NDSU NORTH DAKOTA STATE UNIVERSITY

Department of

Electrical and Computer Engineering

SPRING 2016 NEWSLETTER

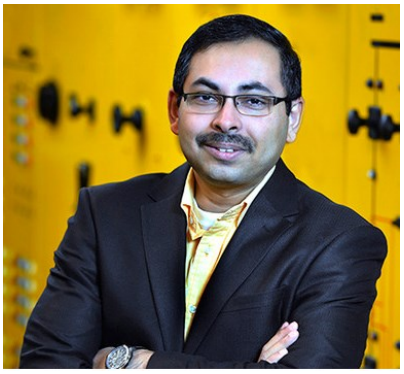
ECE Faculty Receive National Recognition

Washington DC Bound

Dr. Samee U. Khan, Associate Professor of Electrical and Computer Engineering, has been selected to serve as a Program Director at the National Science Foundation (NSF) in the Directorate for Computer & Information Science & Engineering (CISE) for the Computer and Network Systems (CNS) Division. This is a temporary rotating position, where he will serve for 1-4 years while on leave from NDSU; Dr. Khan will evaluate and recommend research proposals for funding, helping to influence new directions in the fields of engineering and science.

Within the past year, Dr. Khan was also appointed to 3-year terms as both an Institute of Electrical and Electronics Engineers (IEEE) Distinguished Lecturer and an Associations for Computing Machinery (ACM) Distinguished Speaker, where he will travel around the country to lecture at various events on topics related to his areas of expertise, which include optimization, robustness, and security of systems, such as big data, cloud, grid, cluster computing, Internet of Things, social networks, wired and wireless networks, cyber-physical systems, smart grids, and optical networks.

NSF CAREER Award



Dr. Nilanjan Ray Chaudhuri, Assistant Professor of Electrical and Computer Engineering, has been awarded a very prestigious $502,810 National Science Foundation CAREER Award to study new ways to make integration of wind energy more efficient and reliable. The research could change how power is distributed around the world. Dr. Chaudhuri's research focuses on connecting U.S. wind farms to the power system through direct current grids. Direct current technology is more economical, reliable, and efficient than widely-used alternating current when transmitting power over long distances. The study will address analytical modeling, autonomous power sharing, integrating wind farms in weak alternating current systems, and extracting frequency support from wind farms. The ultimate goal is to efficiently integrate land-based and offshore wind power into the existing U.S. power grid.

Letter from the Department Chair

Dear NDSU ECE Alumni, Employers, Students, Friends of the Department, and Colleagues:

First, I would like to introduce myself; and then I would like to overview some of the recent department highlights. My name is Scott C. Smith, and I came to NDSU to chair the ECE Department in Summer 2013. Previously, I was a faculty member in the Electrical Engineering Department at University of Arkansas—Fayetteville, and before that in the ECE Department at University of Missouri—Rolla, which has now changed its name to Missouri University of Science & Technology. But, enough about me.

The ECE students, faculty, and staff are all making outstanding contributions, and are being recognized for their excellent work. In this newsletter, we've included some of these stories, as well as major changes in the department, such as new and renovated labs, new faculty and staff hires, and longtime ECE faculty who have retired or passed on. I hope that you enjoy reading about the great things happening in the ECE department at NDSU. These would not be possible without your support. Please keep in touch, and feel free to stop by to see all of the department changes the next time you're in town.

Best Regards,

Scott C. Smith

ECE Student Selected as Spring 2016 Graduation Commencement Speaker

ECE graduating senior, Mackayla Headlee, a 3rd generation NDSU EE graduate, was selected as the commencement speaker for the Spring 2016 graduation ceremony. As she stated in her commencement speaker application: "Something that I am very, very proud of is that I am a third generation electrical engineer to graduate from NDSU. Following in the footsteps of my grandfather, father, and sister before me, I will graduate in May with my Bachelors of Science in Electrical Engineering, continuing my family legacy with this incredible university. I have had a connection to NDSU ever since I can remember. It was the only school I toured, the only school I applied to, and the only place I could have imagined spending the last four years. I have always been a Bison, and I will always be a Bison." After graduation, Mackayla will be moving to Kansas City, MO to work as an Assistant Electrical Engineer at Burns & McDonnell in their Transmission & Distribution – Substation department. Congratulations Mackayla; and best wishes on a very successful career!!!

