

Vermont

Engineering the Future Together

Newsletter

Fall 2011

2011 Award Recipients

Twenty Vermont Professionals received IEEE awards at the annual banquet hosted by the Institute of Electrical and Electronics Engineers (IEEE) Green Mountain Section (GMS) Dec. 2, 2011. **Page 1**

Outreach

Explore STEM projects with high school teams and After Dark, meet with Vermont Inventors and their inventions. **Page 4 and 5**



Student Activities

AERO, Engineering Summer Camp, SEED, IEC, SPAC and iSTEP events. **Page 6**



Education

Engineering your career for a better future. Considerations for Technologists, Engineers, Scientists and Entrepreneurs. **Page 7**



Professional Activities

Develop new skills, communicate best practices, share knowledge and celebrated professional achievements. **R&D News: Sanders, Schulman Announce Innovative Energy Initiative to be Housed at UVM. Page 8**

About IEEE GMS

IEEE and its members inspire a global community through IEEE's highly cited publications, conferences, technology standards, professional and educational activities. **Page 11**



ANNUAL IEEE GMS AWARDS: 2011 ENGINEER OF THE YEAR AWARD

The IEEE GMS Engineer of the Year Award recognizes outstanding contributions to the advancement of the engineering profession.

The 2011 recipient is John Barth, "for seminal improvements to the state of the art of Embedded Dynamic Random Memory Circuit Technology".

IEEE's CORE VALUES

Service to humanity: leveraging technology and engineering to benefit human welfare; promoting public awareness and understanding of the engineering profession.

Peer-reviewed: using unbiased information to enhance the quality of life for all people.

Global focus: supporting and embracing the global nature of and need for technical work and engineering solutions.



Pascal Nsame,
IEEE GMS Chair (Left)
and
John Barth,
Recipient of the
1st IEEE GMS 2011
Engineer of the Year (Right)

Intellectual activity: forward-thinking; nurturing new and existing science and technology.

Growth and nurturing of the profession: encouraging education as a fundamental activity of engineers, scientists and technologists at all levels and at all times; ensuring a pipeline of students to preserve the profession.

Collaboration and community building: cultivating active, vibrant and honest exchange among cross-disciplinary and interdisciplinary global communities of technical professionals.

Professionalism: creating a world in which engineers and scientists are respected for their exemplary ethical behavior and volunteerism.

Trust and respect: promoting a culture where contributions at all levels are valued; encouraging member driven, volunteer- led, knowledge-based projects; building effective volunteer / staff partnerships.

IEEE's GOAL

Be essential to the global technical community and to technical professionals everywhere, and be universally recognized for the contributions of technology and of technical professionals in improving global conditions.



1st IEEE GMS 2011 AWARDS RECIPIENTS

The 1st 2011 INNOVATION AWARDS Recipients are: Geordie M. Braceras, Jeanne P. Bickford, Igor Arsovski, Edward C. Cooney III, David L. Gardell, Paul D. Kartschoke, David E. Lackey, Junjun Li, Qizhi Liu, Douglas W. Stout, “for seminal improvements to the state of the art of Semiconductor Intellectual Property Portfolio Development”.

TECHNOLOGY OF THE YEAR



The IEEE GMS recognized A.J. Rossman, Founder of DRAKER LABORATORIES with the “Technology of the Year Award for seminal improvements to the state of the art of Photovoltaic Technology and Services”.

Draker Labs provides highly accurate and reliable turnkey monitoring solutions that help owners and operators of commercial and utility-scale PV systems maximize the efficiency and profitability of their solar assets. Draker's Sentalis™ monitoring suite combines proven field instrumentation with an intuitive web-based data management system and unmatched customer support.

For more information visit:
<http://www.drakerlabs.com/>

Congratulations to the IEEE GMS 2011 Award Recipients.

ENTREPRENEUR OF THE YEAR



The IEEE GMS recognized Mike Slattery, President asicNorth with the “2011 Entrepreneur of the Award for seminal improvements to the state of the art of Circuit Technology and Services”.

asicNorth provides comprehensive ASIC solutions from team augmentation to turnkey design. Bringing together expert logic and circuit designers to provide highly skilled design services to the electronics industry, asicNorth makes chips happen with attention to detail and unrivaled commitment.

For more information visit:
<http://www.asicnorth.com/>

SERVICE OF THE YEAR



The IEEE GMS presented Vermont Electric Cooperative (VEC) with the 2011 Service of the Year Award during their annual meeting banquet dinner held on December 2 at the Inn at Essex. One of nine awards presented during the evening, recognized VEC for its role in driving improvements to the state of the art of smart grid technology and services. Specifically IEEE commended VEC on its deployment of smart meters, and most significantly, the Cooperative's effectiveness in demonstrating the benefits of smart meters to its consumers. “Service innovation including information management, data analysis, and optimization helps create a more flexible and responsive grid” says Pascal Nsame, the IEEE Green Mountain Section Chair. “We are honored to have received IEEE Green Mountain Chapter's Service of the Year award that recognizes VEC for its accomplishments” said David Hallquist, CEO. More information about VEC's Smart Grid Story can be found at www.vermontelectric.coop.

COLLEGE OF THE YEAR



The IEEE GMS recognized Vermont Technical College with the “2011 IEEE College of the Year Award for seminal improvements to the state of the art of College Education”

One of the five Vermont State Colleges and the only one that specializes in technical education, Vermont Tech offers academic programs that teach the skills needed to succeed in today's evolving technological workplace.

Vermont Technical College's ranking in the 2012 edition of Best Colleges is Regional Colleges (North), 28. Vermont Technical College is a public institution that was founded in 1866. It has a total undergraduate enrollment of 1,658, its setting is rural, and the campus size is 544 acres.

For more information visit:
<http://www.vtc.edu/>

FACULTY OF THE YEAR



The IEEE Green Mountain Section recognized Jeff Frolik with the “2011 IEEE Faculty of the Year Award.” The citation of the award recognizes Dr. Frolik “for seminal improvements to multi-disciplinary engineering education” and for further contributing “to the advancement of the engineering profession.”

