



## May 2013 Newsletter

Joint Section Chapter – Boston - New Hampshire - Providence

March 2013 – May 2013

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

Greetings,

We have had a great set of talks since our last newsletter, just a few months ago. In February, we had a presentation on sensing magnetic fields using lasers and a rubidium cell given by Chris Sataline, who has just defended his Master's thesis on this topic and is an employee at MIT Lincoln Laboratory. In March, Dr. Terry Welsher spoke about Electrical Overstress and Electrostatic Discharge, which drew a large audience, due to the concerns related to ever more sensitive electronics; we were lucky to have him as our speaker, because he was in the Boston area at the time, and this was coordinated as a joint meeting with the ESDA (Electrostatic Discharge Association). Dr. Welsher is an ESD consultant with Dangelmayer Associates. In April, Dr. Peter Carr of MIT Lincoln Laboratory spoke about "Biological Systems: How Reliably Can They Be Engineered?"

Our upcoming talks are expected to be excellent as well. In May, as of this writing, we will soon have Dr. Gilmore Cooke talk about the origins of reliability engineering, which he has traced to the Boston area's large electrical projects, for electrical fire alarms and electric railways. He is a member of the IEEE History Committee and the Chair of the Boston History and Milestones Committee. We are lucky that his focus has included Reliability Engineering. We plan to resume our presentations in the fall, starting in September.

I would like to invite you to take a look at the opportunities for volunteering, you can provide as much or as little time as you would like. We could use your help with organizing events, taking notes, taking pictures, or any number of other rewarding tasks. Please contact me or anyone else on the IEEE Boston Reliability AdCom (Advisory Committee).

I hope to see you soon,

***Dr. Dan Weidman***

***Chair, IEEE Boston Reliability Chapter, joint with Providence, RI and New Hampshire***

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## Contents of this issue

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### Recent Activities

February 13<sup>th</sup>, 2013

“Photonic Magnetometry Measurement at a (Short) Distance”, Chris Sataline, MIT Lincoln Laboratory, held at MIT LL, Lexington, MA.

March 20<sup>th</sup>, 2013

“Electrical Overstress (EOS), the sources and solutions”, Terry Welsher, Senior Vice President of Danglemayer Associates. Co-sponsored by the Northeast Chapter of the ESD (Electrostatic Discharge) Association, at MIT Lincoln Laboratory, Lexington, MA.

April 10<sup>th</sup>, 2013

“Biological Systems – How Reliably Can They Be Engineered?”, Dr. Peter Carr, MIT Lincoln Laboratory, held at MIT Lincoln Laboratory, Lexington, MA.

### Upcoming Events

May 8<sup>th</sup>, 2013

"Certainty of Operations: the origins of reliability engineering in Boston's fire alarm and transit systems", Gilmore G. Cooke, IEEE Boston Section ExCom, IEEE History Committee, at MIT Lincoln Laboratory.

### Announcement

May 13<sup>th</sup>, 2013

Annual Reliability Chapter Awards Competition underway!  
Call for participation, ALL Joint section Reliability Chapter members, we need your inputs!!

May 14-15, 2013

Counterfeit Components Avoidance Workshop – CTI Inc. hosted by Custom Analytical Services, Salem, NH.

## Recent Activities

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### “Photonic Magnetometry Measurement at a (Short) Distance” by Chris Sataline, MIT LL.



Chris Sataline

The February presentation was given by Chris Sataline, from MIT Lincoln Laboratory. His presentation, given on 2/13/13 to the IEEE Reliability Chapter of Boston, Providence, and New Hampshire gave the audience an insight on how he has taken photonic magnetometry measurement to another level in order to explore making measurements of magnetic fields at standoff distances. The presentation was on sensing magnetic fields using lasers and a rubidium cell which allows remote sensing of magnetic fields from a short distance, with minimal interference in the magnetic field being measured, because only a laser is needed to measure the magnetic field present where the rubidium cell is located—no wires need to connect to the cell. Chris captured the attention of the 30 attendees in the audience throughout his presentation and explained the importance of this research since design and launch of satellites is very costly, and their routine maintenance remains unlikely at present.

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## **“Electrical Overstress (EOS), the sources and solutions” by Terry Welsher, Dangelmayer Associates.**



Terry Welsher

The class of device failures typically called Electrical Overstress (EOS) has been getting increased attention in the last two years. Historically, the effects of ESD (Electrostatic Discharge) on integrated circuits, particularly handling in the factory, have received much attention in technical literature, standards bodies, and educational workshops and tutorials.

Terry Welsher, Ph.D. presented “Electrical Overstress (EOS): the sources and solutions” on March 20, 2013. He explained that most failures are “No Trouble Found” and Electrical Overstress (EOS). Combining the categories of EOS and ESD, this is the highest number of failures of failed components. He also pointed out that when a component is mounted on a Printed Wiring Board (PWB) or a Printed Circuit Board (PCB), the component is more sensitive not less sensitive, because of the additional capacitance of longer leads, so that there is more charge transfer at a given voltage than when the component is on its own, before installation onto a board. Dr. Welsher explained that an ESD failure is a type of EOS failure. However, EOS occurs only with a device, while an ESD event can occur in the absence of a device, such as lightning or when you touch a doorknob after walking on carpet on a dry winter day. Dr. Welsher also mentioned that up to half of EOS failures are Charged Board Events, which can occur during unpowered handling, rather than power induced, such as during operation of a poor design. As a practical matter, one approach when wire-bonding is to start wire-bonding to the least sensitive pin of the component, such as the ground pin, or to the ESD-control pin, if there is one.