ECE Curricular Changes and Enrollment

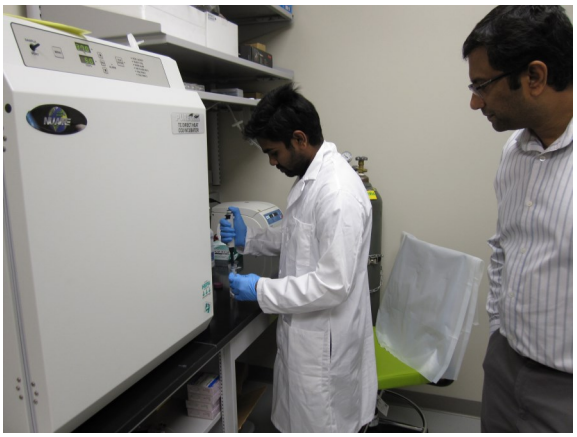
ECE initiated major curricula over halls for the Fall 2014 semester, including 1) an extensive revision of the BS Computer Engineering (CpE) curriculum to follow the IEEE/ACM suggested curriculum topics, such that it now contains more software and less Electrical Engineering (EE), 2) revising the BS EE curriculum to provide students with much more flexibility selecting electives, which allows for more interdisciplinary studies, and 3) converting the PhD degree from coursework-focused to research-focused. ECE enrollment and graduates continue to increase, with a current enrollment of 127 BS CpE, 326 BS EE, 37 ECE MS/ME, and 43 ECE PhD students, and 88 BS EE, 14 BS CpE, 10 ECEMS, and 14 ECE PhD (2nd highest of any NDSU department) graduates last year. This is necessitating new teaching and research spaces, including the ones highlighted below.

New Teaching and Research Labs

STEM Electronics Teaching Lab

NDSU's new $29.4M, 119,505 sq-ft Science Technology Engineering and Math (STEM) building opened for classes in Spring 2016. This building houses a state-of-the-art Electronics teaching lab that includes all of the modern equipment needed for both digital and analog ECE laboratory courses (e.g., oscilloscopes, arbitrary function generators, digital multimeters, multi-channel variable power supplies, prototyping trainer stations, soldering stations, various FPGA and microcontroller/microprocessor boards, and a plethora of analog and digital components. The STEM building also contains a technologically equipped auditorium and active-learning classrooms utilized for a number of ECE courses.

Biomedical Engineering and Cyber Physical Systems Research/Teaching Labs



Following the Department of Architecture and Landscape Architecture leaving the College of Engineering to join the College of Arts, Humanities and Social Sciences, and relocating to their downtown Fargo location, their former building, Ehly Hall, has been completely renovated, including two new ECE labs, one for Biomedical Engineering and the other for Cyber Physical Systems. The Biomedical Engineering lab includes a cell culture room, group meeting/teaching space, and plenty of experimental space, equipped with light/fluorescence microscopes, incubators, centrifuges, etc. The lab is shared between Dr. Dan Ewert's group, focused on cardiovascular engineering and radio frequency gene therapy research, and Dr. Keerthi Nawarathna's group focused on lab-on-chip research.

The Cyber Physical Systems lab is primarily utilized by Dr. Samee Khan's group, which focuses on System Optimization, Robustness, and Security of Big Data, Cloud, Grid, and Cluster Computing, Social Networks, Wired and Wireless Networks, Power Systems, and Smart Grids.

Remote Computer Access for ECE Students

A new server, 50 client licenses, and security software will provide the 500+ ECE students with secure remote access to the numerous and varied licensed software applications required by the multitude of courses taught by the ECE department. Currently, ECE students must be physically present in the ECE computer lab in order to utilize the software required for the vast majority of the courses in their area of study. This project will allow students to complete their coursework without having to be in a specific location; it will similarly enable ECE faculty to prepare materials for their classes from any location; and it will make it possible for researchers, both undergraduate and graduate, and faculty, to work on their research during the summer, even if they are not in Fargo. The project will serve as a pilot to demonstrate how remote computer access can be securely provided to students of a research university.