Dr. Frolik received his Ph.D. in electrical engineering from The University of Michigan in 1995. He came to UVM College of Engineering and Mathematical Sciences in 2002. In addition to his technical research related to environmental sensor networks and wireless communications, he has been the principal investigator on engineering education grants awarded by NSF and Hewlett Packard. The results of these educational efforts have been disseminated in over twenty journal articles and conference proceedings.

For more information visit:
<http://www.cems.uvm.edu/~jfrolik/>

Outstanding Technical Contribution (OTC) Awards

The 2011 IEEE GMS OTC Award Recipients are: *Yves Ngu* "for seminal improvements to the state of the art of Compact Modeling of Through-Silicon-Via (TSV) Technology" and *Tony Stamper* "for seminal improvements to the state of the art of Micro-Electro-Mechanical Systems (MEMS) Technology"

LEADERSHIP AWARD



Dawn Densmore has been awarded the 2011 IEEE "Leadership" award by the Green Mountain Section of that organization. The citation of the award recognizes Ms. Densmore "for seminal improvements to the state of the art of Science, Technology, Engineering and Mathematics Education," and for further contributing "to the advancement of the engineering profession." Densmore has been leading the outreach programs of the College of Engineering and Mathematical Sciences at UVM since 1990.

"It is a pleasure to work with Dawn because of her boundless energy and enthusiasm," said Jeff Frolik, Interim Associate Director of the School of Engineering.

Interim Dean of the College, Bernard "Chip" Cole added, "Dawn is a tremendous resource for Vermont. Her creative drive positively energizes young people across the state to explore and grow in the disciplines of science, technology, engineering and mathematics, areas that are highly important to the future economic growth of Vermont. We are all very proud of Dawn and the outstanding programs that she leads."

More information about the college's outreach programs can be found at: <http://www.uvm.edu/~cems/?Page=outreach/default.php>.

LEADERSHIP AWARD



The IEEE Green Mountain Section recognized Tian Xia with "Leadership Award" for, "Seminal Improvements to the State-Of-The-Art of Circuit Design and Test Technology."

Dr. Tian Xia received his Ph.D. in electrical and computer engineering from the University of Rhode Island.

He worked in IBM T.J. Watson Research Center in summers of 2002 and 2003.

He joined the University of Vermont as an assistant professor in 2003.

His research focuses on mixed signal VLSI circuit design and test.

He is a senior member of IEEE- Computer Society, and IEEE- Solid State Circuits Society.

Specifically, Dr. Xia focuses on research in mixed signal circuit design and testing, and adaptive multifunctional VLSI circuits, and reconfigurable computing.

For more information visit: <http://www.cems.uvm.edu/~xiat/>

IEEE GMS ANNUAL Meeting held Dec. 2, 2011



Robert Dostis, Director, [Green Mountain Power \(GMP\)](#) and Charlie Pughe, Project Manager, GMP invited keynote speakers at the 2011 IEEE GMS annual meeting discussed the Kingdom Community Wind project.

A 63 Megawatts wind generation plant that will be Vermont's largest wind development and most significant renewable energy project. In Lowell, Vermont, twenty-one wind turbines will be erected that will produce enough electricity to power 24,000 Vermont homes.

At between 9 and 10 cents per kilowatt-hour, the energy produced is the lowest cost renewable power available to GMP.

Building generation in Vermont supports the Vermont economy - to date 90 Vermont companies have been hired for the project. When completed in December 2012, it will provide electricity to Vermont Electric Coop members and Green Mountain Power customers.

Success of the project required intense community outreach over the five years from concept to completion. As a renewable energy wind project, Kingdom Community Wind will help reduce our dependence on carbon based fuels in New England and protect air quality.



STEM OUTREACH

Creativity in Action

In its 21st year, The University of Vermont (UVM) Design Aiken/TASC (Technology and Science Connection) engineering challenge provides middle and high school students with student prizes and recognition to schools who compete on Saturday, December 3, 2011 in the tennis court area of the UVM Patrick Gym. This year 62 teams from 21 schools across Vermont and New Hampshire participated. There were two challenges:

1. DELIVERY OF EMERGENCY SUPPLIES.

This challenge is designed to encourage middle and high school students to explore sustainable engineering technology. In this scenario, an earthquake or other natural disaster destroys homes, hospitals, bridges, airports, roads, harbors, and the rail system, isolating an area and leaving residents without access to shelter, hospitals, stores, or pharmacies. Students will create a device that can deliver "Emergency Relief Supplies" via a catapult to provide critical supplies to people isolated by the natural

disaster. Supplies must be delivered to designated locations in the simulated landscape where they can be retrieved by the isolated population and avoid areas such as swamps, rivers, mountains, and ponds where the supplies would be difficult to retrieve or damaged.

2. CREATION OF VIDEO FEATURING EMERGENCY PREPAREDNESS FOR CARS/VEHICLES

Vermont can be known for having its share of ice storms, snowstorms and sudden flash floods. What does it take to have a car or vehicle prepared to handle these unexpected problems? Create a 30 or 60 sec. Public Service Announcement (PSA) or radio announcement that addresses the need for vehicle emergency preparedness. Tell us what items should be in every vehicle to survive if stranded on the road due to an emergency?

For more information about the winning teams, visit: <http://www.cems.uvm.edu/TASC/2011/Winners2011.php>

Aligned with the UVM Design TASC/ Aiken Challenges, the Technology Knowledge Fair (Scouts in Engineering) program offers activities on topics that include: aviation, architecture, computers, electricity, engineering, energy, geology, hunter safety, metals, radio, photography, space exploration, and surveying.

About UVM: The University of Vermont rose 12 places in the 2012 U.S. News & World Report college rankings to 82, a larger jump than any other school in the National Universities category but one. UVM was also ranked 36th among 172 public universities, up from 41st last year. [Read the rankings](#) on the U.S. News & World Report website.



IEEE: Delivery of Emergency Relief Supplies Using Smallest Energy Generation and Footprint Award

1st Hanover High School - For the Win (Left)

2nd Middlebury Union High School - Purple Haze (Middle)

3rd Mt Mansfield Union High School - Man Cannon (Right)





THAT'S BRILLIANT

Meet Vermont Inventors and their Innovative Product in Action.

InventVermont



InventVermont is a 501(c)(3) non-profit organization with the mission to promote innovation, invention and creativity through educational programs and by providing a mechanism for sharing information among its members and associates.

