraries while on campus. I’m 87 now, getting a bit decrepit, but have many wonderful memories of "The Mines", the "Hills" and the people of South Dakota. I was raised as a street kid in Noo Yawk Sitty during the "Great Depression".

I wish you all the best for the future.

Don "One Watt" Watson

Please email any news you would like to be published in the next newsletter to ECE@SDSMT.edu.