ECE Student Organizations

IEEE Student Branch

The NDSU IEEE student branch has grown from 30 members for the 2014-2015 school year to over 50 members this year. In addition to the traditional IEEE speaker meetings that continued throughout the year with companies such as John Deere, Microsoft, and IBM, IEEE held a social meeting on Lego Robots with the support of TechGirls. “Robots and Root Beer” was a competitive night of simple commands to maneuver the robot through a small obstacle course. Before winter break, IEEE members were able to purchase NDSU IEEE jackets to stay warm throughout the winter while showing their IEEE pride. IEEE banking was also made easier with the addition of a debit card for the treasurer to be used for purchasing food, drinks, and supplies for IEEE meetings. Additionally, IEEE obtained an NDSU listserv for a simple way to communicate with only IEEE members via email.

Reactivation of IEEE-Eta Kappa Nu Honor Society

IEEE-Eta Kappa Nu (IEEE-HKN), the honor society of IEEE, is dedicated to encouraging and recognizing individual excellence in education and meritorious work, in professional practice, and in any of the areas within IEEE-designated fields of interest. ECE Juniors in the top 1/4 of their class and Seniors in the top 1/3 are eligible for induction.

The Gamma Tau chapter of IEEE-HKN was first established at NDSU in 1958, but then became inactive in the late 80’s. Mr. Sajid Asif, an ECE doctoral student and current President of the IEEE Red River Valley Section, has initiated efforts to reactivate NDSU’s IEEE-HKN chapter. NDSU’s first induction ceremony in the past 25+ years is planned for Fall 2016. It is hoped that reactivation of IEEE-HKN at NDSU will encourage students toward achieving excellence in their field for the betterment of fellow students, the university, and society in general.

ECE Activities

Workshop for 7th-9th Grade Girls

In Spring 2016, Drs. Na Gong and Jinhui Wang organized a 2-hour "Girls in ECE" workshop as a part of the 37th Expanding Your Horizons Conference: https://www.ndsu.edu/csme/expanding_your_horizons/. Nine junior high girls from different ND schools participated, where they were introduced to several hands-on projects, including a smart video storage system, FPGA piano, wireless sensor network, and UAV. The girls were also provided info regarding NDSU's ECE program, and any questions they had regarding ECE, NDSU, or college life in general were answered. From the students' feedback, the workshop was a big success; and hopefully activities like this will encourage more females to pursue an ECE degree.

NDSU Co-Hosts 2016 IEEE EIT Conference

NDSU ECE faculty had a significant role in organizing the 2016 IEEE International Electro/Information Technology Conference (EIT 2016), held in Grand Forks, ND, May 19-21, 2016, which is the IEEE Region 4 annual conference. Region 4 includes all or parts of Illinois, Indiana, Iowa, Michigan, Minnesota, Nebraska, North Dakota, South Dakota, Ohio, and Wisconsin.

This year's Conference General Chairs were Dr. Sima Noghanian from UND and Dr. Dave Rogers (EIT founding committee member) from NDSU. Other NDSU faculty who greatly assisted with the conference were: Dr. Ben Braaten (program co-chair), who had a major role in selection of papers for presentation, Dr. Debasis Dawn (publications co-chair), who judged each paper regarding suitability for inclusion in IEEE Xplore, Dr. Scott C. Smith (publicity co-chair), Dr. Na Gong (local arrangements co-chair), and Dr. Sanjay Karmakar (registration co-chair). The NDSU faculty mentioned here also had faculty co-chairs for these efforts from UND and other Region 4 institutions. Additionally, Mr. Sajid Asif, NDSU ECE doctoral student and IEEE Red River Valley Section President, represented the Section for the organization of the conference and for the arrangements of student participation, including a poster competition.

The conference was a big success, attracting more than 120 participants who presented well over 100 papers. The conference also included several renowned keynote speakers, including Drs. Dan Ewert and Ben Braaten, from NDSU, to discuss their cardiovascular engineering research involving the development of a wireless pacing system.

