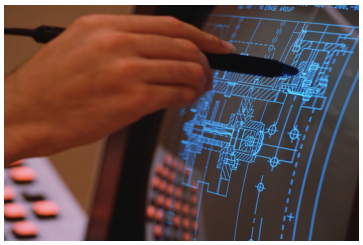


EE CIRCUIT BOARD

UMD Electrical Engineering
271 MWAH, 1023 University Drive **TELEPHONE: 218-726-6147**
Duluth, MN 55812 **FAX: 218-726-7267**
http://www.d.umn.edu/ee/ **umdee@d.umn.edu**

Fall 2012 **Editor: Shey Peterson**

GREETINGS FROM JIANN-SHIOU YANG, PROFESSOR AND HEAD

Greetings to all alumni, students, and friends of the Department of Electrical Engineering at UMD! It is the time of the year for me to update you on the recent news and highlight some of the activities and accomplishments in the Department since Fall 2011. Our faculty have been active in research, teaching, and service. Student involvement in working with their faculty on their research and senior design projects has also grown. We will continue to provide students with a high quality of educational opportunities, provide outreach opportunities, and extend the breadth and depth of our research activities consistent with our student interest and faculty expertise. I hope you enjoy reading this newsletter.

The name change of the Department from Electrical and Computer Engineering to **Electrical Engineering (EE),** became effective Fall 2012**,** and was approved by the UM Board of Regents at its February 14, 2012 Meeting. Along with the program name change, curriculum revisions were developed. Additional technical elective options and increased flexibility were incorporated in the program. The current ECE students have the option to pursue either the **B.S.E.C.E.** or **B.S.E.E.** degree. However, for those students admitted this Fall semester, they will have to pursue the B.S.E.E. degree. The timing of this major change is also coincident with the newly implemented UMD **Liberal Education Program** requirements, which becomes effective this Fall 2012 semester. The Department also offers the **Computer Engineering (CpE) minor** to serve those EE students interested in the computer engineering area. Effective this Fall semester, the Department will administer the newly approved **Energy Engineering minor** for all interested engineering students in the Swenson College of Science and Engineering (SCSE). Although no automatic minors are embedded in our major program, EE students completing the EE major can earn minors in Cp.E, Computer Science, Energy Engineering, and Mathematics by adding just one or two additional courses for each of those minors with appropriate selection of elective courses. In addition, the Department recently approved the **Electrical Engineering minor** and this is mainly for non-EE students.

The Department is preparing a document to be submitted to ABET regarding our program name change. After contact with the Senior Director of the ABET Accreditation Operations, we found that the document needs not to be extensive as a Self-Study Report but should be complete enough to allow two EAC reviewers to make a recommendation that our accreditation can be continued to "Next General Review (NGR)" without a campus visit. This is really good news for us. **Dr. Stan Burns** is in charge of preparing this document and **Mr. Scott Norr** and **Dr. Jiann-Shiou Yang** are on this departmental ABET Committee.

After serving on the faculty for two years, **Dr. Nisha Kondrath** left the department this past June to take another position with Villanova University. I am pleased to welcome **Dr. Lee Zimmerman** to join the department after a faculty search this past summer. Dr. Zimmerman received his Ph.D. from the University of Minnesota Twin Cities with research interests in computer vision and signal processing. He is teaching EE 1315 "Digital Logic" this Fall semester and will teach EE 5522 "Power Electronics" and EE 4951 "Design Workshop" next spring. After 26 years of service **Mr. Marvin Saarela** retired this past January. We welcome **Mr. Xiaogang Chen** as our new lab services coordinator. In Spring 2012, the Department approved a new course EE 5745 "Medical Imaging" to be taught by **Dr. Mohammed Hasan**. Thanks go to **Ms. Joellyn Gum** from LHB, Inc, **Ms. Mary Fralich** from Minnesota Power again for helping me review the ECE/EE scholarship applications. The fourteen scholarship recipients will be awarded their scholarships at the SCSE Engineering Banquet, to be held on October 22, 2012 at the DECC.