InventVermont is a forum for the development and nurturing of the capabilities of its members to conceive, develop, patent, market, and benefit from the innovation process.

For more information visit:
<http://www.inventvermont.com/>

An ECHO After Dark evening of original inventions created by Vermonters.

Hampton Direct



Innovations: The Road To The Future

When it comes to finding solutions for the problems shaping our future, the conversation starts with innovation. We ask: Where do great ideas come from? How can they be implemented and taken to market? Do you have the next big idea that can improve the lives of the world's consumers? Hampton Direct is a company dedicated to enriching life through innovation. If we believe your product idea is marketable, we invest in it 100%.

For more information visit:
<http://www.hamptondirect.com/>

MicroStrain



MicroStrain® is based in Williston, Vermont and is a privately held corporation which has introduced a broad line of micro-displacement sensors that could withstand extreme temperatures, hundreds of millions of cycles, and complete submersion in saline.

Sensors are literally changing our world to enable the next generation of smarter and safer machines, civil structures, and implanted devices.

MicroStrain® innovate by combining multiple sensors along with advanced micro controllers to enhance system performance.

For more information visit:
<http://www.microstrain.com/>

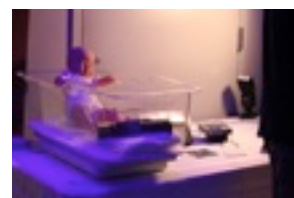
Vermont FabLab



The UVM FabLab will be a facility that brings together high-power computer aided design (CAD) tools and the means by which to realize physical implementations.

The facility, housed in the School of Engineering, will serve not only UVM Engineering students but will also the greater Burlington community through continuing education courses for both adults and high school students. We foresee the UVM FabLab to be an incubator for ideas; a place where a community of artists, engineers, inventors and designers of all ages and experiences interact to develop and test new and novel products. For more information visit: <http://www.vermontfablab.org/>

Microprocessor Designs, Inc.



Microprocessor Designs is an electrical engineering and product design consulting group which specializes in microprocessor based product design and development from the concept phase through manufacturing.

In this capacity the group has provided hardware, firmware, and software expertise for numerous [clients](#) within the US and Canada.

For more information visit:
<http://www.updesigns.com/>



Engineering Summer Camp

Growth and nurturing of the profession

The UVM/GIV Engineering Summer Institute is a 7-day summer program for high school students currently scheduled July 21 - July 28, 2012.

The UVM/GIV Engineering Institute enrolls approximately 100 high school students, freshmen, sophomores, and juniors.

"The Institute focuses on implementing sustainable engineering practices, which is the challenge all engineers and scientists currently face -- how to use global resources in sustainable and equitable ways," says Bernard "Chip" Cole, Interim Dean of the UVM College of Engineering and Mathematical Sciences.

"These students will be empowered with knowledge on how technology impacts our world." Through hands-on engineering projects, laboratory experiences, faculty presentations, and enlightening tours, students will work on real projects in project groups using systems approach solutions.

Start solving the world's sustainability issues now!

Projects include: Renewable/Sustainable Engineering, Robotics Systems, Aerospace Engineering, Engineering Design, and Earth Systems Engineering challenges.

Each student will select a first choice project and will submit an essay delineating the reason why and how research in this area will impact our world.

Recognition will be given for categories such as: Sustainability, Benefit to Humanity, Cost Benefit Analysis, and Communications.

Students are housed in campus dorms, develop a first-hand awareness of the nature of campus life, and learn college survival strategies.

For more information visit: <http://www.cems.uvm.edu/giv/2012/>



AREO SEED PROJECT

Cross-disciplinary collaboration in action

The Alternative Energy Racing Organization (AERO) is a student run club of roughly 25 members at the University of Vermont dedicated to learning, implementing and advancing hybrid technology. Each year, a formula style car is built from the ground up by students. The car is judged on its design as well as its performance in static and dynamic events. At the International Formula Hybrid event in Loudon, New Hampshire this coming May, AERO will be competing with international teams from across the globe. The car's previous success was attributed in large part to the car's custom power train. This power train is a parallel hybrid transaxle in which the internal combustion engine is coupled to the electric motor via the main shaft of the transmission. This allows both systems to propel the car at the same time. The internal combustion cylinder, clutch, and transmission are all stock parts from a 250cc Honda dirt bike. The electric motor is an AC31 3-phase induction motor from High Performance Electric Vehicle Systems. The shifting system will be an intelligent, automated procedure for shifting the formula hybrid racecar. In this shifting system, the CPU takes inputs from the driver and from onboard sensors. It then makes go/no-go decisions on whether or not to shift depending on a number of parameters. The microcontrollers used in the shifting system are ATMEL Atmega 328s implemented in an Arduino Uno breakout board. This is an open-source development tool that is used extensively by hobbyists. The inter-microcontroller communication system used in the AERO car is CAN2.0B and will be used with our shifting system as well. CAN stands for Controller Area Network and is a standard used in the automotive industry.

In addition to the vital teaching provided by engineers at partner companies, ten members of the CEMS faculty are serving as mentors to the SEED student teams. Guidance from Mike Rosen, Jeff Marshall, Josh Bongard, Mike Coleman, Mandar Dewoolkar, Yves Dubief, Jeff Frolik, Darren Hitt, Robert Jenkins and Tian Xia ensure that project implementation is grounded in knowledge and skills from all corners of the undergraduate engineering curriculum.



IEC/SPAC/iSTEP

The IEC and IEEE announce a US\$45,000 [global challenge](#) to examine the impact of electrotechnology and inspire the next generation of innovation. The competition is open to academics centered on the theme: *How does electrotechnology impact economic, social and environmental development? This global initiative invites the world's Academic Institutions to analyze and debate the impact of electrotechnology on the economic, social and environmental development of nations and regions, including how accepted standards affect this process.*

Only one registration per author/co-author will be accepted. Multiple registrations from the same Academic Institution are permitted.

Registration opens: 28 October 2011 12:00 UTC

Registration closes: 1 March 2012 24:00 UTC

All submissions close: 1 July 2012 24:00 UTC

Final deadline for submission of full publication prefaced by an abstract is 1 July 2012 24:00 UTC.

