The Power Group Quarterly Newsletter

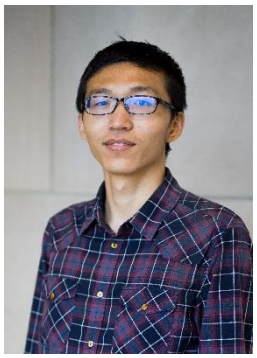
A newsletter highlighting our research centers, labs, faculty, staff and students.

100-for-100 Scholarship Winners

Thank you to all who donated to our 100-for-100 scholarship fund. We were able to raise $5351.23 to fund the scholarships and had 13 students apply. **Yuheng Wu** received the Dr. Mike Glover Scholarship ($1200) and **Asma Mahar** received the Dr. Hung Phi Hoang scholarship ($1200). **Hao Chen** and **Paola Vargas** also received scholarships ($800 each). The balance will be carried over to the fall 2019 scholarship pool.

Yuheng Wu

Asma Mahar



Hao Chen

Paola Vargas

The 100-for-100 scholarship was launched by Dr. Alan Mantooth. It is funded by former MSCAD students and available for graduate and undergraduate students of the MSCAD lab in power electronic packaging, power electronic circuit design, computer aided design, device modeling and integrated circuit design. Our scholarship committee consisted of Dr. Jia Di, Dr. Shannon Davis, Dr. Yue Zhao and Dr. Fang Luo.

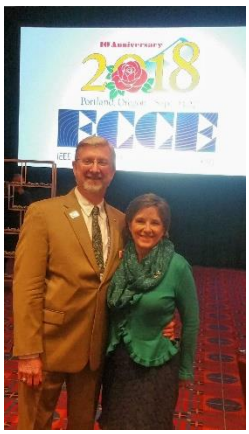
As you review your end-of-the-year giving, please think of the 100-for-100 scholarship. You can go to the MSCAD website at any time and click on the "Donate to the 100-for-100 Scholarship" button. Our next scholarship will be awarded fall 2019. Our goal is to award $10,000 in scholarship money.

ECCE Reception

On Tuesday, September 25th, we hosted a reception at the Altabira City Tavern in Portland, Oregon. The reception was held during the ECCE conference. Attendees included current faculty and students as well as alumni from the 80's, 90's and the 2000's. It was a great time reconnecting with former students.

Where in the World is Alan?

"Where in the World is Alan?" This seems to be a constant question around the office so we decided to create a campaign around it. You will find photos of his travels and whereabouts on our Instagram feed, The Power Group. You can also search #WhereInTheWorldIsAlan. If you would like to connect with him and are wondering if he will be in your area, please contact Jamie Stafford, stafford@uark.edu.



SEEDS Fall Meeting

The Cybersecurity Center for Secure Evolvable Energy Delivery Systems (SEEDS), a cooperative research center between the Department of Electrical Engineering and the Department of Computer Science and Computer Engineering, hosted its 2018 Industry Involvement Meeting on October 15th & 16th on the Carnegie Mellon University campus in Pittsburgh, Pennsylvania. The meeting drew together faculty and students from six partner universities and industry leaders from six companies to discuss current research projects and goals of the center.

The meeting kicked off with a welcome and introduction from Alan Mantooth, executive director of SEEDS, University of Arkansas, and James H. Garrett, dean of CMU College of Engineering. Faculty researchers presented an overview on the status of their projects allowing industry attendees to supply immediate feedback and discussion. A poster session held the second day allowed students and faculty to present projects to industry members and faculty researchers.

SEEDS meetings are open to all industry members, invited guests, faculty and students from partnering universities. The next SEEDS meeting will be held in Fayetteville, Arkansas on April 24-26, 2019. For more information on SEEDS, contact Shannon Davis, Managing Director, seeds@uark.edu, 479-575-6877. For more information on upcoming meetings, contact Karin Alvarado, KarinA@uark.edu, 479-575-4958.

POETS Annual Meeting

The University of Arkansas hosted the 2018 Center for Power Optimization of Electro-Thermal Systems (POETS) Annual Meeting on October 3rd-5th. Attendees included faculty, staff and students from the four partner universities, REU students from two other universities and IAB members from six member companies.

A Research Education for Undergraduates (REU) student retreat preceded the annual meeting. Students from all campuses that participated in the REU program traveled to Arkansas for informational sessions, a tour of the University of Arkansas campus and labs, and other education sessions and activities. The annual meeting kicked off with an all POETS dinner hosted in the new expansion of the National Center for Reliable Electric Power Transmission (NCREPT). Attendees were entertained with a local square dancing group and were able to participate in some line dancing which even included some instructors for those less confident in their dancing skills.

Chris Schmit, John Deere, awards 1st place to Patrick Birbarah, UIUC

Dr. Daniel Sui, Vice Chancellor for Research and Innovation with the University of Arkansas welcomed attendees the first day of the meeting. Dr. Andrew Alleyne, POETS Center Director from the University of Illinois at Urbana-Champaign gave a POETS State of the Center.

Chris Schmit, John Deere, awards 2nd place to Shilpi Mukherjee, UA

The faculty and industry members spent the day in working breakout sessions discussing research assessment, technology development and convergence. The day ended with the POETS Innovation Showcase which is a reception combined with a student poster session and pitch competition. Six students competed in the pitch competition. Patrick Birbarah, University of Illinois at Urbana-Champaign, was awarded 1st place, Shilpi Mukherjee, University of Arkansas, was awarded 2nd place and Sougata Hazra, Stanford University, was awarded 3rd place.

