

May 2006

# IEEE New Hampshire Section Newsletter

[www.ieee.org/NH\\_Section](http://www.ieee.org/NH_Section)

## Contents:

1. Chairman's Thoughts
2. Chapter News
3. Summer Cruise Update
4. IEEE UNH Student Branch and Officers
5. Teacher In-Service Program Training for Engineers #2
6. Young Inventors' Competition
7. Executive Committee
8. Housekeeping

## 1. Chairman's Thoughts

First, I thank the Student Chapter at UNH Durham for allowing me an opportunity to speak at their monthly pizza luncheon on April 13. The title of my talk was Leveraging a Wealth of Technology. I attempted to convey a perspective on engineering practice based on my forty years of experience. Our Section also donated \$500.00 towards new furniture for the IEEE room that will be part of the new Kingsbury Hall. BAE Systems donated some refurbished computers and a scanner to the same cause.

Plans are almost complete for the outing and luncheon cruise on the M.S. Mount Washington on Lake Winnepesaukee scheduled for July 22. Last year we had to turn last minute sign-ups away, so register early. Details about the cruise are in a separate article below.

Thanks goes to Jim Bock, our Webmaster, for updating our website to give it a new fresh look and for getting us a new easier to remember URL, [www.ieee.org/NH\\_Section](http://www.ieee.org/NH_Section)

We have several IEEE Distinguished Lecturers coming to New Hampshire. See the Chapter notice below and look for announcements on our website and in the e-reflector. Although we don't officially have an active Communications Society in NH, we plan to have a lecture by a gentleman from that organization in late September. His talk will also be of interest to a wide variety of disciplines including RF/Microwave folks and Computer users.

I would like to thank Harold Belson, Region 1, Northeast Area Chair for attending our April ExCom meeting. Harold made some suggestions on how we could further improve the administration of the section. We will be discussing these suggestions at our May meeting.

We have received a large number of suggestions for naming this newsletter. We should be picking the winning name on May 11.

Finally, with growth come new challenges. We have a new meeting place for our monthly Executive Committee Board Dinner meetings, but attendance is limited to 12 persons due to room size and budget. We used to hope and wish for getting that many and it rarely happened, but now presence of at least 10 attendees is becoming routine. Therefore we're going to direct invitations to

the monthly meetings and require RSVP. Of course voting board members are expected at all meetings. Some other volunteer helpers may be attending on a rotating basis. Please understand that we do want your help.

Please feel free to contact Tom Perkins at [tomperkins@ieee.org](mailto:tomperkins@ieee.org) or [NHIEEE@aol.org](mailto:NHIEEE@aol.org) . I would enjoy hearing from you.

## **2. Chapter News**

### **Computer Society Chapter**

The chapter will hold a meeting on **Tuesday May 2**, at 5 to 6 PM. Dr. Shahriar Movafaghi will give a presentation on Business Process Outsourcing. The meeting will be in the Walker Auditorium of Robert Frost Hall at the SNHU.

The Chapter has invited the Distinguished Visitor Program speaker, Robert Gezelter, to talk on Safe Computing, a topic that touches on personal and family computer use as well as industry threats, and is a matter of concern for all IEEE members.

"Safe Computing: A Chat with Computer Security Handbook Contributing Editor Robert Gezelter," Chandler Memorial Library, 257 Main Street, Nashua, NH 03060, (603) 594-3415, 7-9 PM on May 18th. This presentation is open to the public.

For more information contact Jim Isaak at [snhu2004alt@JimIsaak.com](mailto:snhu2004alt@JimIsaak.com).

### **Microwave Theory and Techniques Society Chapter**

#### ***Microwave GaN-Based Field Effect Transistors***

**Professor Michael Shur, Distinguished Microwave Lecturer**

**Rensselaer Polytechnic Institute, Troy, NY**

**Monday, May 15, 2006 at 6:00 PM**

Unique properties of GaN/AlN/InN and related semiconductors make them superior for high-power applications. Device physics and device design of GaN-based FETs are different from those for more conventional GaAs and InGaAs based transistors. In GaN/InN/AlN transistors, strain control and polarization effects are very important, and a new epitaxial technique (called MEMO-CVD), a novel strain energy band engineering (SEBE) approach, and quantum well designs have been developed to control strain, polarization, and non-ideal effects. Also, a very large sheet electron density at heterointerfaces in the GaN-based FET channels allows for a novel and unique insulated gate heterostructure design that has many advantages over more conventional heterostructure FETs. Special field plate designs can dramatically increase the breakdown voltage. As a result, high current values in GaN-based microwave field effect transistors can be combined with very high breakdown voltages, and these devices have potential of replacing traditional GaAs and InGaAs based microwave field effect transistors.