ECE Faculty, Staff, and Student Awards

Governor's Award for Excellence in Public Service

Jeff pictured 2nd from left

Jeff Erickson, ECE's Electronics Technician, was one of six ND employees selected from all branches of state government to receive this very prestigious award for his dedication and contributions to the people of North Dakota. Jeff was the awardee in the Technical and Paraprofessional category. Jeff's main duties are purchasing, managing, and fixing lab equipment. He is also a tremendous help with senior design, devising ideas for new projects each semester, helping supervise his project groups, and helping all project groups (about 29 groups of 3-4 students each, every semester) with various electrical, mechanical, and manufacturing aspects of their prototype designs. Jeff is a tremendous asset to the ECE department; he is a very pleasant person to work with, and is always extremely helpful, often going well above and beyond his specific duties to assist ECE students and faculty, as well as students and faculty in other CoE departments. Congratulations Jeff on this much deserved award!!!

College of Engineering Teaching Assistant of the Year Award

Ms. Asha Dubasi, ECE Doctoral Student, is the 2016 CoE Teaching Assistant of the Year Awardee. Asha received her MS CpE degree from University of North Texas in May 2011, and after a brief stint in industry, joined the NDSU ECE PhD program in August 2012. She has been a TA for 5 different courses during her 4 years at NDSU, and helped develop a new laboratory components for one of these classes, Computer Organization. Asha works under the supervision of Dr. Sudarshan Srinivasan in the field of Formal Verification of Safety Critical Embedded Systems. Congratulations Asha!!!

College of Engineering Research Assistant of the Year Award

Mr. Xiaofeng Lyu, ECE Doctoral Student, is the 2016 CoE Graduate Research Assistant of the Year Awardee. Xiaofeng joined the NDSU ECE PhD program in August 2014, under the supervision of Dr. Dong Cao. His research is focused on developing DC to AC inverters with higher power density, better efficiency, and smaller size. This work is quite versatile, with usage in a number of very important applications, such as Integrating Renewable Energy Sources (e.g., wind, solar) into the Bulk Power Grid, Electric Vehicles, Data Centers, etc. So far, Mr. Lyu has published 2 IEEE journal papers and 5 IEEE conference papers on his PhD research. Congratulations Xiaofeng!!!

College of Engineering Teacher of the Year Award

Dr. Jacob Glower, ECE Associate Professor, is the most recent recipient of the CoE Teacher of the Year Award. Dr. Glower has been a professor at NDSU for almost 25 years, starting as an Assistant Professor in September 1991, where he has taught more than 20 different ECE courses, including 4 new courses that he developed. He's incorporated Problem-Based Learning into 3 of his courses, Embedded Systems, Electronics, and Circuits, and incorporated Systems Engineering into Embedded Systems and Electronics, based on industry feedback, to ensure that students go through the entire design cycle process (Requirements Capture, Analysis, Design and Test, and Validation) multiple times during their education, rather than only in Senior Design. Additionally, Dr. Glower developed the Bison Academy website, http://www.bisonacademy.com/, to embrace the open and free dissemination of knowledge to benefit both current and former NDSU students, as well as advertise NDSU to the world. This follows the MIT model of making their classes available on-line with the notion that the classroom experience of student-student and student-instructor interaction provides the real value of a university education. Dr. Glower's website currently averages over 3,000 hits per day; and he has received numerous positive comments from students across the country thanking him for posting helpful materials.

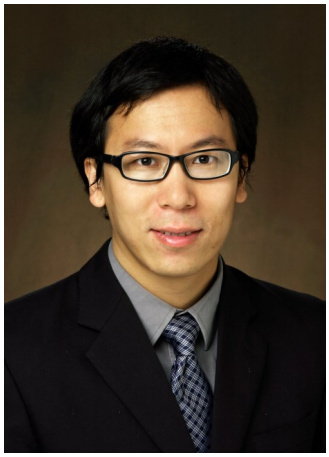
Dr. Glower promotes the notion of NDSU as a student-focused university; he has an open door policy and is always willing to help a student, regardless of whether or not that student is one of his advisees or is currently taking one of his courses. Dr. Glower has by far the highest teaching load in ECE, teaching almost twice as many SSCHs as the next highest ECE professor; and he does this while maintaining excellent teaching, consistently receiving end of semester student evaluations of greater than 4.0 in all of his courses. Congratulations Jake; well deserved!!!