Prize money: Total of \$45 000

1st Prize: \$20 000

2nd Prize: \$15 000

3rd Prize: \$10 000

Who is eligible to participate? The IEC-IEEE Challenge is open to all persons affiliated with an Academic Institution that offers post-graduate study programs. These include members and heads of faculty, professors, lecturers, post-graduate students, teaching and research staff.

Connecting Student with Industry Professionals and IEE Leaders

IEEE leaders and industry representatives will meet with students and faculty advisers Feb. 10, 2012 to discuss collaborative opportunities for technical community development in Vermont during a joined session of the 2nd IEEE Student Professional Awareness Conference and the 1st UVM hosted IEEE Region 1's Integrated Student Transition to Engineering/Technology Professional (iSTEP) event program, which provides students, industry professionals, and IEEE leaders the opportunity to share career experiences at one venue sponsored by the IEEE GMS.

R&D News:

1. Sen. Bernie Sanders and Gov. Peter Schulman announced Monday a \$15 million, three-year partnership with Sandia National Laboratories to establish a joint Center for Energy Transformation and Innovation to be housed at the University of Vermont. [Full story...](#)
2. IBM has awarded the Vermont State Colleges (VSC) system a \$100,000 grant for an energy efficiency initiative to help HowardCenter and Vermont Technical College (VTC) reduce their energy use by at least 5 percent annually. Based on energy management strategies developed at IBM Burlington, the initiative will benefit from the input and partnership of VTC students, faculty and staff, HowardCenter staff, the Vermont Manufacturing Extension Center and IBM volunteers. The grant is one of eleven IBM Centennial Grants awarded by IBM to projects around the world – one of only two in the U.S. – in recognition of the company's 100th anniversary. The IBM Centennial Grants are both monetary and in-kind awards up to \$100,000 each and fund innovative projects in areas such as healthcare, energy, and food safety, helping to build a smarter planet. In 2009, Vermont launched an initiative to become the first "smart grid" state and boost energy efficiency and reliability while creating jobs. IBM believes the techniques learned and applied through the collaboration can help increase energy saving opportunities when Vermont completes its smart grid. "This IBM Centennial Grant is the result of the strong partnership among all the parties that will enable us to drive energy savings for the HowardCenter and VTC, and also will provide economic and environmental benefits to other organizations throughout Vermont," said Janette Bombardier, senior location executive for IBM in Vermont. "We value the opportunity to develop a sustainable energy management blueprint that will help the state take advantage of the benefits of the smart grid." The grant will fund energy efficiency and management education and training, the purchase of smart meters and funding for energy efficiency projects. For the past ten years, the IBM Vermont manufacturing facility has used its Smart Energy Management Program and its own smart grid to reduce energy use 20 percent while increasing manufacturing capability. IBM is collaborating with the Vermont State College system, and the Vermont Manufacturing Extension Center (VMEC), to apply its energy management program to improve energy efficiency by at least five percent for VTC and HowardCenter, the largest mental health and human services organization in Vermont.



Science and technology permeate nearly every facet of modern life and hold the key to meeting many of humanity's most pressing challenges. The National Research Council report [A Framework for K-12 Science Education](#) proposes a new approach to K-12 science education that will both capture students' interest and provide them with the necessary foundational knowledge.

Resources for Technologists

Also known as implementation specialists within a field of Engineering.

For more information on technical field of interest and technical societies visit: http://www.ieee.org/membership_services/membership/societies/index.html

For more information on Professional Certifications visit: http://www.ieee.org/education_careers/education/professional_certification/index.html

Resources for Engineers

Engineers are the link between scientific discoveries and their subsequent applications to human needs. Engineers are professionals concerned with applying scientific knowledge, mathematics, physics and innovation to develop solutions for technical problems.

When asked to design a device, develop an algorithm or improve a system, engineers must rely on industrial standards in a product development environment that is not free of constraints, compatibility requirements and regulations. Examples of standards can be found at the following URLs: <http://www.jedec.org/>

<http://standards.ieee.org/>

<http://www.iec.ch/>

More information visit: <http://www.nae.edu/>

<http://www.nspe.org/index.html>

Resources for Scientists

Scientists are professionals primarily engaging in scientific activity to acquire knowledge using a scientific method by testing and developing new models to explain existing data and predict new results. Scientists often perform some engineering tasks in designing experiments and building prototypes similarly, engineers often perform scientific tasks when involved with innovative product development.

For more information visit: <http://www.nasonline.org/>

Top 10 IEEEExplore Documents

- 1 Hybrid wired / wireless networks for real-time communicationsCena, G.;Valenzano, A.;Vitturi, S.;Volume 2, Issue 1, Date: , Pages: 8- 20
[Abstract](#)
- 2 Web Application Tests with Selenium Bruns, A.;Kornstadt, A.;Wichmann, D.;Volume 26, Issue 5, Date: , Pages: 88- 91
[Abstract](#)
- 3 Analysis of a Model for Excitation of Myelinated NerveMcNeal, Donald R.;Volume BME-23, Issue 4, Date: , Pages: 329- 337
[Abstract](#)
- 4 Simulation of Thermal Comfort in Air-Conditioning Room by AripakLin Qin;Cai Wang;Lifeng Wei; Date: , Pages: 1- 4
[Abstract](#)
- 5 IEEE Recommended Practice for Software Requirements Specifications Date: , Pages: i-
[Abstract](#)
- 6 LTE-advanced: next-generation wireless broadband technology [Invited Paper] Ghosh, A.;Ratasuk, R.;Mondal, B.;Mangalvedhe, N.;Thomas, T.;Volume 17, Issue 3, Date: , Pages: 10- 22
[Abstract](#)
- 7 Cloud Computing and Grid Computing 360-Degree ComparedFoster, I.;Yong Zhao; Raicu, I.;Lu, S.; Date: , Pages: 1- 10
[Abstract](#)
- 8 Data Security in the World of Cloud Computing Kaufman, L.M.;Volume 7, Issue 4, Date: , Pages: 61- 64
[Abstract](#)
- 9 Cloud Computing Research and Development Trend Shuai Zhang;Shufen Zhang;Xuebin Chen;Xiuzhen Huo; Date: , Pages: 93- 97
[Abstract](#)
- 10 A Micropower Chopper—CDS Operational Amplifier Belloni, M.;Bonizzoni, E.;Fornasari, A.;Maloberti, F.;Volume 45, Issue 12, Date: , Pages: 2521- 2529 [Abstract](#)

Resources for Entrepreneurs

Professionals with responsibility of planning, execution, closing of a given product development project.