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 (umdee@d.umn.edu) or snail-mail. I look forward to connecting with you in our next newsletter.

UPDATE FROM ASSISTANT PROF. JING BAI

Dr. Jing Bai was recently awarded a research grant from the National Science Foundation (NSF) for her research on soliton dynamics on mid-infrared quantum-cascade lasers. The research project focuses on the elucidation of underlying physics and nonlinear dynamics in quantum-cascade lasers, which will enable the design of a new class of compact, ultrafast lasers for applications on biomedical sensing and environmental control. Dr. Bai also conducts research on nanoscale photovoltaic devices and optoelectronics for biomedical applications.

UPDATE FROM STAN BURNS JACK ROWE PROF. AND CHAIR

Since rejoining the ECE (now EE) Department full-time effective 1 July 2011, I have been teaching EE 1001, Introduction to Electrical Engineering and both the lecture and laboratory sections of EE 2212, Electronics I. Research interests are in the medical device and instrumentation areas.

As part of my Jack Rowe Chair outreach responsibilities:

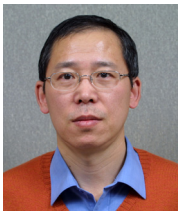
- I want to thank Andrew Remus from Minnesota Power, Greg Carpenter from Boston Scientific, Dean Klein from Micron Technology in Boise, Bruce Howell from Cirrus Design, Keith Erickson from Saturn Systems, and Jeremy Smolich from U.S. Steel ("The Mines") for providing very topical, interesting, and motivational presentations to the EE 1001 class. They also provided more in-depth seminars to the rest of the students and faculty during their visits.
- Currently I am leading the Departmental effort in working with ABET to add the BSEE to the current BSECE accreditation. The BSECE accreditation extends through to September 2016. Prior to that date, all of the SCSE engineering programs will undergo a new accreditation review cycle.
- Our very successful 2011 Engineering Day took place on 29 October with over 215 registrants. To date, there are over 260 registrants for the 30 October 2012 Engineering Day.
- I am a member of the State of Minnesota FIRST Robotics Planning Committee. UMD will host the regional kickoff event for the FIRST Robotics competition on 5 January 2013. I expect 18-22 schools to participate. The Lake Superior Regional will be held on 8-10 March 2013 at the DECC with 100 schools, up from 63 schools in 2012.
- The numbers of engineering students taking the Fundamentals of Engineering Examination has increased markedly over the last few years primarily because the addition of the new Civil Engineering program graduates. I continue to be the Chief Proctor for the UMD site. The last paper offering will be on 13 April 2013. I participated as a member of the NCEES Standards Committee for the new computerized offering that will start in 2014. Those wanting to take the exam will be required to sign up at a local Pearson-Vue test site. UMD Continuing Education will continue to offer a review course open not only to our students but practicing engineers in the region.

UPDATE FROM PROF. CHRIS CARROLL

Dr. Christopher Carroll attended the ASEE annual national conference in San Antonio in June, where he presented a paper reporting experiences gained while adapting the ECE 3341 digital systems lab from wiring discrete digital components to programming CPLD chips using VHDL. The change has been mostly positive, but he mourns that the experience of wiring large circuits has been lost. While in San Antonio, Dr. Carroll strolled the Riverwalk and rode to the top of the Tower of the Americas. This tower, similar to the Space Needle in Seattle, was the central structure of the HemisFair held in San Antonio in 1968, which Dr. Carroll attended as a boy.

In late August, Dr. Carroll participated in the UMD Engineering Camp for middle school girls, and he reported that experience in a paper at the regional ASEE conference in St. Cloud in October. The conference theme was Active Learning. Dr. Carroll hopes that the girls attending the camp were Learning, but at the very least they were certainly Active!