IEEE Doctoral Research Award

Mr. Sajid Asif, an ECE PhD student currently funded by an NSF Doctoral Dissertation Award, won a prestigious $2,500 IEEE Antennas and Propagation Society (APS) Doctoral Research Award. He will be officially receiving the award this summer at the international APS symposium in Fajardo, Puerto Rico. Sajid joined the NDSU ECE PhD program in August 2013 to study electromagnetics. He is currently working on a wireless cardiac pacing system under the supervision of Drs. Ben Braaten and Dan Ewert, which has the potential to significantly advance the field, resulting in far fewer surgeries necessary to replace today's pacemaker's battery every 5-15 years. To date, Sajid has published 13 refereed journal and conference articles stemming from his PhD work. Congratulations Sajid!!!

New ECE Faculty and Staff

Dr. Dong Cao

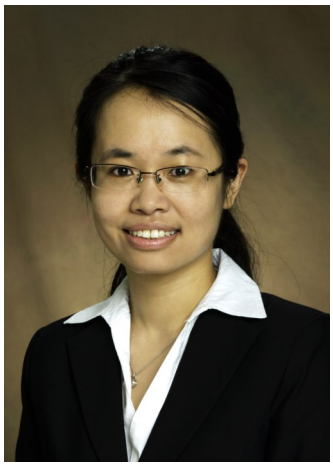


Dr. Cao started at NDSU as an Assistant Professor in August 2014, after completing his PhD at Michigan State University in 2012, and then working at Ford Motor Company for 2.5 years. His area of expertise is Power Electronics, focusing on grid integration of renewable energy resources, hybrid electric vehicles, and applications of wide bandgap devices (e.g., SiC, GaN). Additional information regarding his research, teaching, and background can be found on his website: https://sites.google.com/a/ndsu.edu/dongcao/.

Dr. Nilanjan Chaudhuri

Dr. Chaudhuri started at NDSU as an Assistant Professor in August 2014, after completing his PhD at Imperial College London in 2011, and then working at GE Global Research Center in New York for 3 years. His area of expertise is Power Systems, focusing on dynamics and control, wide-area monitoring, FACTS, HVDC, renewable energy systems, distributed energy, and demand side response. Additional information regarding his research, teaching, and background can be found on his website: https://sites.google.com/site/nilanjanraychaudhurindsu/. Dr. Chaudhuri will be leaving NDSU for Penn State at the end of Summer 2016; we wish him the best of luck!

Dr. Na Gong



Dr. Gong started at NDSU as an Assistant Professor in August 2013, after completing her PhD at SUNY—Buffalo. Her area of expertise is VLSI and Embedded Systems, focusing on device, circuit, architecture, and application level solutions for developing power efficient and reliable VLSI circuits and systems, with an emphasis on energy-efficient data storage. Additional information regarding her research, teaching, and background can be found on her website: https://www.ndsu.edu/pubweb/~nagong/.

Dr. Dharmakeerthi Nawarathna

Dr. Keerthi Nawa started at NDSU as an Assistant Professor in August 2014, after completing his PhD at University of Houston in 2005, and then working as a postdoc at UC—Santa Barbara and UC—Irvine, a Research Associate at University of Notre Dame, and as a member of the research staff at APOCELL, Inc. His area of expertise is Biomedical Engineering, focusing on lab-on-chip technologies and cancer research. Additional information regarding his research, teaching, and background can be found on his website: https://www.ndsu.edu/pubweb/~nawarath/.

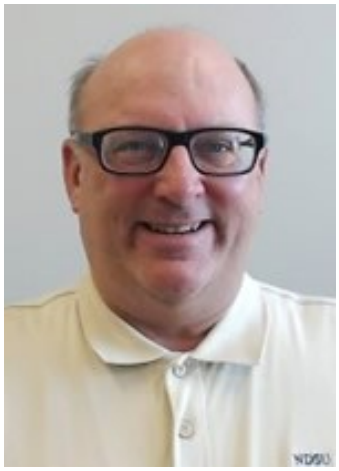
Dr. Jinhui Wang

Dr. Wang started at NDSU as an Assistant Professor in August 2014, after completing a joint PhD program from SUNY—Buffalo and Beijing University of Technology in 2010, and then working as an Assistant Professor at Beijing University of Technology with stints as a Visiting Professor at SUNY—Buffalo. His area of expertise is VLSI, focusing on 3D-IC, novel memory design, power management for SoCs and microprocessors, IC thermal management, CAD, and wireless sensor networks. Additional information regarding his research, teaching, and background can be found on his website: https://www.ndsu.edu/pubweb/~jinhuiwa/.