For more information visit:

<http://www.pmi.org/>

[The Entrepreneurs Village](#)

Industry Day Held Oct. 21, 2011

IEEE Region 1 Central Area Sections Explore cultivating active, vibrant and honest exchange among cross-disciplinary and interdisciplinary global communities of professionals

Workshop on Nanoscale IC and Technology

- Michael Liehr, Vice President for Research, Associate VP for Business, Alliances and Consortia and Professor at the College of Nanoscale Science and Engineering in Albany, NY shared insights in Pioneering Innovation to Drive an Educational and Economic Renaissance in New York State including how the College of Nanoscale Science and Engineering (CNSE) leverages industry partners, academic and government resources in effective partnerships to enable accelerated R&D.



- Dr. Percy V. Gilbert, Vice President, IBM Technology Development, Semiconductor Research and Development Center (SRDC) discussed Semiconductor Technology: Trends, Challenges and Opportunities.

- Pedro Gonzalez, Manager at GLOBALFOUNDRIES discussed Building a University Relations Program: New Generation Workforce Development for High Tech including a partnering model with regional community colleges on curriculum development and early outreach.



- Mohamad Sawan, Professor of microelectronics and biomedical engineering, Polytechnique Montréal, holder of the Canada Research Chair in Smart Medical Devices, and leader of the Microsystems Strategic Alliance of Quebec (ReSMiQ) discussed Smart Brain Interfaces for Sensing and Subsequent Treatment.

Workshop on Smart Grid and Cloud Computing



- Kathy Grise, IEEE Future Directions Program Director discussed IEEE Future Technological Directions and Collaboration including activities focused on providing resources for technologies, information, standards, publications, conferences, education, and collaboration associated with Smart Grid, Life Sciences, and Cloud Computing.



- Kannan Tinnium, Power Systems Platform Leader, Electrical Technologies & Systems, GE Global Research discussed the Technology Opportunities in Smart Grids including motivation / drivers, GE's interest, and the technology opportunities and challenges associated with

this initiative.

- Dr. Xiaochuan Luo, Principal Analyst in the Business Architecture & Technology department at ISO New England Inc. discussed an Overview of ISO New England's DOE Smart Grid project - Synchrophasor Infrastructure and Data Utilization (SIDU) including components of the ISO-NE's SIDU project, the benefits that will be realized, and the challenges associated with the synchrophasor technology.



- Joe H. Chow, Professor of Electrical, Computer, and Systems Engineering at Rensselaer Polytechnic Institute discussed Synchrophasor Data for State Estimation and Model Identification including An algorithm for correcting phase bias in synchrophasor data and applications to dynamic model identification.

Workshop on Collaborative Education



- Troy Wood, university alliances manager in the Corporate Marketing and Strategic Alliances Group discussed the Industry / University Cooperation: Implementation in Synopsys University Program including tools and resources to provide students hands-on experience combining theoretical knowledge with practical skills.



- Dr. Imed Zine-El-Abiding, Client Technology Advisor, Microsystems and Nanotechnology at CMC Microsystems discussed Enabling Microsystems R&D in Canada including the CMC model on how to work with leading suppliers from across Canada and around the world to offer products and services in microelectronics, MEMS, photonics, microfluidics and embedded software.



- Barry L. Shoop, Professor and Acting Head of the Department of Electrical Engineering and Computer Science at the United States Military Academy at West Point discussed Developing Creativity and Innovation Skills of Undergraduate Engineering Students including highlighting the results from teaching this course

over the past three years. As part of this research, each student has the opportunity to interview forward thinking technology leaders in their respective fields of interest. This course is structured as a deliberate interactive engagement between students and faculty that combines the Socratic method with the Thayer method to develop an understanding of disruptive and innovative technologies and a historical context of how social, cultural, and religious factors impact the acceptance or rejection of technological innovation.



1st Annual Technology Day

Held Dec. 2, 2012 at IBM, Essex, VT

— Featured several sessions including a Keynote, Inventors Ceremony, Networking Cafe and over 70 presentations

The 1st Technology Day Best Presentations and Best Posters Award Recipients are:

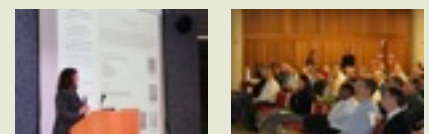
1. **Best Presentation: 0.35um SiGe BiCMOS Technology on High Resistivity Silicon (1KW5PAE)** by Jeff Gambino, Eric Johnson, Mark Jaffe, Derrick Liu, Mark Levy, Alvin Joseph, Jim Adkisson, Dale Martin, Mark Levy, Rob Rassel, Jim Dunn
2. **Best Poster: MEM without the MEM – Building Top Surface Interfaces in our Standard Technology that Allows Others to add on Specialty Features** by Bob Leidy, Greg Jankowski, Dennis Hogan, Donald Letourneau, Laurie Krywaczyk, Pete Sullivan
 - **Honorable Mention: A New IC Bond-Pad Model for Radio-Frequency Applications** by Kai D. Feng, Hanyi Ding, and Hailing Wang
 - **Copper Wirebond Packaging on IBM's Low-K Silicon** by H. Wilson, J Lindberg, J. Leonard, T. Nakae, K. Yonehara, T. Aoki, E. Ohno
3. **Most Innovative Presentation: Nitrate Pollution Reduction in the Lake Champlain Watershed at the**

IBM Vermont Waster Treatment Facility by David Kost, Lindsey Stahl, Joe Comeau, Dave Libby

4. **Most Innovative Poster: The 14nm SOI Transistor Suite** by Jeff Johnson and Terry Hook
 - **Honorable Mention: Evaluation of Test Fixture for QFN- Packaged Millimeter Wave RFIC and Multi-Gigahertz High Speed Digital IC** by Yan Ding, Hanyi Ding, Dana Brown, John Ferrario
 - **Honorable Mention: On-Chip ESD Protection Design Schematic Level Checking** by Nicholas Palmer, Mujahid Muhammad, Robert Gauthier, James Montstream, Karen Henderson
5. **Best Presentation by New Tenure: Exploring the Extremes in High Voltage CMOS Technologies: 12 to 120V LDMOS Devices** by John Ellis-Monaghan, Yun Shi, Ted Letavic, Santosh Sharma, Natalie Feilchenfeld, Rick Phelps, Don Cook, Christopher Lamothe, Jim Dunn
6. **Best Poster by New Tenure: Airflow Re-balancing Project in 200mm Manufacturing Facility** by E.