Location: BAE Systems Headquarters, Auditorium at Main Lobby, 65 Spit Brook Road, Nashua, NH. Entrance to Parking Lot is ¼ mile east of Exit 1, off F.E. Everett Turnpike (Route 3)

Any questions may be directed to [thomas.perkins@baesystems.com](mailto:thomas.perkins@baesystems.com) or call (603) 885-5040.

## Power Electronics Society Chapter

If you have any suggestions for meeting topics or speakers; or if you would like to become more active in the Chapter please contact Chuck Button at [chuckbutton@ieee.org](mailto:chuckbutton@ieee.org)

## Power Engineering Society Chapter

If you have any suggestions for meeting topics or speakers; or if you would like to become more active in the Chapter please contact Paul Krell at [krell@unitil.com](mailto:krell@unitil.com)

## 3. Summer Cruise Update



Don't Miss the Boat!

The IEEE New Hampshire Section's 2006 Summer Cruise is setting sail from Weirs Beach at 12:30 PM on Saturday, July 22.

\$15 each for IEEE members and family (\$50 per family maximum)  
\$38 each for all others

Ticket price includes 2 ½ hour cruise on Lake Winnepesaukee,  
Private, air conditioned dining room,  
Dinner Buffet & Cash Bar

All guests are invited to remain on board for the 3:15 Cruise at no additional charge.

RSVP: [NHIEEE@AOL.COM](mailto:NHIEEE@AOL.COM) by July 1, 2006

MAIL PAYMENTS TO:  
Donna Davis  
NH Section Administrator  
34 Cohas Drive  
Auburn, NH 03032

Please include your name, email address, # of guests,  
and check made payable to: IEEE-NH Section



**MOUNT WASHINGTON CRUISES**

P.O. Box 5367 • Weirs Beach, NH 03247 • (888) 843-6686 • (603) 366-5531



GIVE THE GIFT  
OF A CRUISE

**CruiseN**  
\*com

## 4. IEEE UNH Student Branch and Officers

The IEEE Student Branch at the University of New Hampshire has been active this year in creating a balance of academic and community building events for students and faculty, with the purpose of promoting a sense of community, contributing back to the college, and creating an awareness of opportunities for undergraduates.

Academic contributions range from providing engineering tutoring to under-graduate students, to hosting a lecture series aimed at fostering interests in various fields for undergraduate and graduate students. Tom Perkins, Chair of the IEEE NH Section, has been a participant in the lecture series.

The IEEE Student Officers hosted an autumn barbeque and holiday party aimed at fostering community between engineering students as well as faculty at UNH. The IEEE Student Branch also hosted an IEEE Dinner on April 26<sup>th</sup>, which was Senior Project Day for seniors in Electrical and Computer Engineering at UNH. The dinner celebrated the upcoming completion of another successful academic year. The officers are also hosting a spring barbeque for all engineering departments on the last day of classes, and will continue the lecture series.

The current UNH IEEE officers, who are seniors in electrical engineering, have also been working to create a comfortable and inspiring space for students and faculty with new furnishing for the IEEE Student Lounge, in the new engineering building, Kingsbury Hall. The IEEE NH Section and BAE Systems have made contributions to the furnishing of the new lounge.

This year the IEEE Student Branch has been ably lead by Bradley Bell, Chair, Katelyn Palmer, Treasurer, and Michael Genovese, Historian.

Bradley Bell is a senior in electrical engineering and will be continuing his education as a graduate student at UNH. Brad works for CATLab, also entitled Project54, which implements advanced technologies into police cruisers for the purposes of improving the ability of police to exchange, collect and interpret data and to provide seamless integration of the controls of all of the equipment within a police cruiser. For his senior project, Brad is doing research for CATLab on human, computer interactions. In particular he is studying speech user interfaces, the importance of user location in relation to a speaker when the system gives a speech output, and the affect that the content of the output has on the user, for example the difference in the affect of a command versus a more passive output.

