

ECE CIRCUIT BOARD

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Fall 2011 **Editor: Shey Peterson**

GREETINGS FROM JIANN-SHIOU YANG, PROFESSOR AND HEAD

Greetings to all alumni, students, and friends of the Department of Electrical and Computer Engineering at UMD! I am pleased to be able to report the continued success of the department despite the stress of budget cuts. The strong pace of accomplishments of our faculty, students, and alumni is an important indicator of value and standing of the ECE Department. This newsletter will highlight some of the activities and accomplishments our faculty and students have made since Fall 2010. I look forward to another year of success.



In Spring 2010, the Department offered two new course ECE 5522 "Power Electronics" and ECE 5742 "Pattern Recognition and Machine Learning". These two courses were taught by **Dr. Nisha Kondrath** and **Dr. Mohammed Hasan,** respectively**.** In addition to ECE 5501 "Energy Conversion Systems" offered by **Mr. Tom Ferguson** every Fall semester, he also taught ECE 5477 "Antennas and Transmission Lines" last spring. Even though ECE 5477 is listed on the UMD Catalog, we had not offered it for many years. We will offer this course again in Spring 2012. These new courses are to educate and prepare our students for life-long involvement in the growing interesting Electrical Engineering area. **Dr. Stan Burns** is back to the ECE Department as the Jack Rowe Chair this Fall after serving as the SCSE Associate Dean for three years. He is teaching ECE 1001"Introduction to Electrical and Computer Engineering" this semester and will teach ECE 2212 "Electronics I" next Spring. Thanks to the Student Technology and Laboratory Fees, the Department is able to upgrade two instructional laboratories every year. Last spring, a new electric drive lab station was added to the Power System Laboratory. Students will have the opportunity to use this state-of-art equipment in Spring 2012 when the Power Systems course ECE 4511 is offered. A new experiment will be developed by **Mr. Scott Norr** and **Dr. Nisha Kondrath.** We have two promotions in Spring 2011: **Dr. Imran Hayee** was promoted to the rank of full Professor and **Dr. Hua Tang** was promoted to Associate Professor with tenure. Congratulations to both of them!

After serving on the SCSE Engineering Scholarship Committee for several years, I found that the competition for engineering scholarships has become keen. This year's review committee for ECE included **Ms. Joellyn Gum** from LHB, Inc, **Mr. Tom Donofrino** from Minnesota Power and myself. Of the total 20 applications, 17 have above 3.50 GPA with excellent academic performance, but only 12 students were awarded the scholarships. I hope we can provide more scholarships to these outstanding students.

Finally, I would like to share this information with you regarding the new **Energy Engineering** minor. A joint proposal for this Energy Engineering minor, developed by the four engineering Department Heads and **Dr. Stan Burns**, was approved at the SCSE Assembly Meeting last Spring. This minor is to provide engineering students with knowledge and skills needed to understand, address, and make effective decisions about the generation, production, utilization, and application of energy. It will prepare students for employment opportunities in the private and public sectors, graduate studies and research. This interdisciplinary minor will be offered in Fall 2012 and administered by our ECE Department.

We would like to thank the members of our Industrial Advisory Board, and welcome Adam Wortz from OSI. We welcome alumni to contribute to our growth and development. If you have an interest in serving on our Board, please contact the department.



Top Row: **John Given, Greg Carpenter, Keith Erickson, Dan Waseen, Adam Wortz** Bottom Row: **Tom Ferguson, Lisa Nebel, Don Kozlovski, Brian Janzig** Not Pictured: **Jon Anderson, Joe Bange, John Kappenman**

This newsletter will update you on the recent exciting events and achievements in the Department. Please stay connected with the Department and consider sharing your personal success story with us. Jot us a quick note and let

us know what's happening. 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", and welcome you to visit the Department the next time you have a chance to come to Duluth.

UPDATE FROM STAN BURNS
JACK ROWE PROF. AND CHAIR



After a three year term as an SCSE Associate Dean, I have rejoined the ECE Department full-time effective 1 July 2011 as the Jack Rowe Chair. I continue to teach ECE 1001, Introduction to Electrical and Computer Engineering, and will also be teaching ECE 2212, Electronics I Spring 2012.