Shah, D. Crawford, P. Zachary, G. Bates, M. Tiersch, T. Mcdevitt

- **Honorable Mention: TEOS Spots Are Us (TEOS Spots PDCA)** by Randy Brault, Vishwa Shah
- **Characterization and Optimization of Device Asymmetry on 32SOI Logic PFET** by Jie (Thomas) Deng, J. Johnson, B.J. Greene, S. Lee, M. Lacroix, G. M. Sinn, O. Gluschenkov, A. Kumar, S. Springer



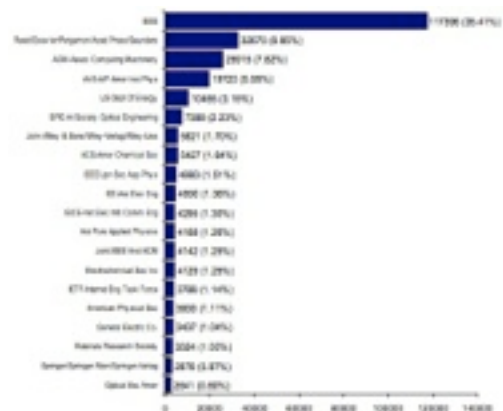
Opening Session

Technology Driven Industries and IEEE's Role in Enabling Leading Edge Product Innovation

New technology continues to build upon science and IEEE standards, and the dependence is increasing. The world's economy depends on innovation rates that are faster than before. While 4G LTE is pushing the fusion of computing and communications to new heights, efficient electric-drive cars are going mainstream, medical applications of robotics are emerging, 3-D chips and ultraviolet lithography are extending Denard's scaling laws [http://www.ieee.org/portal/cms_docs_societies/sscs/PrintEditions/200701.pdf]. See top Tech 2012 special issue of IEEE Spectrum January issue [<http://spectrum.ieee.org/at-work/innovation/top-tech-2012>].

- Several studies have shown a larger portion of this science base comes from papers appearing in IEEE journals, and papers presented at IEEE sponsored conferences, which are cited heavily by later patents [Breitzman, 2009]. The top patent producing firms overwhelming reference IEEE publications and conferences. 35% of all scientific references from 25 patenting firms [<http://www.iptoday.com/issues/2011/03/top-patent-firms.asp>] go to IEEE publications. This represents a 515% increase since 1997. About 48% of all scientific references from nearly 200,000 US patents that have been issued in the last 12 years are Information Technology (IT) related patents - patents in Telecommunications, Semiconductor Manufacturing, Computer Software and Hardware.

Assignee	2009 US Patent Count	1997-2009 US Patent Count
International Business Machines Corp.	4216	42647
Samsung Electronics Co Ltd	3997	24897
Microsoft Corporation	2919	12287
Canon Inc	2264	26199
Hewlett Ltd	2290	26799
Toshiba Corp	1853	16713
Panasonic Corporation	1817	21389
Sony Corp	1804	19964
Fujitsu Limited	1715	18477
Intel Corporation	1690	16680
Fuji Firms Holdings Corp	1457	14312
Seiko Epson Corporation	1416	10121
Siemens Aktiengesellschaft	1331	16189
Research-Pricent Co	1275	15633
General Electric Company	1216	16453
Motorola Mobility Inc. Co. Ltd	1209	5788
LG Electronics Inc.	1180	6290
NCC Corp	1041	16688
Ricoh Co. Ltd.	1034	7343
Wipro Technology Inc.	968	17188
Oracle Systems Inc.	910	9332
Motorola International Inc.	849	7819
AT&T Inc	820	6291
Denso Corp	800	9153
Honda Motor Co. Ltd.	796	9446



- New [IEEE patent scorecards](#) help ranks the world's most valuable patent portfolios. The score is calculated by multiplying a given company's new per year patent

count by the product of four Pipeline Power score variables including: Pipeline Growth, Pipeline Impact, Pipeline Generality, and Pipeline Originality.

- For more information on the 2011 top 50 US Patent Assignees, visit: http://ifclaims.com/index.php?page=misc_Top_50_2011

Upcoming Local Activities

- \$7500 Cash Available for New Engineering Hires through the [state of Vermont](#).
- Engineering Week: This year, [Engineers Week](#) commences on Monday Feb. 19, 2012 and culminates with the E-Week banquet on Friday, Feb. 25, 2012.
- 1st Engineering Day, June 2012, IBM, Essex, VT
- 1st International Science and Engineering Symposium, Oct. 2012, Hilton, Burlington, VT
- 2nd Technology Day, Nov. 2012, IBM, Essex, VT

Upcoming Activities in the State

- Formula HYBRID International Competition, Monday April 30 through May 3, 2012, Loudon, NH. Formula Hybrid challenges college and university student to design, build, and compete high-performance hybrid and electric vehicles. Building on the Formula SAE program, Formula Hybrid adds an extra level of complexity: fuel efficiency. New for 2012: Formula Hybrid has created the Electric Category. See the [2012 Competition](#) page for details.

Upcoming Activities in the Region

- IEEE Region 1 Meeting and Officers Leadership Training Workshops, March 8-11, 2012, Hartford, CT and collocated with [IEEE Region 1 Student Conference](#).
- The 21st IEEE North Atlantic Test Workshop ([NATW](#)), May 9-11, 2012, Boston, MA.

