

ECE CIRCUIT BOARD

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Fall 2010 **Editor: Shey Peterson**

Greetings to all alumni, students, and friends of the Department of Electrical and Computer Engineering at UMD! It is the time of the year for me to update you on the recent exciting events happening in the department. Even though we are facing the stress of budget cuts, we remained focused on doing what we do best: educating our students, creating knowledge through research, and serving our profession. More than anything else, I am very proud of the accomplishments of our faculty and students this past year. This newsletter will highlight some of the activities and accomplishments we have made since Fall 2009.



Dr. Nisha Kondrath, joined the ECE faculty in Fall 2010 as Assistant Professor. Dr. Kondrath received her M.S. and Ph.D. degrees from Wright State University, with research interests in the areas of power electronics, high-frequency PWM DC-to-DC converters, inverters, alternative energy sources, power semiconductor devices, and high-frequency power magnetics. I am pleased to welcome her to the department. Mr. **Tom Ferguson,** as an ECE adjunct visiting professor, continues to teach ECE 5501 "Energy Conversion Systems" this semester. **Sarah Wilfahrt** joined the department as Office Support Assistant in spring semester to replace Kathy Bergh, who recently retired after several years' outstanding service for the department. As the department receptionist, Sarah greets students and guests, answers the department phones, and provides information to faculty and students. I welcome Sarah in joining the ECE team!







The renovation of the rooms 141 and 291 in the MWAH building was completed the end of August and we have moved our Control Systems Laboratory and Digital Circuits Laboratory to 141 and 291A, respectively. The rest of the space in 291 is used for our graduate students.

The ECE program was reviewed by the ABET (Accreditation Board for Engineering and Technology) team last fall. The October 2009 visit went well and the team was very pleased with the experience, opportunities, and quality the ECE Department offers. I am happy to report that our program has been re-accreditated by the ABET. Many thanks go to all the ECE Industrial Advisory Board Members, our faculty, and support staff for their countless hours spent in the preparation of our program review. My congratulations also go to our students for their enthusiasm, motivation, abilities, and outstanding performance.

We are pleased to announce that **Keith Erickson** was inducted into the SCSE Academy of Science and Engineering on October 8th. He is the first engineering graduate to receive such an honor. Keith Erickson graduated from the Department of Computer Engineering in 1987, a member of the 1st graduating class. He then went on to graduate school at the University of Iowa, where he received a Master's degree in Electrical and Computer Engineering in 1989. In 1990, Keith founded Saturn Systems, a software engineering and IT consulting firm. Since then, Saturn Systems has grown from a single person start-up company to a well respected industry leader. Today, Saturn has over 35 employees and has a satellite office in Charleston, South Carolina.



I want to mention to our alumni how eager we are to remain connected to you. Please send information to the Department via e-mail (ece@d.umn.edu) or snail-mail. I look forward to connecting with you in the next "Circuit Board" transmission.

UPDATE FROM STAN BURNS
SCSE ASSOCIATE DEAN
JACK ROWE PROFESSOR IN ECE



Engineering enrollment continues to grow with over 961 undergraduates at the end of the second week of classes in the five engineering programs. This continued growth is in recognition of the high quality SCSE programs taught by dedicated faculty.

We had a very successful ABET re-accreditation result. ECE, ME, IE, ChE and CS were all reaccredited. Civil Engineering will apply for accreditation when they have their first graduate in Spring 2012. The College is very appreciative of the input provided by the program

advisory boards. They are a very important component of this outcomes-based assessment process.