Chris Schmit, John Deere, awards 3rd place to Sougata Hazra, Stanford

The meeting concluded on Thursday with presentations on six IAB funded projects. Some attendees then transitioned to a High Ambient Temperature Systems workshop held on Thursday and Friday. The workshop was led by Debbie Senesky, assistant professor of aeronautics and astronautics at Stanford University, and David Huitink, assistant professor of mechanical engineering at the University of Arkansas. It introduced the questions, "What could be accomplished if the power electronics, microprocessors, and batteries of the future ran hotter (perhaps as high as 500 degrees Celsius, or more)? How would this new operating point revolutionize the design of automobiles, aircraft, and spacecraft?"

"Building on the current successes in POETS and standing upon the shoulders of the 'giants' in power electronics research was the fundamental premise in this workshop," Huitink said. "We have a spectacular team in POETS, through whom we expect to revolutionize the capabilities in mobile power electronic systems. Bringing the key minds in device, packaging, sensing and reliability of these systems together with the major industrial partnerships, ranging from electric vehicles to aircraft and heavy machinery helps us to pinpoint technical challenges, which we can then work together to solve."

POETS meetings are open to all industry members, invited guests, faculty and students from partnering universities. The next POETS meeting will be held in Illinois on October 23-24, 2019. For more information contact Jodi Gritten, grittend@illinois.edu.

GRAPES Fall Meeting

The National Science Foundation Center for GRid-connected Advanced Power Electronic Systems(GRAPES) in the Department of Electrical Engineering hosted its Fall 2018 Industrial Advisory Board Meeting on November 7th & 8th in Fayetteville, Arkansas. The GRAPES meeting drew together faculty and students from six universities, including three international universities, and industry leaders from 10 of the 16 membership companies.

The meeting kicked off with a welcome and introduction from Alan Mantooth, executive director of GRAPES, University of Arkansas, and John English, dean of UA College of Engineering. The meeting focused on current research project updates as well as new project proposal presentations requesting funding. Faculty researchers presented an overview on the status of their projects allowing industry attendees to supply immediate feedback and discussion. A poster session followed, during which students and faculty presented project posters to industry members and faculty. All agreed this dedicated time spent together allows them time to connect and learn from each other.

GRAPES facilitates close research interactions between university faculty and students and the industrial members of the center. This relationship gives researchers a direct tie to today's power industry, allowing them to research topics that are closely aligned with industry interests. It also gives the involved companies a clear voice into what the students are learning, and so directly improves the quality of the employees they will hire in the next few years. Nearly 100 undergraduate and graduate students have worked within the center. Many of these students have gone on to work for member companies, while others have continued their educations or gone to work for other companies in the power and power electronics industries.

GRAPES meetings are open to industry members, invited guests, faculty and students. The next GRAPES meeting will be held in Milwaukee, Wisconsin on May 21-22, 2019. For more information on GRAPES, contact Shannon Davis, Managing Director, grapes@uark.edu, 479-575-6877. For more information on upcoming meetings, contact Karin Alvarado, KarinA@uark.edu, 479-575-4958.

Alumni Corner

(An email from former student Ashfaq Rahman)

Hi Dr. Mantooth,

I hope you are doing well. I figured I'd share some of my recent work experience and how my time at the MSCAD lab has really helped me in the last 3 years so that maybe you can share them with your current and future students. I specifically want to emphasize the IC design group because being an IC designer entails a lot more than just schematic capture and running simulations as you had always reminded us.

I have been working on bringing up a new process for our group over the last few months. We don't have a working PDK yet – no DRC or LVS checking. So, when we are putting down test structures we are having to hand check and be very patient and diligent with our methods because the tools are of little use. Our layouts are based on the sample device layouts from the foundry, no pcell or the general convenient layout features you'd get from a complete PDK. This is very similar to the work we did with Raytheon on the SiC process.

We are also talking regularly with the foundry to come with the appropriate device and layout structures – again something I had to do with the engineers at Raytheon and I think Paul Shepherd and the rest had to for the Cree SiC process. My experience during that time has enabled me to navigate through these issues where I am almost considered a second/third point of contact in this new process after our top layout guy (there are other vastly more experienced guys working on other projects, but my experience lets my manager keep them for ongoing commercial projects rather than use them for a future one).

I can give you a couple of specific examples – nobody in our group other than the top layout guy knew how to import a GDS file into our libraries. When he was out for a couple of weeks, I was able to get the GDS into the library. I also recently finished up routing a layout that went to 44 pins on the top level – in a process with an incomplete PDK and LVS. And no one's found a fault on the wiring yet. I certainly would have been unable to do any of these if not for my time at the MSCAD lab.

A few more things I have done in the last 3 years – spent 6 months testing in the lab with automated measurements that let me characterize a commercial chip that is in several iPhone models; wrote test plans for the ATE, work with them to get their testing right – check out and characterize/trouble-shoot parts on the bench. I have also worked with the Failure Analysis team to debug – even tested on FIB parts like we did with Dr. Salamo's team for the Dongbu project. And speaking of Dongbu, I still have weekly calls in the evening with an East Asian foundry – so even those calls that were really frustrating have given me some idea of what to expect.

It's a long email, but I had such a varied experience at the MSCAD lab, and already so much of that has been beneficial at my job, that I thought I should let you know that to not only express my appreciation for the opportunity and guidance you, Matt, Jim and Tom gave me, but maybe let you share these a little with your current students. My only regret – I wish I had spent a little more time learning Python and PERL to automate some of my testing and simulations, and get a bit more experience in Verilog-A.

Regards,
Ashfaq Rahman

(Apologies for the typos, trying to finish in a hurry before my child decides he wants more attention)