



## Madison Section Newsletter

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### Upcoming Meetings

#### Machine Learning in Digital Medicine

IEEE Section/ Joint Engineers in Biology and Medicine Meeting

Date: Wednesday, August 14th

Madison Central Library

[Event Info](#)

#### LENR what the ....???

Date: Wednesday, September 4th

UW-Madison, Science Hall

[Event Info](#)

#### Optimizing power system operations

#### Methods to manage the impact of renewable energy on electric grids

IEEE-Madison IAS/PES Chapter

Date: Monday, September 9th

UW Engineering Hall

[Event Info](#)

#### Tuning magnetic anisotropy in nanostructures for biomedical applications

IEEE-Madison Joint Section/ EMB18 Chapter

Date: Friday, October 25th

UW Engineering Hall

[Event Info](#)

### News/Announcements

Volunteers Needed! See below for more information

### Past Meeting Reviews

Review of July Future Energy Challenge

## August Section/EMB018 Joint Meeting

### "Machine Learning in Digital Medicine"



- Wednesday, August 14th, 3:30 PM to 5:00 PM
- Dr. Giorgio Quer, Sr. Research Scientist at the Scripps Research (SR) in San Diego
- Location:  
Madison Central Library  
201 W. Mifflin St., Madison WI 53703  
Conference Room 104

- Please Register at the IEEE-Madison [event page](#).

**Talk:** Digitalize human beings using biosensors to track our complex physiologic system, process the large amount of data generated with artificial intelligence (AI) and change clinical practice towards individualized medicine: these are the goals of digital medicine. At Scripps, we are a team of computer scientists, engineers, and clinical researchers, in partnership with health industries, and we propose new solutions to analyze large longitudinal data using statistical learning and deep convolutional neural networks to address different cardiovascular health issues.

One of the greatest contributors to premature mortality worldwide is hypertension. Lowering blood pressure (BP) by just a few mmHg can bring substantial clinical benefits, but it is hard to assess the "true" BP for an individual, since it fluctuates significantly. With a dataset of 16 million BP measurements, we unveil the BP patterns and provide insights on the clinical relevance of these changes.

Another prevalent health issue is atrial fibrillation (AF), the most common sustained cardiac arrhythmia, associated with stroke, heart failure and coronary artery disease. AF detection from single-lead electrocardiography (ECG) recordings is still an open problem, as AF events may be episodic and the signal noisy. We conduct a thoughtful analysis of recent convolutional neural network architectures developed in the computer vision field, redesigned to be suitable for a one-dimensional signal, and we evaluate their performance in the detection of AF using 200 thousand seconds of ECG, highlighting the potential and pitfall of this technology.

Looking to the future, we investigate new applications for wearable devices and advanced processing in the All of Us Research Program, an unprecedented research effort to gather data from one million people in the USA to accelerate the advent of precision medicine.

**Bio:** Dr. Giorgio Quer is a Sr. Research Scientist at the Scripps Research (SR) in San Diego, California, and the Director of Artificial Intelligence at the SR Translational Institute. He is also a Lecturer in the Halıcıoğlu Data Science Institute at UC San Diego. He received the B.Sc. degree, the M.Sc. degree (with honors) in Telecommunications Engineering and the Ph.D. degree (2011) in Information Engineering from University of Padova, Italy. In 2007, he was a visiting researcher at the Centre for Wireless Communication at the University of Oulu, Finland. During his Ph.D., he proposed a solution for the distributed compression of wireless sensor networks signals, based on the joint exploitation of Compressive Sensing and Principal Component Analysis. From 2010 to 2017, he was a visiting scholar at the California Institute for Telecommunications and Information Technology and then a postdoc at the Qualcomm Institute, University of California San Diego (UCSD), working on cognitive networks protocols and implementation. He is a Senior Member of the IEEE, a member of the American Heart Association (AHA), and a Distinguished Lecturer for the IEEE Communications society. His research interests include wireless sensor networks, compressive sensing, probabilistic models, deep convolutional networks, wearable sensors, physiological signal processing, and digital medicine.