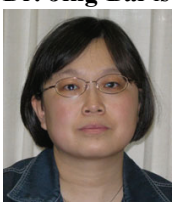
The Iron Range/UMD Graduate Engineering Education Program started Fall 2009 at the Mesabi Range Community and Technical College in Virginia offering a Professional Master of Engineering degree. Students have access to related courses offered on the UMD campus and to ITV and on-line courses, taught by UMD faculty. UMD SCSE offers this in cooperation with the Arrowhead University Consortium. This graduate program has received financial support from the Iron Range Higher Education Committee and will provide additional advanced educational opportunities for our students and engineers who are employed in the area in the private and public sectors. The purpose of the Graduate Engineering Education Program is to provide better access to advanced engineering degree programs for people living and working in the region. Upper division/graduate engineering courses designed to meet the specific needs of those engineers needing to maintain licensure, upgrade their engineering skills, or broaden their areas of employability will be offered. The program focuses on developing competencies in the areas of engineering design, problem solving, and practice beyond what can be achieved in earning a Bachelor of Science degree in a given engineering discipline. An MEng graduate student is expected to have a focus and degree designation in one of the core UMD disciplines of Civil Engineering, Chemical Engineering, Electrical and Computer Engineering, Industrial Engineering, or Mechanical Engineering. J. Moe Benda was appointed the on-site Director for students studying on the Iron Range program in January 2010.

There is good news on the graduate placement front despite challenging economic times. SCSE Graduates continue to be in high demand. There were 309 respondents to the recently-published UMD Career Services alumni survey out of 383 degrees awarded between July 1, 2008 and June 30, 2009. Placement exceeds 90% in virtually all degree programs within SCSE. Over 82% reported that they are working in a related or somewhat related field, over 2/3 of the graduates are working in Minnesota.

The regional ASEE conference location rotates through more than a dozen schools in the upper midwest region. UMD's last turn at hosting the conference was in 1994, but it is UMD's turn again in 2011, so the engineering programs at UMD are jointly preparing to host a great regional ASEE conference in Duluth in October, 2011.

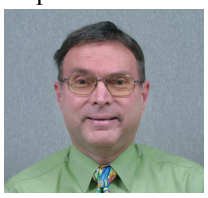
The Fundamentals of Engineering Exam leading to licensure will be on Saturday, April 8, 2011. The UMD Continuing Education office will be offering a review course starting in January 2011. More details are forthcoming and will be sent to our students and regional professional societies for distribution.

UPDATE FROM ASSISTANT PROF. JING BAI



Dr. Jing Bai is awarded the Grant-in-Aid research award from the Graduate School of University of Minnesota. The award duration is from Jan 2010 to June 2011. Her research interests include nanoscale optoelectronics, photovoltaics and the application of nanotechnology on medical devices. Recently she gave a talk "Single-mode instability and multi-mode instability of quantum cascade lasers" at the 10th IEEE Conference on Nanotechnology (IEEE NANO 2010) held in Seoul, Korea on Aug. 17-20, 2010. Dr. Jing Bai is now supervising graduate students, Mr. Girum Asrat and Mr. Xiaohu (Tiger) Qian in ECE and Mr. Hadi Madanian from Physics.

UPDATE FROM PROF. CHRIS CARROLL



Dr. **Christopher Carroll** presented the paper "Experiments with a Sixteen-Digit Seven-Segment Oscilloscope Display" at the 2010 American Society for Engineering Education (ASEE) national conference in Louisville, KY, in June. This paper describes uses for his innovative oscilloscope display, which he originally disclosed at the ASEE regional conference in Milwaukee, WI, in September, 2009. This display will eventually see application in the ECE 3341 lab as an output device for use with student lab circuits. In October, Dr. Carroll will present the paper "Intelligent Control on the S12 Microcontroller Using Fuzzy Logic Instructions" at the ASEE regional conference in Mankato, MN. This paper reports some of the results of the ECE 4951 design workshop that Dr. Carroll and Dr. Stachowicz taught together during the Spring semester.

UPDATE FROM PROF. NISHA KONDRATH



Nisha Kondrath received her Ph.D. in Engineering from Wright State University, Dayton, OH in June 2010. She joined the Department of Electrical and Computer Engineering, University of Minnesota Duluth as a term faculty for the academic year 2010-2011. Her research interests are in the areas of Electronics and Power Electronics. Dr. Kondrath is currently teaching two undergraduate courses, ECE 1315: Digital System Design and ECE 2212: Electronics I. She has proposed a new course in Power Electronics, to be offered in Spring 2011.