Upcoming Activities in the Country

- 59th International Solid-State Circuits Conference ([ISSCC](#)), Feb. 19-23, 2012, San Francisco, CA. ISSCC is the flagship conference of the Solid-State Circuits Society, and is the premier forum for the presentation of advances in solid-state circuits and systems-on-a-chip. The Conference offers a unique opportunity to network with leading experts in the field. For 2012, the Conference theme is "Silicon Systems for Sustainability."
 - *Free Online Tutorials and Short Courses from past years of ISSCC are [new member benefits beginning 2011](#).*

- [Predoctoral Achievement Award](#). Applicants must have completed at least one year of graduate study, be in a Ph.D. program in the area of solid-state circuits, and be members of IEEE and the [Solid State Circuits Society](#). The award includes, \$1000 honorarium to the student, and also cover the cost of the student's attendance at ISSCC (travel, registration fee and hotel, subject to certain limits).

- International Reliability Physics Symposium ([IRPS](#)) April 15-19, 2012, Anaheim, CA, USA. IRPS has been the premier conference for engineers and scientists to present new and original work in the area of microelectronics reliability.

- 49th Design Automation Conference ([DAC](#)), June 3-7, 2012, San Francisco, CA. DAC covers all topics related to the design complex systems on chip: Embedded System design and verification down to physical layout verification & test.
- Symposium on [VLSI Technology and Circuit](#), June 12-14, 2012, Honolulu, HI. Provides designers of integrated circuits an opportunity to meet and present important new work on all aspects of VLSI circuits

Upcoming Activities in the World

- The 5th International Conference on Software Testing, Verification and Validation ([ICST](#)), Apr. 17-21, 2012, Montreal, Canada. The premier conference in all areas related to software quality.
- The 10th IEEE International New Circuit and Systems ([NEWCAS](#)), June 2012, Montreal, Canada
- The 25th International Conference on Micro Electro Mechanical Systems ([MEMS](#)), Jan. 29 - 2 Feb. 2012, Paris, France.

Upcoming Nominations

- Nominations are due 31 January 2012 for the 2013 Technical Field Awards (TFA.) TFAs honor contributions or leadership in specific fields of interest of the IEEE.
- Nominations for the IEEE Fellows Class of 2013 are now being accepted. Nominate a colleague, co-worker or friend whose career and body of work you consider eligible for elevation to the IEEE Fellow Grade. [Apply only online](#). Deadline date is 01 March 2012. Is the nominee a [senior member](#) already? That's a requirement to becoming a fellow.

- [IEEE Region 1 Awards](#) completed nominations and endorsements due by June 15th, 2012.

Upcoming Webcasts

- Feb. 9, 2012 at 12 PM EST: [Accelerating Your Agile Configuration Management Through Deployment Automation](#)
- Feb. 16, 2012 at 2:00 PM EST: [Joule Heating Simulations](#)

Replays Available:

- ♦ [Calibre PERC: Effective Reliability & Low Power Verification](#)
- ♦ [Planning, Architecting & Executing Smart Grid Transformation](#)
- ♦ [Scalable Baseband Solutions](#)

Upcoming Online Training

- Jan. 16-20, 2012, [5-Day Wireless Communication Engineering Intermediate Fundamentals Review & Current Practices](#)

Technical Society News

- Signal Processing [Content Gazette](#)
- [Solid-State Circuit](#) Journal
- Computer [Transactions](#)
- [Communication](#) Society
- [Circuit and System](#) Society
- [Reliability](#) Society



Building Watson: A Brief Overview of DeepQA and the Jeopardy! Challenge

Distinguished Lecture by Eric Brown
Held on Oct. 19, 2011

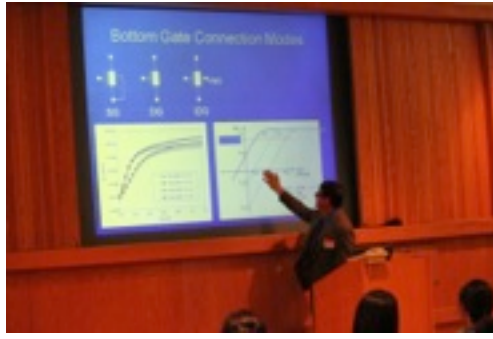
Abstract:

Watson, named after IBM founder Thomas J. Watson, was built by a team of IBM researchers who set out to accomplish a grand challenge—build a computing system that rivals a human’s ability to answer questions posed in natural language with speed, accuracy and confidence. The quiz show Jeopardy! provided the ultimate test of this technology because the game’s clues involve analyzing subtle meaning, irony, riddles and other complexities of natural language in which humans excel and computers traditionally fail. Watson passed its first test on Jeopardy!, beating the show’s two greatest champions in a televised exhibition match, but the real test will be in applying the underlying natural language processing and analytics technology in business and across industries. In this talk I will introduce the Jeopardy! grand challenge, present an overview of Watson and the DeepQA technology upon which Watson is built, and explore future applications of this technology.

Bio:

Eric Brown earned his B.S. degree at the University of Vermont (1989) and M.S. and Ph.D. degrees at the University of Massachusetts (1992, 1996), all in Computer Science. At UMass Eric was advised by Bruce Croff and was a member of the Center for Intelligent Information Retrieval .

Eric joined the IBM T.J. Watson Research lab in 1995 as a Research Staff Member, and has been a manager since 2004. While at IBM Eric has conducted research in information retrieval , document categorization, text analysis, question answering, bio-informatics, and applications of automatic speech recognition. Since 2007 Eric has been a technical lead on the DeepQA project at IBM and the application of automatic , open domain question answering to build the Watson Question Answering system . The goal of Watson is to achieve human-level question answering performance. This goal was realized in February of 2011 when Watson beat Ken Jennings and Brad Rutter in a televised Jeopardy! exhibition match. Eric’s role on the project has spanned architecture development, special question processing, and hardware planning and acquisition, and he is currently focused on commercialization. Eric has published numerous conference and journal papers, and holds several patents in the areas of text analysis and question answering . Eric currently resides in New Fairfield, CT with his wife and three children.