## September Section Meeting

### "LENR What the ...."



- Wednesday, September 4th, 5:30 PM to 7:00 PM
- Bob Greenyer, Martin Fleischmann Memorial Project
- Location:
  - ; Science Hall
  - 550 North Park St., Madison WI 53703
  - Lecture Hall 180

- Please Register at the IEEE-Madison [event page](#).

**Talk:** When you think you know how things work and then you not only witness, but recognize something as being so far from what is generally expected, that it shocks you to the core, what would you do? Would you let your scientific curiosity become a life-long search for the answer? Could you let it pass you by and carry on the mundane treadmill of the path often traveled? What would make a person choose to spend the rest of their life engaged in an activity that to many, would appear pointless and misguided?

Bob Greenyer talks about some of those people that not only knew they were seeing something special, but took it upon themselves to try and understand the observed effects, with an aim to give humanity, against the odds, new tools with which to take us collectively forward.

These people laid the groundwork for what is now becoming a hot research area, one which may define the next millennia and our species long term prospects.

**Bio:** Bob Greenyer studied manufacturing engineering at Brunel University, West London, during which time he also worked at the Electrical Engineering Department of Smithkline Beecham Pharmaceuticals (now Glaxo-Smithkline) at their largest UK factory which produced Augmentin and conducted primary research including that focussed on anti-bacteria and anti-viral solutions. During his time there, he updated all of the Electrical Engineering standards documentation, developed a portable system to monitor the over 100 electrical meters on site, helped specify a factory wide modern alarm system and developed a database to track maintenance on the sites 4000 industrial electric motors.

On leaving university he launched his then new media studio and developed cutting edge websites, animations and interactive solutions for a range of industries and FTSE 100 companies. Later he worked at the highest levels of one of the worlds largest international banks, developing all of their major client and investor facing media, analyzing complex data sets and presenting the resulting conclusions in words, graphs and moving images.

This skillset and operation was moved to India where it was intended that the operation would be scaled, however, a combination of the financial crisis and proceduralization of what once was stimulating problem solving led him to explore one of his other greatest passions, the science of energy.

In 2012, he took himself to South Korea to ICCF-17 the semi-annual conference of Condensed Matter Nuclear Science, where he and 4 other like-minded individuals set up the Martin Fleischmann Memorial Project to try and see if a new approach to science could stimulate more engagement in a maligned and poorly understood frontier of energy research.

Since then, he has had the opportunity to converse and work with some of the leaders in this field across the world and be a part of designing, conducting and analyzing a range of experiments both in house and conducted by third parties.

## September IAS/PES Meeting

**"Optimizing power system operations - Methods to manage the impact of renewable energy on electric grids"**



- Monday, September 9th, 5:30 PM to 7:00 PM
- Dr. Line A. Roald, UW-Madison ECE Department
- Location:  
Engineering Hall  
1415 Johnson Street, Madison WI 53706  
Room 2535

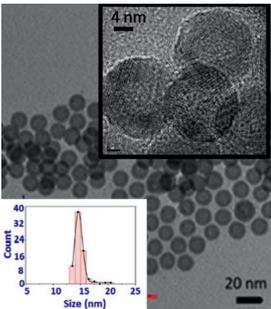
- Please Register at the IEEE-Madison [event page](#).

**Talk:** How can transmission system operators ensure secure and reliable operation of the electric grid when renewable energy generation is uncertain? How can rooftop solar PV be a resource rather than a problem when managing voltage unbalance in distribution grids? To answer these and other questions related to renewable energy integration, new tools for power systems operations are required. This presentation will discuss our research aimed at developing such new tools. In particular, we will discuss how data-driven, optimization-based methods can help manage renewable energy variability and harness the flexibility available in the grid.

**Bio:** Line A. Roald is an Assistant Professor and Grainger Institute for Engineering Fellow in the Department of Electrical and Computer Engineering at the University of Wisconsin – Madison. Prior to joining UW Madison, she obtained her PhD at ETH Zurich in Switzerland and worked as a post-doctoral fellow at Los Alamos National Laboratory in New Mexico. Her research interests include optimization, probabilistic methods and data analytics for electric power systems.