UPDATE FROM PROF. TAEK KWON



Dr. Taek Kwon at the UMD ECE Dept. and Dr. Brent Auvermann at the Texas A&M University (TAMU) received a research grant from the National Research Initiative (NRI) Competitive Grants Program for a collaborative

project entitled "Visibility-Based Measurement of Fugitive Dust from Open-Lot Livestock Operations." In this project, Dr. Kwon and his students will be developing wireless nephelometers for measuring fugitive dust densities from agricultural operations, which will be tested in Texas. Dr. Kwon also received additional research grant for the development of a Weigh-Pad based portable weigh-in-motion (WIM) system from the Minnesota Department of Transportation.

UPDATE FROM PROF. AND JACK ROWE CHAIR MARIAN STACHOWICZ



Dr. Christopher Carroll and **Dr. Marian S. Stachowicz** conducted the ECE 4951 Senior Design Workshop: Intelligent Control Design Using S12 Microcontroller. Fourteen students presented their final projects from this course during the Annual UMD Undergraduate Research/Artistic Showcase in the Kirby Ballroom on April 29, 2010.

The Laboratory for Intelligent Systems presented eight posters at Minnesota Power during April 30-May 7, 2010 and Professor Stachowicz delivered lecture "Computing with Students from LIS" on May 7, 2010.

Dr. Marian S. Stachowicz presented invited three-hours tutorial "Soft Computing for Control Applications" during the IEEE-ICIT 2010 International Conference on Industrial Technology, March 14-17, 2010, Viña del Mar, Chile. In Krakow, Poland he also taught course "Control Theory" for graduate students from College of Mechanical Engineering and Robotics, AGH University of Science and Technology.

UNDERGRADUATE NEWS

Engineering Scholarship Awardees



Top Row: **Matthew Badzinski , Nathan McCullough, Jared Sweet, Matthew McCarroll, Jake Housley, Andrew Stone** Not Pictured: **Benjamin Ruter** Bottom Row: **Emily Howe , Yang Zhou, Usama Shaikh, Andrew Grengs, John Hoverman**

First Robotics

For the first time, a First Robotics Regional will be held in Duluth. UMD and East High School will be hosting as many as 40 schools from the region with an estimated over 1500 participants. The event will be 10-12 March 2011 at the DECC. UMD is hosting the kick-off event in January. ECE students will again be assisting the Duluth East team.

Students Compete in Clean Snowmobile Challenge



CSC Team Members: **Stan Burns** (Faculty Advisor), **Miles Wittlief, Sam Cassibo** (Captain), **Jeremy Olson, Asad Jawed, Kyle VanTatenhove**

Engineering students (primarily from MIE and ECE) competed with teams from 19 schools in the Clean Snowmobile Challenge, a collegiate design competition sponsored by the Society of Automotive Engineers. Students from participating schools take a stock snowmobile and reengineer it to reduce emissions and noise while maintaining or boosting performance.

The team received the Hawk Technology Safety Award, and 2nd place in the objective handling event. Out of all internal combustion competitors, the UMD Team had the lowest fuel consumption. They were also 2nd lowest in the design MSRP at $10,952.

GRADUATES

Spring 2010

B.S.E.C.E.

Jacob Annis
Benjamin Boldt
Stephen Cheruiyot
Michael Cordle
Brandon Eberle
David Hallberg
Alexander Kamrud
Timothy Kopp
Michael Phillips
Milton Turcios
Ryan Bezdicek
Mark Bretall
Roger Connaughty
Anthony Dornfeld
Elyse Frederick
Emily Hamilton
Derrick Keffeler
Christopher Plefpsen
Bryan Thorsell
Robert Yang

M.S.E.C.E.

Eric Branson

Expected Fall 2010

B.S.E.C.E.