There are several tasks I am following through that bridge the appointment transition. These include:

- Review and revise the ECE proposal for an Energy Engineering Minor. This is a lengthy process which started early last year. It should become effective Fall semester 2012.
- Similarly, the conversion of the ECE program to an Electrical Engineering program with a Computer Engineering Minor has a lengthy history. If it proceeds according to plan, it will become effective Fall semester 2012. Dr. Jiann-Shiou Yang will provide additional detail in future newsletters.
- Our very successful Engineering Day is scheduled for October 29th. Scott Norr is the ECE representative on the planning committee that I am chairing.
- UMD SCSE is hosting the American Society For Engineering Education (ASEE) North Midwest Section Conference 13-15 October. Over 40 papers have been submitted as of mid-September. The traditional banquet and annual business meeting will be a dinner cruise on Lake Superior!

UPDATE FROM ASSISTANT PROF. JING BAI



Dr. Jing Bai is awarded the research grant from the Whiteside Institute for Clinical Research in Spring 2011. Her current research activities include nano-optoelectronics, nano-photovoltaics, nonlinear optics, and bioengineering, with both fundamental and applied interests in science and engineering. Dr. Bai gave an invited talk in the Physics Department of University of Science and Technology of China (USTC) on July 5, 2011. She presented and served as the Session Chair at the 2011 IEEE International Conference on Electronics and Optoelectronics (ICEOE 2011) held in Dalian, China during July 29-31. She also presented and served as the Session Chair at the 11th IEEE International Conference on Nanotechnology (IEEE NANO 2011) held in Portland, Oregon during Aug. 15-19, 2011.

UPDATE FROM PROF. CHRIS CARROLL



Dr. Christopher Carroll presented the paper "Teaching Ground-Floor Digital Circuits to Pre-Engineering Students" at the 2011 American Society for Engineering Education (ASEE) national conference in Vancouver, British Columbia, in June 2011. That paper described an innovative but simple test instrument that could be used by students without engineering knowledge to develop and test digital circuits. This is a topic that Dr. Carroll would like someday to present to high school students as part of Project Lead the Way, a national program that introduces engineering topics at the high school level.

Dr. Carroll travelled to Vancouver this past summer with his wife, with a bit of difficulty when the Amtrak train was cancelled due to flooding in North Dakota! Dr. Carroll was able to take the Canadian train (ViaRail) back from Vancouver to Winnipeg. While in Vancouver, Dr. Carroll experienced a treat related to the new emphasis on power and energy in the ECE department. On the top of Grouse Mountain, just north of Vancouver, is a wind turbine electric generating tower that includes a transparent observation pod suspended about 200 feet above ground at the top of the tower, just under the hub supporting the spinning blades. The view was spectacular, even though interrupted every few seconds by a wind turbine blade passing just a few feet beyond the window.

In October 2011, UMD will host the regional meeting for the North Midwest Section of ASEE. Dr. Carroll will present the paper "Adapting Digital Design Instruction to a Programmable Logic Device Setting" at that conference. That paper will detail some of the difficulties that Dr. Carroll faced in converting the ECE 3341 (Digital Computer Circuits) lab from wiring discrete integrated circuits on breadboards to a computer-based setting using CPLD (Complex Programmable Logic Device) components. This Fall, 2011, ECE 3341 is using CPLDs for the first time in the lab, and so far the experiment has been successful.

UPDATE FROM PROF. MOHAMMED HASAN



Dr. Mohammed Hasan taught a new course: "Pattern Recognition" ECE 5752 in Spring 2011. This course added strength to the signal processing component for our graduates. The course focuses on various methods of pattern recognition including non-parametric techniques, linear discriminant functions, support vector machines, statistical classification, minmax procedures, and maximum likelihood decisions.

He also proposed a new course "Fundamentals of Signal Detection and Estimation" which will be taught in the Spring of 2012.

UPDATE FROM PROF. TAEK KWON



Dr. Taek Kwon is currently working on the development of a Weigh-Pad based portable weigh-in-motion (WIM) system for the Minnesota Dept of Transportation. This will make it easier and less expensive to monitor truck traffic, especially in rural areas. The additional freight data will be useful for managing the country road system, designing appropriate pavements, and setting bridge load restrictions. Eventually, the plan is to contract with a manufacturer to produce a commercial version of the system.