## October Joint Section/EMB18 Meeting

### "Tuning magnetic anisotropy in nanostructures for biomedical applications"



- Friday, October 25th, Noon (TBD)
- Dr. Hari Srikanth, Dept. of Physics, University of South Florida
- Location:  
Engineering Hall  
1415 Johnson Street, Madison WI 53706  
Room TBD

- Please Register at the IEEE-Madison [event page](#).

**Talk:** Magnetic nanoparticles have been building blocks in applications ranging from high density recording to spintronics and nanomedicine. Magnetic anisotropies in nanoparticles arising from surfaces, shapes and interfaces in hybrid structures are important in determining the functional response in various applications. In this talk I will first introduce the basic aspects of anisotropy, how to tune it in nanostructures and ways to measure it. I will discuss resonant RF transverse susceptibility, that we have used extensively, as a powerful method to probe the effective anisotropy in magnetic materials. Tuning anisotropy has a direct impact on the performance of functional magnetic nanoparticles in biomedical applications such as contrast enhancement in MRI and magnetic hyperthermia cancer therapy. There is a need to improve the specific absorption rate (SAR) or heating efficiency of nanoparticles for hyperthermia and I will focus on the role of tuning surface and interfacial anisotropy with a goal to enhance SAR. Strategies going beyond simple spherical structures such as exchange coupled core-shell nanoparticles, nanowire, nanotube geometries can be exploited to increase saturation magnetization, effective

anisotropy and heating efficiency in magnetic hyperthermia. This lecture will combine insights into fundamental physics of magnetic nanostructures along with recent research advances in their application in nanomedicine.

**Bio:** Hari Srikanth is a Professor of Physics at the University of South Florida in Tampa, FL. He received his Ph.D. in experimental condensed matter physics from the Indian Institute of Science. After postdoctoral research for several years, Hari joined USF in 2000 and established the Functional Materials Laboratory. His research spans a wide range of topics including magnetization dynamics in nanostructures, applications of magnetic nanoparticles in nanomedicine and RF devices, magnetic refrigerant materials, spin calorics, microwave materials and complex oxides with competing magnetic phases. He has over 250 publications and has given over 200 invited talks around the world. Hari has developed a short tutorial on nanomagnetism, enjoys delivering pedagogical lectures for a broad audience and especially interacting with students and early career researchers. Hari is a Fellow of the American Physical Society, with the citation mentioning his contributions in the field of nanomagnetism, and a Senior Member of IEEE. He is currently an Associate Editor for Journal of Applied Physics. Hari has been closely involved with the MMM and INTERMAG conferences for more than 15 years serving as Publication Editor, Publication Chair and on program committees. He is also a 2019 Fulbright awardee. Hari has been a short term visiting professor in Slovak Academy of Sciences (Kosice), Basque Center for Materials (Bilbao), Indian Institute of Technology (Bombay), Indian Institute of Science (Bangalore), Federal University of Rio de Janeiro (Brazil) and Immanuel Kant Baltic Federal University (Kaliningrad)

## Reviews of Past Meetings

### Review of July International Future Energy Challenge 2019 Event

Nine finalists in the International Future Energy Challenge 2019 Student competition arrived in Madison on Sunday, July 28th with their E-Bike Controllers in hand and with high hopes to win the \$10,000 first prize. On successive days, the teams put their controllers through a series of talks and tests while the judges looked on and kept score. Here is a summary of what they went through:

Monday, July 29th: After a tour of the Grainger Maker Space at UW-Madison, each student group gave a short "elevator speech" touting the best aspects of their designs. They also published a specification sheet that was evaluated by a team of judges. Competitors and support teams were given a food pass for lunch at Union South. Each group in turn, picked in random order, connected their controller to a standard supply and motor/load for a series of bench tests. The first test were simple "Functional" tests, verifying that E-Stops or Brake inputs disabled the drive. Also, did the LED correctly blink for low battery, or other fault conditions.

Tuesday, July 30th: This day began a series of more difficult tests that included rotating the motor and assessing operational performance and overall efficiency under different load conditions. Before other tests, they had to pass a Hi-Pot leakage test from battery leads to the controller case of 250 VAC. The first operational test was a no-load, "chain off" test that simulated a fault condition where the motor either stopped at a maximum RPM, or faulted after exceeding the maximum RPM condition. They then had to pass an efficiency test with three separate loads and three separate commanded speeds. Finally, the last functional bench test was a simulated hill climb for 30 seconds.