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## **“Biological Systems – How Reliably Can They Be Engineered?” by Peter Carr, MIT Lincoln Laboratory.**



Peter Carr

Dr. Carr’s presentation had a great turnout. He spoke about the fragility of the DNA molecules and the robustness of the genetic code. In his talk, he explained how green fluorescent protein allows researchers to track specific genes in amazing detail to indicate in what portions of an organism a nearby gene is active (other colors are also used by researchers). Dr. Carr explained that “Synthetic Biology” is the field of research that is attempting to make biology easy to engineer, so that it is constructionist, analogous to the way electronic components, such as logic gates, are readily available to design a circuit. This is in contrast to using existing biological systems and genetically modifying them for a new result; we don’t normally take an existing circuit and modify it when we are trying to build a circuit with new functionality, but instead we start from scratch using basic building blocks, and we do so without necessarily understanding the construction of the

components or semiconductor physics.

Analogously, Synthetic Biology is trying to create tools for engineering new genomes without the need to craft each gene. These parts are being catalogued at [PartsRegistry.org](http://PartsRegistry.org). Dr. Carr also explained that the 4 genetic base pairs are used in triplets called “codons,” of which there are 64 possibilities (4 cubed), but many are not used. If the ones that are not presently used for organisms were used to construct an organism, then it might be possible to engineer crops that are immune to viruses or any diseases.

## Upcoming Events

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Gilmore G. Cooke

### "Certainty of Operations: the origins of reliability engineering in Boston's fire alarm and transit systems", by Gilmore G. Cooke, IEEE Boston Section ExCom, IEEE History Committee.

Reliability Engineering is believed to have been born in Boston over 160 years ago. Gilmore Cooke, SLM, IEEE Milestones Committee Chair, will explore Reliability Engineering concepts that are common to two of Boston's early milestone projects: Electric Fire Alarm System of 1852, and Power System of Boston's Rapid Transit, 1889. Certainty of operations, reliability through strength, and reliability through redundancy, were the ideas shared by two great innovators, William Channing and Fred Pearson.

#### Location:

Building: Main Cafeteria  
MIT Lincoln Laboratory  
244 Wood Street  
Lexington, Massachusetts  
United States

**Date:** 8-May-2013

**Time:** 05:30PM to 08:00PM (2.50 hours) **All times are:** US/Eastern

**Registration:** On-line at the IEEE Reliability joint section chapter website, <http://www.ieee.org/bostonrel>  
Registration deadline for this meeting is COB Monday May 6<sup>th</sup>, 2013

## Announcements

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### Annual Reliability Chapter Awards for 2012

#### *Inputs requested on technical activities from Jan 1 - Dec 31 2012*

- Participants: IEEE Reliability Society members of the IEEE Boston-New Hampshire-Providence sections
- Deadline: **COB MONDAY MAY 13th, 2013**
- Information:
  - Your inputs are critical to our success. Award money from these competitions is used to host our meetings.
  - You must be a Reliability Society member; your IEEE number is required with your submission.
  - Includes your participation & publications in IEEE or Non-IEEE technical professional events (Published Papers, Proceedings, Conference Presentations, Posters, Session chair / organizing committee duties).

*Please follow the link below read the category descriptions to enter your inputs*

Website Awards Link: [Reliability Chapter Submit your Inputs](#)

## Counterfeit Component Avoidance Workshop- Hands on Training

- When: May 14th-15th, 2013
- Where: Custom Analytical Services, 50a Northwest Dr. Unit 4 Salem N.H.
- Sponsor: Components Technology Institute, Inc.
- Information: Registration is now open for this event, seating is limited to 18 participants
- Registration Link: [Topics & Registration Details](#)

### *Attendees will learn about*

- Use of microscopes, lighting and camera
- Actual use of X-ray to examine internal characteristics
- Using XRF to assess the lead material & plating
- Decapping of PEMs and die assessment
- Electrical testing with ABI Sentry tester
- Value of FTIR & SEM/EDX
- Lab experts on each of these detection techniques will assist the teams

*Attendees are encouraged to bring suspect counterfeit components for assessment by the instructors*

The IEEE Reliability Society Joint Section Chapter  
– Boston - New Hampshire - Providence  
February Newsletter is available at the following link:

[Boston - New Hampshire - Providence Joint Chapter Newsletter](#)

or copy and paste the URL below on your browser

[http://ewh.ieee.org/r1/boston/ri/newsletters/boston\\_chapter\\_newsletter\\_may13.pdf](http://ewh.ieee.org/r1/boston/ri/newsletters/boston_chapter_newsletter_may13.pdf)