UPDATE FROM PROF. AND JACK ROWE CHAIR MARIAN STACHOWICZ



Dr. Marian S. Stachowicz travelled extensively this summer. He acted as visiting Professor, presenting 10 lectures and consulting with graduate students from the AG-H University of Science and Technology in Krakow, Poland during May and the beginning of June 2011. He also acted as visiting Professor, presenting 5 lectures and consulting with graduate students from the Warsaw School of Computer Science, Warsaw, Poland in the area of the advanced control systems and soft computing, Warsaw, Poland during June 2011.

On a personal note, he went wind surfing in Turkey, and



sailing with his grandson Mikolaj, son Pawel and wife Ludmila on the Baltic Sea as a crew members on brig STS "Fryderyk Chopin". The visited ports in Poland, Sweden, Denmark, and Germany.

SPECIAL NOTE FROM MARVIN SAARELA



After twenty six years I am going to retire. It has been an exciting and at times challenging career. I loved it. We have gone from two students to about 200 with about 20 graduate students. With the addition of other engineering departments adding their students to our labs we are busy. I have enjoyed watching the excitement as the students put their senior projects together and have them working right, or when they are offered the perfect job after graduation. It's nice to have known so many of you and I wish you all the best. I will continue to mention the department and UMD every chance I get.

My wife and I hope to sell the house in Cloquet next summer and move to the nice quiet farm she has in the St Cloud area. I will get to play with all the nice farm toys. Thank you all for a great time.

Sr. Lab Services Coordinator, soon to be retired.
Marvin Saarela

UNDERGRADUATE NEWS

Engineering Scholarship Awardees



Top Row: **Emily Howe, Cory LeClaire, John Christensen, Christopher Wichello, Jake Housley,** Bottom Row: **Matthew Protas, Dana Gorg, Yang Zhou, Ben Nelson, Joel Johnson, Matt Badzinski** Not Pictured: **Benjamin Ruter**

GRADUATES

Spring 2011

B.S.E.C.E.

Brent Eliason	Maxwell Geary
Levi Goeden	Andrew Justen
David Langmo	Cody Lohse
Calvin Nguyen	Matthew Pohl
Timothy Salmonson	Usama Shaikh
Andrew Stone	Dylan Stupca

M.S.E.C.E.

Xiaogang Chen	Scott Klar
Naveen Yadhupati	

Expected Fall 2011

B.S.E.C.E.

Ademola Falade	Andrew Grengs
Zachary Hartig	Matthew McCarroll
Nathan McCullough	Beau Pocquette
Andrew Rogstad	Kyle Somora
Raymond Somrock	Tou Yang
Sean Zarn	

M.S.E.C.E.

Peng Li	Yi Liu,
Buddhika Maitipe	Chike Uduku

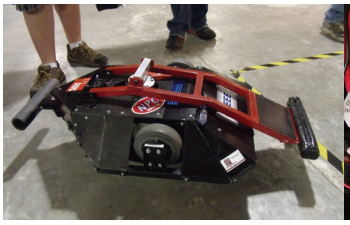
First Robotics

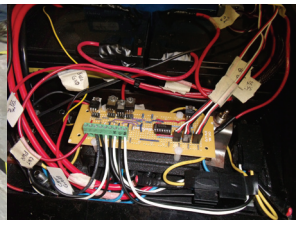


UMD hosted the First Robotics kick-off event on January 7th, 2011. Regionals were held March 10-12 at the DECC. ECE students assisted the Duluth East High School team, who won Regionals!

Battle Bots

For the first time this year our students, along with MIE students, participated in Battle Bots in Florida. "Scorpio"

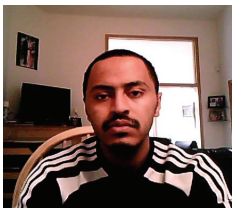




was unique by being the only flipper bot at the competition. Unfortunately, the floor gave them more problems than it did for other bots.

GRADUATE STUDENT WORK

Girum Sileshi and Dr. Jing Bai presented a paper



"Optical system design of laser-based stethoscope" at the 2011 Design of Medical Devices Conference (DMD2011) held in Minneapolis, MN during April 12-14, 2011. Girum has been working with Dr. Jing Bai and Dr. Stan Burns since he joined ECE department in Fall 2010.