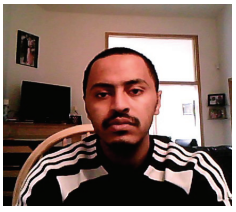
Andrew Becklund
Shannon Koecher
Miles Larson
Andrew Pedersen
Nicholas Weiss
Matthew Wright
Joseph Engebretson
Benjamin Kyllo
Shane O'Brien
Jared Sweet
Nicholas Westing

GRADUATE STUDENT WORK

Matthew Leines successfully defended his MS thesis titled "Linear Quadratic Regulator Control of an Under Actuated Five-Degree-of-Freedom Planar Biped Robot"

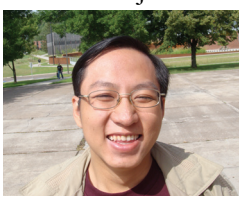


under the supervision of Dr. **Jiann-Shiou Yang** in Fall 2010. He was recently promoted to 1st Lt commissioned officer of the US Air Force, working at Kirtland Air Force Base in Albuquerque, New Mexico, for the Air Force Research Labs (the Space Electronics Branch of the Space Vehicles Directorate). Most of his work involves managing contracts for small technology development businesses, focusing on electronics for space platforms (satellites) especially light weight, low power, and radiation hardened technologies. Matthew Leines also works extensively on nano-class satellites and CubeSats and other related technologies.



Mr. Girum Asrat jointed the department as a graduate student in Fall 2010. He is now working on the research project "Laser-based stethoscope". His research is co-advised by Dr. Jing Bai and Prof. Stanley Burns.

Hai Dinh joined the department in Fall 2008 and is



supervised by Dr. Hua Tang. Mr. Dinh's master thesis work focuses on development of a flexible camera calibration algorithm for diverse traffic scenes and a vehicle tracking algorithm for traffic data collection of roundabouts and intersections. Starting from Fall 2010, Hai will also work on FPGA implementation of a complete video detection system.

Peng Li joined the department in Fall 2008 supervised



by Dr. Hua Tang. Mr. Li worked on hardware acceleration of speech recognition algorithms in 2009. In 2010, he worked on FPGA implementation of variable block size motion estimation (VBSME) in latest video coding standards H.264/AVC. Over the summer 2010, Peng worked on FPGA implementation of the mixture-of-Gaussian (MoG) algorithm for video segmentation for transportation applications. Currently, Peng has started his PhD study at the UMN-Twin Cities Campus.

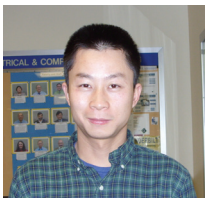


Buddhika Maitipe is a graduate student from department of Computer and Electrical engineering of University of Minnesota Duluth working under the guidance of Professor Imran Hayee. His thesis work is on Dedicated Short Range Communication (DSRC) based Vehicle to Infrastructure (V2I) and Vehicle to Vehicle (V2V) traffic information system for congested US roadways. The initial goal was to develop a portable system that can be easily deployed at a work zone site to acquire and communicate important travel information, e.g., travel time (TT) through congestion and start of congestion (SoC) location to the driver. By providing this information, i.e., SoC location and TT, drivers can make informed decisions on route choice and be prepared for upcoming congestion. The system composes of a portable Road Side Unit (RSU) the infrastructure that can engage the On Board Units (OBUs) of the traveling vehicles using DSRC technology to acquire necessary traffic data (speed, time, and location) from its GPS receiver. From the acquired data, the RSU periodically estimates the SoC location and TT that are broadcast to all vehicles in its coverage range. An OBU receiving the broadcast message calculates the distance to the SoC location. The distance to the SoC location and TT are then relayed to the driver who can make smart decisions regarding whether to seek an alternate route and when to expect a sudden speed reduction. Results from the field demonstration have shown that the developed system can adapt to changing work zone environment smoothly under various congestion patterns on the road. This research work will be presented in Transportation Research Board annual conference in January 2011.