UPDATE ON LAB SERVICES COORDINATOR XIAOGANG CHEN



Our new lab services coordinator **Xiaogang Chen** moved with his family to Lubbock, Texas from China in 2004. He obtained his BSME from Dalian Jiaotong University in China and had 15 years of engineering experience in the heavy mechanical engineering field. He came to Duluth in 2007 and began studying in the ECE department soon after. He received his MSEE from UMD in May 2011. Xiaogang joined the Electrical Engineering Department at University of Minnesota Duluth as a lab services coordinator in Jan. 2012.

UPDATE FROM INSTRUCTOR TOM FERGUSON

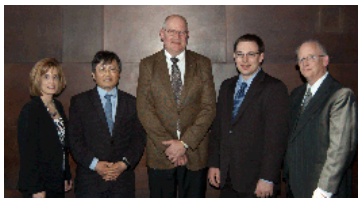
Mr. Ferguson has been collaborating with the Renewable Energy Foundation in the United Kingdom on impacts of wind generation on baseload generation in both the United States and UK. He also gave a luncheon address to the ASME regional student leadership conference on Saturday, October 6, 2012. The Energy Conversion Systems course has a strong enrollment of 26 students, pointing to a high level of interest in energy and the energy minor.

UPDATE FROM PROF. IMRAN HAYEE

Dr. Imran Hayee received the Chancellor's Distinguished Research Award for 2012. Faculty members who receive this award are honored for their excellence in research or creative activity, scholarly or artistic contributions to individual disciplines and dedication to student research. As recipient he presented his research to the University in February and was commencement speaker in the graduation ceremony for graduate students in May 2012.

UPDATE FROM PROF. TAEK KWON

Dr. Taek Kwon received a Research Partnership Award 2012 for research in "Advanced LED Warning Signs." from the Center for Transportation Studies, University of Minnesota, Twin Cities, April 6, 2012. Partners involved in this award include: Brian Boder, St. Louis County, Rob Ege, MnDOT, Victor Lund, St. Louis County, Alan Rindels, MnDOT, Mike Weiss, MnDOT.



Pictured left to right: Dawn Spanhake of CTS, Taek Kwon, Alan Rindels, Victor Lund, Rob Ege

Partners in this year's project worked to improve the safety of rural blind intersections by developing a low-cost, easy-to-install advance warning sign system that can be implemented on existing static signs. The Advanced Light-Emitting Diode Warning System uses solar energy to power wireless technology for vehicle detection. The system shows promise in changing driver behavior by increasing wait times and reducing speeds. It was installed in St. Louis County, and positive benefits have been recorded. The work included a survey of nearby residents and discussion of the psychology of drivers crossing such intersections. The researchers are currently in the second phase of the project. Dr. Kwon hopes it will provide real, practical solutions using off-the-shelf products that can be implemented in any rural intersections that have blind spots.

UPDATE FROM INSTRUCTOR SCOTT NORR

Senior Design Workshop run by **Mr. Scott Norr** has created some great new "bots" for the Department, including two cleaning bots and one wi-fi mapping bot. In addition, one of his senior design teams is working with Jay Austin in Large Lakes Observatory (LLO) to build a low-cost water-temperature monitoring sensor. He travelled with Dr. Yang to the UM Twin Cities to attend the DOE-sponsored Energy Workshop in August. In addition to his teaching duties, Mr. Norr is completing his graduate degree from our own department!

UNDERGRADUATE NEWS

IEEE Student Branch

IEEE has become very active in the resent years. Our club has grown to 65+ members and we have a very good turnout at the meetings as well. Some of the activities and tours that IEEE has conducted in the last couple of years include: Selling 50+ ECE Fleeces and T-shirts each, IEEE Picnics where we grill at least 150+ hotdogs and burgers, and Tours including Minnesota Power (Hibbard Facility, Thompson Facility), NewPage Paper, and a plan to go to Enbridge. With so much on our plate and less funding, we sincerely ask for donations. Even the smallest amounts would help. Please support us. Like us on Facebook at: https://www.facebook.com/UMDIEEESC