Katelyn Palmer is also a senior in electrical engineering. She has worked on the Un-tethered Officer Project at UNH for the past two summers, and received a summer undergraduate research fellowship grant for research related to extending Project54's emergency response communication technologies to an officer outside of his or her vehicle. Katelyn also took advantage of UNH's study abroad relationship with the Budapest University of Technology and Economics and studied

abroad in Budapest, Hungary the first semester of her junior year. For her senior project Katelyn is working with nine mechanical engineers on the design and construction of a racing hovercraft, in particular on an electric control system for a linear actuated trim tail. In addition, Katelyn has volunteered for the past three years as a Wildcat Youth Mentor and now serves as a site coordinator and liaison for one of the mentoring locations. After graduation, Katelyn looks forward to her work at Raytheon as well as working towards her masters.

Michael Genovese grew up in Bow, NH. He is a senior in electrical engineering whose interests revolve around music and music technology, as he has had much experience as a musician, sound man, DJ, recording technician and equipment constructor. Michael has built multiple non-traditional speaker cabinets which incorporate mood lighting and has extended low and high frequency drivers for guitar amplification. He is currently working on a personal guitar isolation system that incorporates crossover technology, vacuum tubes and acoustical foam to create a guitar amplifier that is capable of extending the usable guitar bandwidth while maintaining good tone at a controllable volume. The system uses an isolation cabinet containing an 8" guitar speaker so that any audio signal sent to it will be attenuated down to a quiet volume and only captured by a microphone. After graduation, Michael hopes to find a job within the music technology field. He also has interests in power grid technology as well as sustainable energy solutions, as he feels that there will be a growing energy crisis in the near future for which engineers will have to design appropriate solutions.

## **5. Teacher In-Service Program Training for Engineers #2**

Last month, in order to meet publication deadlines, your editor put together a rushed article on this program. This month Don Sherwood, another attendee at the workshop, has prepared the following more detailed report on his experiences at the workshop.

A Teacher in Service Program workshop was held at the Boston Museum of Science on March 24<sup>th</sup> and 25<sup>th</sup>. This program was started by the IEEE to address declining enrollment seen in engineering schools in the United States and in other developed countries.

The IEEE thinks an effective way to reverse this trend is to increase the level of technological literacy at the local level, particularly in high schools and in elementary schools. To accomplish this, the IEEE has developed 15 hands on activities that are geared to students from ages 4 to 18 (more will be coming). These activities emphasize applied inquiry-based learning with increased math requirements as the age level increases.

The goal of the program is have teams from individual sections present these activities to the teachers as opportunities to increase their student's awareness in various engineering and technology areas. The training sessions can be used to fulfill the teachers' in-service professional development requirements. In-service refers to the continuing education teachers are required to complete after graduation.

There were a number of presentations and hands on activities during the workshop explaining how the program works and how sections can bring it to their individual communities.

Ralph Painter talked about his experiences getting the program up and running in the Florida West Coast section. He emphasized the importance of making proper contacts and keeping the cost to a minimum, typically under \$100 per 30 student class.

There was a panel discussion on how to approach the school community, with as many suggestions as panel members.

Doug Gorham, IEEE Educational Activities Director of Educational Outreach, suggested that one or two training sessions for teachers during a year represents a good section program.

Members from the Museum of Science presented a similar program they developed called Engineering is Elementary. It is currently being used in a number of Massachusetts communities.

The hands on activities were both instructive and fun. They include making a mobile, sail, robot arm and reverse engineering three types of mechanical pens. They emphasized the importance of including all material in a kit and keeping the cost down. I enjoyed making the mobile. It can be used to demonstrate balancing concepts for the lower grades; higher grades can use it to solve rotational equilibrium equations. Mine actually balanced, more or less, the first time.

A key requirement of the program is to identify the state standards that each activity presented satisfies. Standards are the particular topics that must be covered during the course of the year for each subject. They are different for each state. The Massachusetts' standards for Science and Technology / Engineering Curriculum Framework were passed out at the workshop. The web site for the New Hampshire science and technology standards is:

<http://www.ed.state.nh.us/education/doe/organization/curriculum/Assessment/Science.htm>.

I enjoyed the workshop. The presentations and activities were very well prepared and presented. The workshop was very well attended, with one participant traveling from South Africa. Some of the antidotal comments suggest that making contacts with the school community is a "learn as you go" process, and can be difficult at first. The table below summarizes the currently available lesson plans. The lesson plans can be viewed or downloaded from

<http://www.ieee.org/web/education/preuniversity/tispt/lessons.html>

This is a worthwhile project that I look forward to working on during the next year.