Ms. Rini Shrestha joined the ECE Department in



September 2010 from Nepal. Supervised by Dr. Jiann-Shiou Yang, she is currently working on the research project "An Onboard Virtual Rumble-Strip Based Operation for Road Departure Warning". The project is funded by NATSRL.



Mr. Xiaohu (Tiger) Qian joined the department as a graduate student in Fall 2010. Xiaohu is now working on the research project "Strain-enhanced plasmonic solar cells," with Dr. Jing Bai.



Mr. Tom Soldner joined the department as a graduate student in Fall 2009 and is currently in his second year supervised by Dr. Hua Tang. Mr. Soldner is interested in designing analog, mixed-signal and radio-frequency circuits.

FACULTY PRESENTATIONS AND PAPERS

J. Bai, "Effect of self-phase modulation on the instabilities of quantum-cascade lasers", *Journal of Nanophotonics*, 2010 (In press)

J. Bai, "Compression of laser pulse in multi-resonance quantum-cascade structures", *SPIE Symposium on Photonics Europe*,Brussels, Belgium, April 12-16, 2010.

D. Zhou and **J. Bai**, "Infrared (IR) Thermal Imaging-Based Automatic Tumor Tracking During Breast Cancer Radiotherapy", *Design of Medical Devices (DMD) Conference*, Minneapolis, MN, April 13-15, 2010.

C. Carroll, M.S. Stachowicz, "Intelligent Control Design Using S12 Microcontroller: a Student Design Workshop" *Proceedings of the International Conference on Engineering Education, ICEE 2010*, Gliwice, Poland, July 18-22, 2010

M.A. Hasan, "Reliable dynamical systems for canonical variate computation" *American Control Conference (ACC),* Baltimore, MD, 2010

M.A. Hasan, "On second derivative-free zero finding methods" *American Control Conference (ACC)*, Baltimore, MD, 2010

M.A. Hasan, "On computing multi-dimensional extreme eigen and singular subspaces," in *Proceedings of IEEE International Symposium for Circuits and Systems*, Paris, France, May 31-June 2, 2010

M.A. Hasan, "Low rank approximation of a set of matrices" in Proceedings of IEEE International Symposium for Circuits and Systems, Paris, France, May 31-June 2, 2010

N. Kondrath and M. K. Kazimierczuk, "Control current and relative stability of peak current-mode controlled pulse-width modulated DC-DC converters without slope compensation," *IET Proceedings on Power Electronics*, (in press).

N. Kondrath and M. K. Kazimierczuk, "Inductor winding loss owing to skin and proximity effects including harmonics in non-isolated PWM DC-DC converters operating in continuous conduction mode," *IET Proceedings on Power Electronics*, (in press).

N. Kondrath and M. K. Kazimierczuk, "Characteristics and applications of silicon carbide power devices in power electronics," *International Journal of Electronics and Telecommunications*, vol. 56, no. 3, pp 231-236, 2010

N. Kondrath and M. K. Kazimierczuk, "Bandwidth of transformers," in *Proceedings of Electrical Manufacturing and Coil Winding Conference*, Grapevine, TX, Oct. 18-20, 2010.

N. Kondrath and M. K. Kazimierczuk, "Control-to-output and duty ratio-to-inductor current transfer functions of peak current-mode controlled DC-DC PWM buck converter in CCM," in *Proceedings of IEEE International Symposium for Circuits and Systems*, Paris, France, May 31-June 2, 2010, pp. 2734-2737.

S Klar, T. Kwon, B. Auvermann"Development of low-cost dust generator, wireless test chamber, and wireless nephelometers for a feedlot dust study" *Proceedings of the International Symposium on Air Quality and Manure Management for Agriculture*, September 13-16, 2010.

Sakirkin, B.W. Auvermann, **T. Kwon,** et al "Photometric measurement of ground-level fugitive dust emissions from concentrated animal feeding operations," *Proceedings of the International Symposium on Air Quality and Manure Management for Agriculture*, September 13-16, 2010.

