

SIGNALS Department of Electrical and Computer Engineering Fall 2015, Vol. XV, Issue 1

Note from the department head



It is now the fall term, the first academic term of my tenure as department head. This is also my first column in Signals and I would like to begin by acknowledging the many contributions of my predecessor: Professor David Lilja. Dave worked hard to improve the department in many ways. One very concrete measure of his success was an increase of research funding by 150% to its current value of about \$20 million/ year. Almost all of this funding comes from competitive grants and contracts with various federal departments/agencies and industry. Under his leadership, the department maintained a position among the world's leading ECE departments at a time when this is becoming increasing difficult for public universities.

I was advised before taking this position that most of my time would be spent reacting to various issues that arise, but it is important to have some goals of my own. Following this advice, I would like to mention three areas where I intend to focus my efforts. First, I hope to make the department more attractive to prospective undergraduate students by more forcefully drawing attention to the advantages and opportunities that ECE has to offer. Second, about 80% of our current PhD students received financial offers when being recruited to the university: I would like this to be 100%, thus helping us fulfill our research potential.

Finally, I believe that our department could greatly benefit from more interdisciplinary research, particularly large centers such as those funded by the National Science Foundation. I intend to provide more details on these topics in future issues of this newsletter.

Finally, I want to thank you for your previous support of ECE and I hope that together we can bring this department into the bright future that seems possible.

Randall Victora

ECE News

faculty news

Minnesota Nano Center Awarded \$4.5 Million by NSF



The National Science Foundation (NSF) has announced the formation of the National Nanotechnology Coordinated Infrastructure (NNCI) network, and the University of Minnesota is pleased to announce that the Minnesota Nano Center has been selected to be one of the nodes in NNCI receiving an award

of \$4.5 million over five years. This follows an eleven year period of participation in the NSF National Nano Infrastructure Network over which the school was awarded \$8 million.

The NNCI is designed to enable major discoveries, innovations, and contributions to education and com-



merce by providing researchers from academia, small and large companies, and government, with open access to university user facilities with leading-edge fabrication and characterization tools, instrumentation, and expertise within all disciplines of nanoscale science, engineering, and technology.

In addition to providing users access to a full range of fabrication equipment in Keller Hall and the new Physics and Nano building, as a new NNCI node the Minnesota Nano Center will support activities in two-dimensional materials, bionano, and, through participation by North Dakota State University, advanced packaging. Participation in the network will enable the University of Minnesota to further strengthen its capabilities in this vital area. The effort will be led by Prof. Stephen Campbell, who holds the Bordeau Chair in the Department of Electrical and Computer Engineering and is the director of the Minnesota Nano Center.

IEEE Magnetics Society Summer School

The Department of Electrical and Computer Engineering hosted the 8th IEEE Magnetics Society summer school from June 14 to June 19. The summer school was led by Prof. Beth Stadler (chair), and Prof. Randall Victora (co-chair). The summer school is designed for graduate students who are members of the IEEE Magnetics Society and studying magnetism and related areas. Student attendees must go through a selection process that includes recommendations by their advisors and IEEE Magnetics members.



The 2015 school saw students from the US, Europe, Asia, Latin America and Australia. Opening on Sunday evening with a reception and dinner, it had a packed schedule of lectures punctuated by a Seagate

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sponsored excursion to the Wabasha Street Caves and a cruise on the Mississippi river. There were two poster sessions and four distinguished lectures over the six days, with prizes being awarded for the best posters.

The 26th TMRC

The Department of Electrical and Computer Engineering in conjunction with MINT (Center for Micromagnetics and Information Technologies) hosted the 26th TMRC (The Magnetic Recording Conference) over August 17-19. Sponsored by the IEEE Magnetics Society, the conference was focused on "Enhanced Future Recording Technologies for Hard Disk Drives Beyond 10 Tbyte Capacity". William Cain, Vice President of Technology at Western Digital Corporation delivered the keynote address "Navigating Market and Technology Transitions".

Some of the topics covered included perpendicular magnetic recording at more than 1Tbit/in², shingled and two-dimensional magnetic recording, and alternate recording technologies. There were 38 papers presented and poster sessions at the end of the first two days of the conference.

Prof. Beth Stadler on Tour as Distinguished Lecturer

Prof. Beth Stadler is currently on her lecture tour as an IEEE Magnetics Society Distinguished Lecturer. As a Distinguished Lecturer, she has been traveling around the world delivering her talk titled "Magnetic Nanow-ires: Revolutionizing Hard Drives, Random Access Memory (RAM), and Cancer Treatment." By the end of her lecture tour, Prof. Stadler will have talked at 40 venues to include institutions in Europe, Asia, and the United States.

Prof. T. Georgiou in Scientific Reports

Prof. Tryphon Georgiou in a paper led and co-authored by Prof. Allen Tannenbaum and other researchers and



faculty from Stony Brook University and Memorial Sloan Kettering Cancer Center, demonstrates that a certain geometric feature of protein networks can be used to identify cancer cells.

The paper published in the Nature research journal Scientific Reports, addresses a key challenge in cancer therapy, to

explain and quantify the apparent robustness of cancer cells. Advances on this front may significantly impact targeted treatment of cancer cell networks. The paper titled "Graph Curvature for Differentiating Cancer Networks" reveals the role of curvature as a cancer network characteristic, and its relationship to robustness as a functionality of the network. While the paper is focused on cancer cells, it points to the use of the analytical approach to the study of complex cellular networks to understand phenomena in molecular biology.

Prof. Mehmet Akcakaya Receives NIH ROO Award



Prof. Mehmet Akcakaya received the NIH R00 award in September. This is part two of the two-part Pathway to Independence award (K99/R00), with the second part being awarded at the start of a tenure-track or equivalent faculty position. It is one of the most

competitive NIH early career awards, and is designed to support outstanding researchers transition from mentored research positions to tenure-track positions.

Prof. Jarvis Haupt Receives Russell J. Penrose Award

Prof. Jarvis Haupt has been awarded the inaugural

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Russell J. Penrose Excellence in Teaching Award by the University of Minnesota. The award recognizes his genuine interest and excellent performance in teaching undergraduate and graduate students, and is based on strong student and peer evaluations, and quality of course materials.

student news

Yulong Lí Wins Interdisciplinary Fellowship



Yulong has been awarded the highly competitive interdisciplinary fellowship by the University of Minnesota for his work on the creation of an ultra-small radiation dosimeter for cancer therapy using fully-depleted silicon-on-insulator (FDSOI) technology. Because of its structure, conventional dosimeter uses the same element for radiation sensing (write) and data extraction (read), which makes it difficult to achieve both high scalability and sensitivity. FDSOI uses different elements and has the advantage of separating "read" and "write" as a dosimeter, thereby achieving high scalability and sensitivity simultaneously. The FDSOI dosimeter will be suitable for superficial dosimetry and can also be implanted directly into the patient. It will employ passive wireless sensing which could improve the application of in vivo radiation dose verification and ultimately benefit patient treatment outcomes. Yulong is working under the guidance of Prof. Steven Koester.

Mustafijur Rahman Receives Best in Session at Techcon 2015



Mustafijur Rahman received the Best in Session Award at Techcon 2015 for his paper "An Ultra-Low Power 2.3-2.5 GHz WBAN Receiver Frontend Employing Frequency Translated Mutual Noise Cancellation". The paper was authored by Mustafijur

and his advisor Prof. Ramesh Harjani. Techcon 2015 is conducted by Semiconductor Research Corporation (SRC)

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Randall Victora Department Head Roopa Sukumaran-Berzins Editor

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