2012 Engineering Scholarship Awardees

Top Row: **Patrick Trueman (Builders Scholarship), Yaroslaw Bagriy (Robert J. Marchetti Engineering Scholarship), Jerald Thomas (Builders Scholarship), Peter Noll (Saturn Systems Inc. Scholarship)** Bottom Row: **Rebecca LaCasse (Electrical and Computer Engineering Alumni Scholarship), Tyler Roschen (Chao-Ming Tseng Scholarship), Benjamen Strobel (Chao-Ming Tseng Scholarship), Aamani Gundu (Minnesota Power Foundation Scholarship), Dana Gorg (Mary Ann and Jerry Ostroski Engineering Scholarship), Emily Howe (Thor A. Gustafson Scholarship), Ben Ruter (Thor A. Gustafson Scholarship), Matthew Protas (Cliffs Natural Resources Scholarship),** Not Pictured: **Victoria Bourget (Schott Foundation Scholarship), John Christensen (Roy Labounty Scholarship)**

GRADUATES

Spring 2012

B.S.E.C.E.

Matthew Badzinski	Tyler Burger
Lisa Dennis	Augustus Gonowolo
Jared Grimm	Luke Hensel
Jake Housley	Seth Iverson
Nicholas Jacovitch	Joshua Peura
Anthony Riehle	Spencer Sutton
Christopher Whichello	Matthew Willenbring
Yang (Joe) Zhou	

M.S.E.C.E.

Maksym Kloka	Peng Li
Buddhike Maitipe	Girum Sileshi
Tom Soldner	

Expected Fall 2012

B.S.E.C.E.

Richard Allen	Brian Brandt
Robert Hines	Dustin Jackson
Kyle Kreimer	Tyler Kruzel
Christopher Mason	Benjamin Nelson
Justin Niemann	Jacob Rausch
Nathan Reiman	Benjamin Ruter
Nickolas Schmitz	Andrew Siebenaler

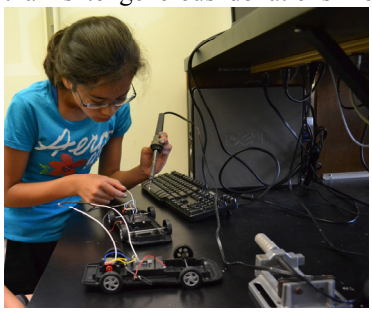
M.S.E.C.E.

Eric Branson	Chike Uduku
Scott Klar	Yi Liu
Sawm Vang	Xiaohu Qian

Electrical Engineering Summer Camp

After 2 years of preparation, for the first time this year the Electrical Engineering Department hosted 13 7th grade

girls in a week long day camp. They learned soldering, worked with solderless breadboards, LEDs, solar panels, mini motors and sensors, among other things. They were exposed to UMD, the VIZLab, and most importantly – Electrical Engineering. They were able to attend for free thanks to generous donations from the Commission on



Women here at UMD and the Women's Center of the Office for Equity and Diversity, as well as funds from our own department. Faculty volunteers **Scott Norr, Chris Carroll** and **Jing Bai** worked extra hard to create an interesting and active program, with the help of student volunteer **Dana Gorg** and student lab helpers **Jerald Thomas** and **Steve Jungst**. Secretary **Shey Peterson** and graduate student **Sukriti Subedi** also helped out as they were able.

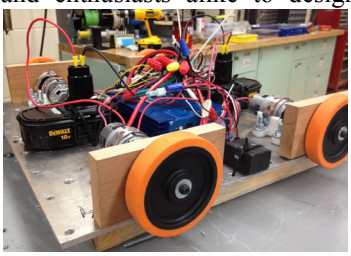
First Robotics

UMD will host the regional kickoff event for the FIRST

Robotics competition on January 5th, 2013. EE students are assisting the Duluth East High School team, the Duluth Denfeld High School team and advised the Marshall High School team.