<b>Lesson Plan Focus</b>	<b>Ages</b>
<b>◆Everything You Wanted To Know About Electric Motors</b> (Lesson Focus: Electric Motors: principles and everyday uses)	10-14
<b>◆Light Waves and Spectroscopes</b> (Lesson Focus: Light and Spectrometry)	10-14
<b>◆Simple Machines</b> (Lesson Focus: Simple machines: their principles and uses)	4-9
<b>◆The Orbit of Planet Gamma</b> (Lesson Focus: Random error and systematic error)	10-14
<b>◆Build Your Own Robot Arm</b> (Lesson Focus: Develop a robot arm using common materials)	10-18
<b>◆Build Working Models With Household Items</b> (Lesson Focus: Develop a working model of a nail clipper)	10-18
<b>◆Get Connected With Ohm's Law</b> (Lesson Focus: Demonstrate Ohm's Law with digital multi-meter)	10-18
<b>◆Insulators and Conductors</b> (Lesson Focus: Demonstrate conductors and insulators)	8-14
<b>◆Simple Electric Switches</b>	8-14

(Lesson Focus: Demonstrate how switches control circuits)	
<b>◆Two Button Buzzer Circuit</b> (Lesson Focus: Demonstrate how two switches interact in an electrical circuit such as that used to sound a buzzer)	8-14
<b>◆Design and Build a Better Candy Bag</b> (Lesson Focus: Evaluate, design, and build a better candy bag)	8-14
<b>◆Series and Parallel Circuits</b> (Lesson Focus: Demonstrate parallel and serial circuit design)	8-14
<b>◆Solid Conductors</b> (Lesson Focus: Demonstrate the concept of solid conductors)	8-14
<b>◆Flashlights and Batteries</b> (Lesson Focus: Demonstrate electrical circuits in a flashlight)	7-11
<b>◆Rotational Equilibrium: A Question of Balance</b> (Lesson Focus: Demonstrate rotational equilibrium concepts)	11-18



Jim Anderson (tan shirt) trying to understand the directions and Don Sherwood (gray sweater) having fun during the Build Your Own Robot Arm project.

## 6. Young Inventors' Competition

On Saturday April 8 Dean Bacon, Celine Bilodeau and Jim Anderson traveled to the Winnisquam High School in Tilton to judge the Electrical Specialty Awards at the 20<sup>th</sup> Young Inventors' Competition. The wide variety of entries and the knowledge and enthusiasm of the students was mind boggling.

The first place award, a \$75.00 gift certificate to Borders book store, was presented to Ian Palleiko, a second grader at Rollinsford Grade School. His submission was in the Inventions category and was titled "Power Gloves with Question Robot 2000." The gloves included a battery and contacts. By touching the terminals of a motor you could see if it would run. There were also a series of boards with electricity related multiple choice questions. By touching the contacts of a particular answer you could tell if you had selected the correct answer.

The second place award, a \$50.00 gift certificate to Borders book store, was presented to Tim Lavin, a fourth grader at Peter Woodbury School in Bedford. His submission was in the Rube Goldberg Machines category and was titled "The Dog-O-Matic." The machine used a selection of batteries, switches and a motor in true Rube Goldberg fashion to water a dog.

The third place award, a \$25.00 gift certificate to Borders book store, was presented to Alex Esakof, a sixth grader at Hampstead Academy in Atkinson. His submission was in the Inventions category and was titled "E-Raser." This was an electrically powered eraser to make it easier for handicapped people to use an eraser.

If you want to revive your faith in the capabilities of the young people of New Hampshire, volunteer to help with the judging next year. To volunteer, contact Dean Bacon [bacond1@NU.com](mailto:bacond1@NU.com)

## **7. Executive Committee**

For a list of the ExCom members and their contact information please go to:  
[http://ewh.ieee.org/r1/new\\_hampshire/Officers.html](http://ewh.ieee.org/r1/new_hampshire/Officers.html)

## **8. Housekeeping**

If you have any suggestions for improving this newsletter please contact the Editor, Jim Anderson, at [james-w-anderson@ieee.org](mailto:james-w-anderson@ieee.org).

If you wish to be removed from the mailing list or change your email address, please send an email to the NH Section Administrator, Donna Davis, at [NHIEEE@aol.com](mailto:NHIEEE@aol.com).