Eric Christianson

Mr. Christianson was hired as an IT System Administrator dedicated to the ECE department in October 2015. His responsibilities include provide prompt and efficient computing support services for the ECE department faculty, staff, and students, installing, supporting, and managing ECE software packages and licenses, specking out, purchasing, building, and installing computer hardware, setting up and maintaining secure remote access capability for ECE faculty, staff, and students, maintaining the ECE computer cluster and teaching lab computers, and other IT related work as needed. Eric was previously the IT Analyst at NDSU's Center for Nanoscale Science & Engineering (CNSE) facility for the past 12 years; and he graduated form NDSU with a BSEE degree in 1995.

Software and Systems Group

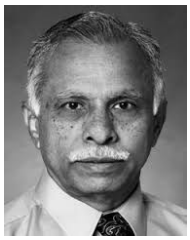


The SSG research group, headed by 1980 NDSU BSEEE graduate Matt Noah, transitioned from NDSU's CNSE to the ECE department in Fall 2015. SSG, in its 10th year of existence, is a group of 5 full-time engineers working on both North Dakota Centers of Excellence and Research ND projects with private sector companies nationwide, with the stated goal of growing the high-tech sector in North Dakota. SSG's current 3 major projects include TrackR, which is a Bluetooth LE sensor and smartphone product that is the world leader, Cogi, which is a complex software system used to record audio on smartphones, and SmartC2 Systems, which is a software solution for managing small airports and drone-based flight systems. All three projects are currently deployed commercially, and all three partner companies are looking to expand operations to North Dakota. Additional information regarding SSG's projects and partner companies can be found on their website: www.ndsu.edu/ssg.

ECE Faculty Retirements and Passing

Dr. Raj Katti

After 23 years at NDSU, Dr. Katti retired in Summer 2014 to move to University of Washington—Tacoma, where he is now the Interim Director of the Institute of Technology. We wish him the best of luck in this new position!



Dr. Subbaraya Yuvarajan

After 27 years at NDSU, Dr. Yuvarajan retired in Summer 2013 to move to Dallas, TX to be closer to family. We wish him a happy and long retirement!

Associate Professor Val Tareski

The ECE department was saddened this year by the passing of one of our long-time professors, Val Tareski, who died July 5, 2015, from cancer at the age of 73. Val earned his BS and MS EE degrees from NDSU, and then became a member of the NDSU ECE faculty, retiring in 2008 after 43 years. Val was an amateur radio operator for over 50 years and was the faculty advisor for the NDSU Amateur Radio Society. There is a scholarship in his honor, "The Val Tareski Computer Engineering Scholarship." May he rest in peace.

Your Donations Matter

We want to express our sincere appreciation for your past donations. Know that they make a big difference in helping keep our department up-to-date and furnished with state-of-the-art equipment needed to provide our students with the best possible education. Your donations also help support student and faculty travel to disseminate their research, as well as student scholarships.

NDSU is now the top research university in the 5-state region, including North Dakota, South Dakota, Idaho, Wyoming, and Montana. As such, there is a big push to continue to increase our research efforts, while maintaining excellence in educating our students. This requires resources; and many changes are being made to support this, some as detailed in this newsletter. However, there is one major area, Endowed Professorships, where ECE, and the entire NDSU College of Engineering, is far behind our peer institutions. Compared to our peer research universities in our Central States region, who have on average 1 endowed ECE professor for every 6-7 ECE faculty, our department has 0 endowed professorships. Hence, ECE would need 3 endowed professorships to be on par with our regional peers. Note that endowed professorships are utilized to attract the best and brightest faculty to perform high-impact research, which they then disseminate into their classes, positively impacting our students' education. An Endowed Professorships requires a substantial donation, typically in the $1.5-5M range. Please contact the ECE Department Chair, Dr. Scott C. Smith (scott.smith.1@ndsu.edu; 701-231-7608), if you'd like to discuss this possibility. Otherwise, please consider making a donation of any amount; all matter, and are sincerely appreciated!

To donate, go to https://www.ndsualumni.com/contribute, select "Other" for Designation, and enter Electrical and Computer Engineering; or send a check to Electrical and Computer Engineering, NDSU Dept. 2480, PO Box 6050, Fargo, ND 58108-6050. Thank you for your support!