



**The IEEE Reliability Society
Joint Section Chapter: Boston - New Hampshire - Providence
November 2022**

<http://www.ieee.org/bostonrel>

Welcome to the Boston Chapter Newsletter:

The joint chapter hosted two presentations this autumn. Dr. Luqiao Liu presented “Magnetic Tunnel Junctions for Non-Conventional Computing” in September, and David Auda presented “Certified Reliability Engineer- CRE- Overview of The Reliability Body of Knowledge” in October.

David Silkworth will present “OpenReliability Software Tools on R December 14th. We miss the in-person networking and are grateful subject matter experts continue to participate in on-line webinars to discuss applications and solutions.

If you are interested in presenting at a monthly meeting, being adding to the meeting notifications, or attending in an AdCom meeting, send an e-mail to Jay Yakura, Vice Chair james.yakura@ieee.org or Mike Bannan, Chair michael.bannan@ieee.org. We are always working to fill the calendar with fresh reliability presentations months in advance. You may find URL links to all the meetings on <https://events.vtools.ieee.org>, - search for region 1, section Boston, CH01021. The core team of volunteers help us keep things going, but there is ample opportunity for new members to participate in the Advisory Committee.

AdCom meetings: January 24, February 28, and April 18,2023.

Future Presentations: January 11, February 8, and March 8,2023 are target dates.

Election results: the current AdCom members have consented to continue to support the joint chapter in 2023.

Meeting Highlights:

September 14, 2022:

“MAGNETIC TUNNEL JUNCTIONS FOR NON-CONVENTIONAL COMPUTING”

Dr. Luqiao Liu, Associate Professor of Electrical Engineering at Massachusetts Institute of Technology

12 participants

Dr. Liu presented the fundamental aspects of magnetic tunnel junctions (MTJs) in spintronics research. These devices are key components for magnetic field sensors and digital magnetic random-access memories. They are being studied as building blocks for non-conventional computing, utilizing their functions of non-linearity, stochasticity, etc.

From Wikipedia, Spintronics “is the study of the intrinsic spin of the electron and its associated magnetic moment, in addition to its fundamental electronic charge, in solid-state devices... Spintronics fundamentally differs from traditional electronics in that, in addition to charge state, electron spins are exploited as a further degree of freedom, with implications in the efficiency of data storage and transfer.”

The structure of magnetic random-access memory (MRAM) is like that of DRAM, with potential reliability issues related to read and write errors, device-to-device variations, and spatial interactions among devices, among others.

Recent research explores the possibility of building Hopfield neural network with MTJs by using their oscillatory or probabilistic switching properties. Current research examines the dynamic behavior of an electrically coupled array of gigahertz spin Hall nano-oscillators, where the magnetic layers of the MTJs undergo persistent precession. He is investigating an abstract model allowing for the analysis of the performance of the spin Hall oscillator network at the circuit level using conventional electronic components and considering phase noise and scalability. The results provide design insights and analysis tools toward the realization of a CMOS-integrated spin Hall oscillator Ising machine operating with a high degree of time, space, and energy efficiency.

The recording and slides for Dr. Liu’s presentation may be found at the following links:

[MAGNETIC TUNNEL JUNCTIONS FOR NON-CONVENTIONAL COMPUTING \(Passcode: ^6@3BVTA\)](#)

<https://r1.ieee.org/boston-rl/event/technical-presentation-mram/>

October 12, 2022:

“CERTIFIED RELIABILITY ENGINEER- CRE- OVERVIEW OF THE RELIABILITY BODY OF KNOWLEDGE”

David Auda, Reliability Engineer, ASQ

15 participants

The Certifications of the ASQ are globally recognized and highly respected by industry. This presentation reviewed the table of contents of the Body of Knowledge and sample questions for each category. Reliability is a unique discipline, has a language of its own, and is distinct from Quality and Statistics. The exam process has become more challenging over the last decade.

Mr. Auda emphasized that obtaining the certification is a combination of understanding the content and being able to prepare for and pass a test. He recommended that preparation to sit for the exam should be planned three or more months in advance and that good study habits with sample exam questions are essential.

The recording and slides for Mr. Auda’s presentation may be found at the following links:

[CRE- OVERVIEW OF THE RELIABILITY BODY OF KNOWLEDGE](#) (Passcode: 488aj#T2)

<https://r1.ieee.org/boston-rl/event/technical-presentation-cre/>

Upcoming Activities

December 14, 2022:

“OPEN RELIABILITY SOFTWARE TOOLS ON R”

David Silkworth, Managing Director at OpenReliability.org

Open Reliability is dedicated to the development and use of reliability engineering and operations research applications under the open-source paradigm.

Too often it is observed that engineers will choose to base decisions on what is believed to be the correct result from a shrink-wrapped program without understanding what has really taken place 'under the hood'. Indeed, some argue that their analysis may be superior, simply based on the popularity, or even expense, of the software used to generate a result. The goal here is to openly present the inner workings of various analytical techniques in a way that encourages deeper understanding of the basis for analysis. Turning these techniques into useful software may be a beneficial result, but not an end-in-itself.

The IEEE Boston Reliability Group presentation is expected to include a fast-paced perusal of published tutorial type documents and pages. These cover topics from installation of R and acquisition of the relevant R packages to some interesting uses. We can pause for discussion throughout. However, it is expected that those interested in the topics can circle back to absorb the material on their own time. The presenter remains available to handle individual guidance at djsilk@openreliability.org.

Advisory Committee (AdCom) Members 2022

Chair: Mike Bannan – BAE Systems - michael.bannan@ieee.org
Vice Chair: Jay Yakura – Retired james.yakura@ieee.org
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Giora Kuller - Retired g.k.kuller@ieee.org
Charles Recchia - charles.recchia@ieee.org

Chapter Seeks Volunteers

The IEEE mission is Advancing Technology of Humanity.

The IEEE Reliability Society mission is Promoting recognition of the reliability profession, developing, and disseminating reliability best practices, and being a resource for collaboration among reliability professions.



As a volunteer organization, our success is directly related to having people like you involved in the planning and execution of our meetings and communication processes.

Please consider joining us.

Email us to attend one of our Advisory Committee meetings to see how the team works together. Your contributions may be as much or as little as you would like. We have a good team of volunteers that help us keep things going, so if you would like to join us, there is ample opportunity to choose how you would like to contribute.

You may find URL links to all the meetings on <https://events.vtools.ieee.org>, - search for region 1, section Boston, CH01021. For updates on upcoming events see the IEEE Spectrum or contact Jay Yakura james.yakura@ieee.org or Mike Bannan michael.bannan@ieee.org to be added to our notification list.

Consider Reliability Society Membership

Society Membership includes:

- Society Newsletter (electronic),
- IEEE Transactions on Reliability (online),
- IEEE Reliability Society Conference Digital Library (online), and
- IEEE Reliability Society Resource Center (online).

Readers can contact chapter newsletter editor Mary Jones (maryajones@ieee.org) with any comments, suggestions or if interested in contributing to our next issue.

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