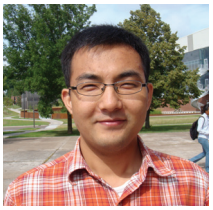
Hai Dinh was a graduate student who joined the department in Fall 2008. While at UMD, Mr. Dinh's research work focused on development of a flexible camera calibration algorithm for roundabout traffic scenes and a vehicle tracking algorithm for traffic data collection of roundabouts and intersections. Mr. Dinh successfully defended his master thesis in January 2011 and received the Center for Transportation Studies Huber Award for Excellence in Transportation Research in April 2011! Mr. Dinh is currently a PhD student in ECE department at University of Alabama Huntsville.



Umair Ibrahim and **Buddhika Maitipe**, along with advisor Dr. Imran Hayee, created the models and planned the programming of a vehicle to vehicle system, also known as V2V to satisfy the U.S. Department of Transportation's research program using Dedicated Short-Range Communications (DSRC) technology for data retrieval between moving vehicles, and from vehicles to transportation infrastructure. They created a combination of a traffic data acquisition and distribution system where the information is obtained and then distributed to each vehicle. They presented the units at the Transportation Research Board's annual conference in Washington DC earlier this year and received funding from the Northland Advanced Transportation System Research Laboratories (NATSRL) to continue this project beyond the concept phase. The future phases of this work will increase safety and minimize travel time for emergency vehicles who need to arrive on the scene quickly.



Peng Li was a graduate student who joined the Department in Fall 2008. Mr. Li had worked on hardware acceleration of speech recognition algorithms, FPGA implementation of variable block size motion estimation (VBSME) algorithm and Mixture-of-Gaussian (MoG) algorithm for real-time image segmentation for intelligent transportation applications. Currently, Mr. Li is pursuing PhD in ECE department at UM-Twin Cities Campus and plans to defend the Master thesis in Spring 2012.



Ms. Rini Shrestha started her second year as graduate research assistant to develop an innovative land departure warning (LDW) system without using the knowledge of lane markers and GPS location information. She together with Benjamin Nelson, an ECE undergraduate student, are working on determining the test vehicle's heading angle, an essential step to find the vehicle's lateral position on the road for the LDW system. Under the supervision of Dr. Jiann-Shiou Yang, they are using the homography to convert the front-view images taken by an in-vehicle camera to the top-view images. The feature selection and tracking via the pyramidal Lucus-Kanade optical flow method is then used to find the angle. The project is funded by NATSRL.



Xiaohu (Tiger) Qian presented a paper "Strain-tuned light trapping performance of plasmonic solar cells" at the 37th IEEE Photovoltaic Specialists Conference (PVSC 37) held in Seattle, WA during June 19-24, 2011. Xiaohu has been working with Dr. Jing Bai since he joined the ECE Department in Fall 2010.





Mr. Tom Solder is a graduate student who joined the department in Fall 2009 and is currently in his third year. He is interested in designing analog, mixed-signal and radio-frequency circuits.

FACULTY PRESENTATIONS AND PAPERS

J. Bai, "Phase Instability and Amplitude Instability of Quantum-Cascade Lasers with Fabry-Perot Cavity", *IEEE Transactions on Nanotechnology*, available for early access online 2011.

X. Qian, and **J. Bai,** "Strain-tuned light trapping performance of plasmonic solar cells", *the 37th IEEE Photovoltaic Specialists Conference (PVSC 37),* Seattle, WA, June 19-24, 2011.

J. Bai, "Instabilities of quantum-cascade lasers under self-phase modulation," *IEEE Proceedings on 2011 International Conference on Electronics and Optoelectronics (ICEOE 2011),* V3-258 - V3-261, 2011.

J. Bai, G. Nordehn, **G. Sileshi**, **S. Burns**, L. Wittmers, and R. Ulseth, "Optical system design of laser-based stethoscope", *2011 Design of Medical Devices Conference (DMD2011)*, Minneapolis, MN, April 12-14, 2011.

J. Bai, "Amplitude Instability and Phase Instability of Quantum-Cascade Lasers under Kerr Effect," *the 11th IEEE International Conference on Nanotechnology (IEEE NANO 2011),* Portland, Oregon, Aug. 15-19, 2011.