Battlebots

Battlebots club is a great opportunity for both beginners and enthusiasts alike to design and build a robot for



competition. Our club hopes to compete in the national BotsIQ tournament in Miami, Florida this year, with our current 120 lb bot design being finalized and construction beginning soon. A rolling prototype was completed last semester, and our proposed drive system was functional. In addition, we're in the beginning design phase for a brand new 15 lb bot that we also hope to compete at a local spring tournament hosted at Lake Superior College. We have a club website at Bulldogbots.com detailing our current progress and latest developments, as well as other information about previous bots and projects. We're always looking for donations and sponsorship opportunities, if you're interested in helping our club out, please contact us.

GRADUATE STUDENT WORK

Under the supervision of Prof. Dr. Imran Hayee, funded by Intelligent Transportation Systems (ITS), **Umair**

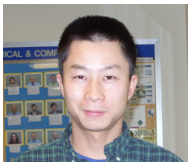
Ibrahim worked on successfully developing and field demonstrating a hybrid traffic information system combining DSRC technology and portable changeable message signs (PCMS) for work zone environment to improve traffic mobility and driver safety on the US roadways. The developed system uses DSRC based V2I and V2V communication to acquire travel safety parameters such as travel time (TT) and starting location of congestion (SLoC), and disseminate these parameters to both DSRC equipped vehicles and DSRC equipped PCMSs which are strategically placed alongside the road. He developed the DSRC-PCMS interface for PCMSs to receive these travel safety parameters from nearby DSRC equipped vehicles on the road via DSRC based V2V communication, and display them for the drivers of the vehicles lacking DSRC capability. A research paper has been accepted for presentation at the Transportation Research Board (TRB) 2013 annual conference to be held in Washington D.C. Previously, Mr. Ibrahim published a Journal paper in the TRB as a co-author and presented poster at the Annual TRB-2012 conference. Before coming to the USA, he published two research papers in the field of Optical communication and had also presented his work in a conference in his home country of Pakistan.

Husam Ismail is working on the second phase of the

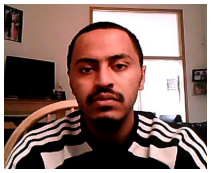
Advanced LED Warning Signs project with Dr. Kwon. Please visit the Lakewood/Lismore Road Intersection. Dr. Kwon installed his LED based intersection warning

system called ALERT-2 and they are currently evaluating the effectiveness of this system. This project was funded by Local Road Research Board (LRRB).

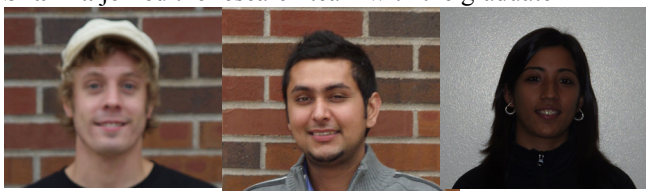
Recently, a research paper co-authored by graduate student **Xiaohu Qian** and Dr. Jing Bai was accepted by the Journal of Computational and Theoretical Nanoscience. The paper presented a systematic study on optical properties of hollow spherical metallic nanoshells, which will provide theoretical guidance on the experimental synthesis of hollow metallic nanospheres with varying geometric factors for optical and biomedical applications.



Girum Sileshi successfully defended his Master's thesis "Optical System Design of Laser-Based Stethoscope" on June 6, 2012. After graduation, Girum started working in Navistar, Inc., in Chicago as a product engineer.



Two graduate students **Gregory Taubel** and **Rohit Sharma** joined the research team with the graduate student **Rini Shrestha** to develop an image-based lane departure warning system under the supervision of Dr. Jiann-Shiou Yang. This project is funded by NATSRL. The motivation of this research is that various environmental factors such as rain, heat might wear out the lane markers and the presence of snow on the road might also affect the visibility of road markers. Therefore, it is highly desirable to develop a system which can make use of lane markers when they are available, but can also work when lane markers become invisible for a short period of time. The system developed mainly uses a mixed approach by integrating the point tracking Lucas-Kanade optical flow and the Hough transform-based lane detection techniques to determine the vehicle's lateral characteristics and issue a warning to the driver if necessary. The final product of this study was road tested on I-35, US-53 and several other major roads in the Duluth area.