T. Kwon, "Data warehouse integration of WIM and vehicle class data and application developments of MEPDG, adjustment factors, and reporting," in *NATMEC 2010,* June 21-24 2010.

M.S. Stachowicz, "Soft Computing For Advanced Control Applications" *Proceedings of the International Conference on Engineering Education, ICEE 2010*, Gliwice, Poland, July 18-22, 2010

P. Li, H. Tang, "A Low-power VLSI Implementation for Full-search Variable Block Size Motion Estimation in H.264/AVC", *Proc. of IEEE International Symposium on Circuits and Systems (ISCAS'10),* Paris, France, May 30-Jun 2, 2010, pp. 2972-2975.

P. Li, H. Tang, "VLSI Architecture Design for Reconfigurable Block Size Motion Estimation", *Proc. of IEEE International Conference on Consumer Electronics (ICCE'10),* Las Vegas, NV, Jan 11-13rd, 2010, pp. 439-440.

S. Rud, N. St. Jacque, A. Vant and and **J.-S. Yang**, "A Support Vector Machine (SVM) Classification Approach to Heart Murmur Detection" *Advances in Neural Networks - Lecture Notes in Computer Science*, pp. 52-59, Springer-Verlag, Berlin Heidelberg, June 2010.

J.-S. Yang, "A Mixed Sensitivity Optimization Design for a Benchmark Control Problem," *Proceedings of The 2010 IEEE International Conference on Industrial Electronics and Applications*, Taichung, Taiwan, pp. 738-743*, 2010.*

ALUMNI NEWS

This is a new section of our Newsletter – we hope you enjoy it, and hope you contribute! Please let us know what you have been up to since graduation!

Michael Cordle is working in Eden Prairie as an Electrical Engineer for the North American branch of an international process control company called FOSS. FOSS provides dedicated analysis systems and quality control systems primarily for agricultural and pharmaceutical processing. His job primarily involves designing a customized interface (both software and hardware) between the equipment that FOSS sells and the customer's existing production equipment.

He finds it is really interesting because it involves almost every area of ECE, from the high-level software, control systems, PLC's, VFD's and a small amount of custom digital or analog design. He also deals with a lot of computer and network setup as well. He gets to spend about 40% of his time traveling, mostly in the US, but potentially some international traveling as well.

Andrew Remus presented a seminar entitled: Minnesota Power's Renewable Energy Future on October 8, 2009. He has been with Minnesota Power for 10 years. He earned his B.S.E.C.E from UMD in December 2000. In addition to his career as an Electrical Engineer he has also been an adjunct professor for ECE 2006 and co-advised three Senior Design Projects. He is active in student outreach at the local schools and colleges. Throughout his career, he has lead many renewable energy projects; including most recently the Taconite Ridge Wind Farm – for which he was the Project Manager.

In the spring of 2006, **Samuel Rud** graduated from UMD with a Bachelor's of Science in Electrical and Computer Engineering. He became employed as a Software Development Engineer at Beckman Coulter, Inc., in Chaska, MN. His duties there included developing application level and device specific software for automated immunoassay diagnostic instruments. In 2007, Mr. Rud resigned his position in order to pursue a Master's degree. Relocating to Göteborg, Sweden, he attended Chalmers University of Technology entering into the Master's program Systems, Controls, and Mechatronics. He returned November 24, 2009 to present a seminar entitled: "Direction Dependent Dynamics And Their Relation to Systems And Processes". He was conducting research in the area of automatic control, and graduated from Chalmers shortly after this presentation. Currently he is working at the Sierra Nevada Corporation in Denver, Colorado. He is developing communication systems for military aircraft at the firmware level.

If you would like to make a donation to support the efforts of the ECE Department and/or for scholarships , you may send your contributions to:

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Please note "ECE Department" on your check.

WE WANT TO HEAR FROM YOU!!!

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Information about the MSECE Degree Program:
http://www.d.umn.edu/ece/publications/handbook/msece/msece.htm

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