Wednesday, July 31st: The top five teams (some did not pass all of the required tests) got to strap their controller on a Trek provided bike with the test motor mounted and run a 8-lap timed track partitioned with track guards provided by Saris. Four members of the team had to participate, each taking two laps with fast changes in between. The timed trials ended at 2:00 PM and the teams attend the final awards banquet that evening.

The UW-Madison WEMPEC Faculty Kyle M Hanson and Giri Venkataramanan did a exceptional job organizing the event and their student support provided needed help for all of the teams to repair, tune, and test the controllers. IEEE-Madison volunteers Hugh Schmidt, Tom Kaminski, Don Neumeyer and Thomas Murphy also provided much needed support during the setup and testing phases.



## International Future Energy Challenge - 2019



### News/Announcements

- Volunteers Needed:** Are you interested in volunteering? If so, IEEE Madison is looking for a few people interested in a few exciting new volunteer positions. First, the Executive Committee is looking to fill a new position of auditor. This position will work with the Treasurer and the Executive Committee to review all expenditures and ensure that IEEE Madison remains compliant with all IEEE policies and procedures, as well as applicable laws. The auditor will also serve on the Finance and Audit committee. If you are interested and wondering how much time this volunteer position will require, it is estimated that it will be at most a couple hours per month. If you are interested, please contact Nathan Toth, IEEE Madison Section Chair, at [tothnj@ieee.org](mailto:tothnj@ieee.org).

Secondly, IEEE Madison will be forming an Ethics Committee. The purpose of the Ethics Committee will be to foster awareness of ethical issues, promote ethical behavior among members of IEEE Madison, and advise the Executive Committee on IEEE Ethics policy and concerns. The Ethics Committee will consist of 3 or more members of IEEE. For those interested in volunteering for the ethics committee, please contact Nathan Toth, IEEE Madison Section Chair, at [tothnj@ieee.org](mailto:tothnj@ieee.org). The time commitment for this committee will be approximately 2 hours per month.

Volunteering for IEEE Madison helps to grow a community of engineers, scientists, and technologists in the Madison area.

If you are interested in any of the above positions or are interested in volunteering for any other position or task, please contact Nathan Toth at [tothnj@ieee.org](mailto:tothnj@ieee.org).

- IAS/PES Chapter Fall Event Update:** Dan Ludois, Chair of the Joint IAS/PES Chapter sends this note: "I've finally got the facilities at UW allow me roof access for my large scale wireless power transfer demonstration. I'll be working on coil placement for the rest of the summer with final testing occurring in the Fall. It should make for a VERY interesting and photogenic chapter meeting this fall."

Stay tuned for more information!

## IEEE Madison Leadership

- Section Chair - Nate Toth
- Section Vice Chair - Hugh Schmidt
- Section Treasurer - Tom Kaminski
- Section Secretary - Mike Stemper
- Webmaster - Nate Toth
- PES/IAS Chair - Dan Ludois
- PES/IAS Vice Chair - Eric Severson
- PES/IAS Secretary/Treasurer- Mike Stemper
- EMB Chapter Chair - Dennis Bahr
- Life Member Affinity Group Chair - San Rotter
- Life Member Affinity Group Vice Chair - Charles Cowie
- ECN Chair - Tom Kaminski
- Young Professionals Chair - Nate Toth
- Members at Large: Clark Johnson, Craig Heilman, Dennis Bahr, San Rotter.

## Membership Upgrades

Those interested in upgrading their IEEE membership level should send their resumes or other information showing five years of significant performance in an IEEE-designated field to Charles J Gervasi via email at [cj\(at\)cgervasi.com](mailto:cj(at)cgervasi.com). Madison Section Board will attempt to find Senior IEEE members knowledgeable in the applicant's area of practice who may be able to provide references. You are invited to attend the informal networking portion of the monthly Section meetings (starting at 11:30am) to meet the Section Board members and discuss intentions.

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