Mr. Moazzam Sahi is currently a second-year graduate student who joined the department in Fall 2011. He is currently working on hardware implementation of video segmentation and object extraction algorithm.

Ms. Sukriti Subedi is currently a second-year graduate student who joined the department in Fall 2012. She is currently working on developing a multiple-camera vehicle tracking algorithm in 3D models.

Mr. Tom Solder was a graduate student who joined the department in Fall 2009 and worked on analog/RF circuit design for wireless applications. On July 24th 2012, Tom successfully defended his master thesis titled "Design of a Delta-Sigma Fractional-N PLL Frequency Synthesizer at 1.43 GHz".

FACULTY PRESENTATIONS AND PAPERS

J. Bai, **G. Sileshi, S. Burns,** G. Nordehn, L. Wittmers, "Development of laser-based heart sound detection system," *Journal of Biomedical Science and Engineering,* vol. 5, no. 1, pp. 34-37, January 2012.

J. Bai, "Phase Instability and Amplitude Instability of Quantum-Cascade Lasers with Fabry-Perot Cavity", *IEEE Transactions on Nanotechnology*, vol. 11, no. 2, pp. 292-297, 2012.

H. Dinh, H. Tang, "Camera Calibration for Roundabout Traffic Scenes", *paper presented and published in 2012 IEEE International Midwest Symposium on Circuits and Systems*, Boise, ID, Aug. 5-8th, 2012.

T. Kwon, "Development of weigh-pad-based portable WIM system at Minnesota DOT," presented at *TRB Conference: North American Travel Monitoring Exposition and Conference (NATMEC 2012*), Dallas, TX, June 2012.

T. Kwon, R. Weidemann and V. Lund, "Intersection Safety: All the stops (new system takes advantage of technology to warn drivers of upcoming intersections in rural areas)," *Roads & Bridges,* pp. 48-53, Jan 2012.

J.-S. Yang, "An Image-based Optical Flow Approach to Determine Vehicle's Lateral Position" *Proceeding of the 16th International Conference on Image Processing, Computer Vision, and Pattern Recognition* (IPCV'12), Las Vegas, NV, July 16-19, 2012.

J.-S. Yang, "Estimation of Vehicle's Lateral Position via the Lucas-Kanade Optical Flow Method," *WSEAS Transactions on Systems,* vol 11, no. 11, to appear November 2012.

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!

After a brief visit to update us here on campus, BSECE graduate of 2012 Joe Zhou, recently drove across country to start work as an Electrical Engineer for Western Digital at Irvine, CA. He will be working on ASIC (application-specific integrated circuit) design and verification. Before this he was an electrical engineering intern last summer at ITW - Despatch Industries and product engineer at GeaCom earlier this year.

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

UMD/SCSE Development Director
148 Engineering Building
1303 Ordean Court
Duluth, MN 55812-3025

Please note "EE Department" on your check.

UNIVERSITY OF MINNESOTA
Duluth Campus

Department of Electrical Engineering
Swenson College of Science and Engineering
271 Marshall W. Alworth Hall
1023 University Drive
Duluth, MN 55812-3009

WE WANT TO HEAR FROM YOU!!!

EE CONTACT INFORMATION:

Dept. of Electrical Engineering
University of Minnesota Duluth
271 MWAH, 1023 University Drive
Duluth, MN 55812
Telephone: 218-726-6147
Fax: 218-726-7267
Email: umdee@d.umn.edu
Web Site: http://www.d.umn.edu/ee/

EE Department Head

Dr. Jiann-Shiou Yang
218-726-6290
jyang@d.umn.edu