D. M. Bellur, **N. Kondrath**, and M. K. Kazimierczuk, "Transformer winding loss caused by skin and proximity effects including harmonics in PWM DC-DC flyback converter for continuous conduction mode," *IET Proceedings on Power Electronics*, vol. 4, no. 4, pp. 363-373, 2011.

N. Kondrath and M. K. Kazimierczuk, "Loop gain and margins of stability of inner-current loop of peak current-mode controlled PWM DC-DC converters in CCM," *IET Proceedings on Power Electronics,* vol. 4, no. 6, pp. 701-707, 2011.

N. Kondrath and M. K. Kazimierczuk, "Control-to-output transfer function of peak current-mode controlled PWM DC-DC boost converter in CCM," *IET Proceedings on Electronic Letters,* vol. 47, no. 17, pp. 991-993, 2011.

N. Kondrath and M. K. Kazimierczuk, "Comparison of wide-frequency and high-frequency duty ratio-to-inductor current transfer functions of DC-DC PWM buck converter in CCM," *IEEE Transactions on Industrial Electronics,* (available online for early access).

T. Kwon, R. Weidemann, V. Lund, and B. Boder, "Determining the effectiveness of an advanced LED warning system for rural intersections," *Transportation Research Record (TRR): Journal of theTransportation Research Board*, 11-2792, 2011.

M.S. Stachowicz, L.B. Kofoed, "Sustainable Design and Renewable Energy in the Engineering Curriculum" *International Conference on Engineering Education, ICEE 2011,* Belfast, Northern Ireland, August 21-26, 2011.

H. Dinh, H. Tang, E. Kwon, Camera Calibration for Roundabout Traffic Scenes, poster presented in *Transportation Research Board Annual Meeting,* Washington DC, Jan 23-27th, 2011, 13 pages.

Peng Li, Hua Tang, "Design of a Low-Power Coprocessor for Mid-Size Vocabulary Speech Recognition Systems", *IEEE Transactions on Circuits and Systems I,* Vol. 58, No. 5, pp. 961-970, May 2011.

M. Leines and **J.-S. Yang**, "Linear Quadratic Regulator (LQR) Control of an Under Actuated Planar Biped Robot", *Proceedings of The 2011 IEEE International Conference on Industrial Electronics and Applications*, Beijing, China, June 21-23, 2011.

J.-S Yang and **W. S. Levine** "Specification of Control Systems," pp. 9.1-9.20 (Chapter 9), in the book titled *Control System Fundamentals* of *The Control Handbook* (volume 1 of the three volume-set), CRC Press, Boca Raton, FL, 2011.

J.-S. Yang has two papers titled "An Optimization–Based Approach to Sepcial Events Traffic Signal Timing Control" (2008) and "Traffic Signal Timing Control for a Small-Scale Road Network" (2004) selected for listing on the Applied Physics Laboratory of the John Hopkins University's web page *Simultaneous Perturbation Stochastic Approximation (SPSA) - Selected References on Theory, Applications, and Numerical Analysis*.

ALUMNI NEWS

This is a somewhat 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!

Andy Dooley, class of 2000 and a previous TA is currently at Brocade in the Twin Cities as a Software Engineering Manager. He was kind enough to send us job openings for our new graduates.

Levi Goeden has found employment as a Hardware Test Engineer for CareFusion in Plymouth, MN. There, he will be developing and maintaining test systems for ventilators in the healthcare field.

Rami J. Haddad, Ph.D., our first masters program graduate, finished his Ph.D. and is now a Visiting Assistant Professor for the Department of Mechanical and Electrical Engineering at Georgia Southern University.

Andy Stenlund graduated in 1998. He sent an email telling us he used a lot of the control theory from our Control Systems class in his first 12 years of employment at Aspect Automation (formerly Remmele Engineering – Automation Division). He created a lot of interesting industrial machines ranging from door & window machines, to flat panel display glass, industrial water filters to implantable devices. During his career there he earned his MS in Software Engineering from the University of St. Thomas. He also got to work with other ECE graduates, Nathan Heinrich (2002), and James Iverson(2003).] He says "Working with James and Nate taught me a very valuable lesson – I really liked working with guys from ECE; they know about networks, know how to learn, know how to solve problems and were very motivated to succeed." December of 2009 he began working at Ulteig in the Energy Sector working in Protection and Controls. He has since been working to develop their Communications (Protective Relaying/PLC/HMI Programming/Networking) group.

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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