The Quest for the Ultimate Nanoscale Silicon CMOS Transistor

Distinguished Lecture by Stephen Parke
held on Oct. 7, 2011

Abstract:

As Moore’s Law scaling of CMOS integrated circuits reaches physical limits, “beyond CMOS” technologies such as quantum dots, molecular transistors, and carbon nanotube transistors are being researched as possible CMOS replacements for the distant future. However, in the nearer term, significant technological improvements are still needed for what the ITRS Semiconductor Roadmap refers to as “Non-classical CMOS transistor structures.” There are many of these 3-D and multi-gated non-classical structures which are being investigated by industry and academia. In our work, we are collaborating with start-up American Semiconductor, Inc. to develop the new independent-double-gate (IDG) FlexFET CMOS transistor. By varying the bottom gate voltage of the FlexFET transistor, standby power can be dynamically changed over ten orders of magnitude, while the active power vs. speed tradeoff can be varied by a factor of two. Minimum sized transistors may be used to achieve ultra-low-power (ULP) in standby, while dynamic threshold adjustment is used to achieve high-performance in active.

Bio:

Dr. Stephen Parke earned the AA degree from Olivet Nazarene University in 1980, and the BSEE and MSEE degrees from Purdue University in 1982 and 1984, respectively.

He interned with the IBM T.J. Watson Research Center, then spent the first several years of his career with IBM Microelectronics in Essex Junction, VT, where he worked in semiconductor R&D on five generations of IBM’s memory chip technologies. In 1989, he was awarded an IBM PhD Fellowship and began full-time study at the University of California at Berkeley. He fabricated and studied nano-scale silicon-on-insulator transistors, and received the PhD degree from UC Berkeley in 1993. He transferred to the IBM Semiconductor R&D Center in Fishkill, NY where he became a team leader in the IBM/Toshiba/Siemens TRIAD multi-cultural technology development project.

In 1996, he left IBM for an entrepreneurial academic start-up opportunity at Boise State University. He was one of the first two ECE faculty hired in the newly created College of Engineering. He initiated several university /industry partnerships to design, fund, construct, and equip the Idaho Microfabrication Laboratory and was the director of this lab for the first few years after it opened in 1998.



He became ECE Department Chair at Tennessee Tech University in 2006, where he implemented “The 20/20 Vision” for improved curriculum, research funding, lab facilities, and engagement with industry and alumni.

In Fall 2010, he returned to Idaho to lead the formation of a new school of Engineering at Northwest Nazarene University, near Boise.

The FinFET Future Arrives

Distinguished Lecture by Ed. Nowak
held Nov. 18, 2011

Abstract:

3D, vertical channel transistors, i.e. FinFETs, are now replacing planar FETs in leading-edge CMOS technology. Following a decade of proposals, research, development, and problem solving, the FinFET has finally emerged as the industry-standard device architecture post-22nm, with Intel and TSMC announcing FinFETs at the 22 and 14nm nodes, respectively, and most others clearly headed in a similar direction. A review of the unique role that IBM/Burlington played in bringing this technology to the forefront of the industry, with the first CMOS results produced in our own 200mm Fabricator in 2001-2003, is given, and followed by the trail of FinFET advances to the present day.

Bio:

Ed Nowak received SB and MS degrees in Physics at MIT ('73) and UMD ('75), respectively and a PhD in Quantum Field Theory at Maryland ('78).

Following a post-doc at NYU, Ed joined the metal-gate FET memory group in IBM Burlington in 1981, eventually leading device design for IBM’s first 1Mb DRAM in production. He then migrated to high-speed CMOS logic in 1986, leading CMOS 2s device design. A ‘hobby’ of fully-depleted double-gate transistors came to focus in 2000, when Ed led the introduction of FinFETs in IBM with a small team in Burlington, then expanding to Fishkill, Yorktown, and Boeblingen, delivering foundational work which now serves as the basis for FinFET technology in the industry.

Currently Ed serves as Device Chief Designer in the 300mm CMOS process development organization, and spends enthusiasm and energy on bringing FinFETs into the 14nm node.

Ed also strives to play the bassoon, reconcile the wave-function collapse with causality, and explore the implications of Modified Newtonian Dynamics.

About IEEE

IEEE's core purpose is to foster technological innovation and excellence for the benefit of humanity.

IEEE Vision Statement

IEEE will be essential to global community and to technical professionals everywhere, and be universally recognized for the contributions of technology and of technical professionals in improving global conditions. The IEEE is engaged in an [enterprise-wide strategic planning process](#). A summary of the long-range strategic plan, termed the [IEEE Envisioned Future](#) (PDF, 56 KB), details the main elements of the plan.

Top Five IEEE Sections Congress 2011 Recommendations

1. IEEE to develop a comprehensive log-term strategy to increase the number of next generation youth pursuing science and engineering careers.
2. As members maintain their membership over their years, IEEE must reward them for their loyalty. Rewards ought to be tangible and useful and can be done simply and inexpensive. Create Global Fidelity Programs

Including: (a) Continue membership Recognition 5-10,-15-20 years of membership (b) Bonus for specific Benefits (e.g. reduced fee, IEEE merchandise, etc).

3. IEEE membership (including e-Membership) should include a Society membership as part of the basic membership fee.
4. Increased support to students in technical activities with grants to attend conferences and

organization of technical competitions.

5. To encourage interest in pre-university students in engineering careers, IEEE to publish a subscription periodical (paper or electronic) targeted to high school students that highlights engineering activities of interests to those students. The periodical should also have articles promoting the benefits of an engineering career and what the students can do in college to get involved with IEEE.

Washington Internships for Students of Engineering (WISE)

Each year, outstanding engineering students are selected to spend nine weeks in Washington, D.C., learning about the public policy process, including how government officials make decisions on complex technological issues and how engineers can contribute to legislative and regulatory public policy decisions.

For more information visit:

<http://www.wise-intern.org/application/index.html>

Dr. Gordon W. Day, IEEE President-Elect, 2011



Gordon Day spent most of his career in research and management at the National Institute of Standards and Technology, where he founded and led the NIST Optoelectronics Division. His personal research ranged from fundamental optical measurements to the development of standards for optical fiber and new concepts in instrumentation. More recently, he served as science advisor to Senator Jay Rockefeller and Director of Government Relations for the Optoelectronics Industry Development Association. He has been a Professor Adjoint at the University of Colorado and a Visiting Fellow at the University of Southampton (UK), and has served on many

industry, government, and academic advisory groups. He is a past President of the IEEE Photonics Society and of IEEE-USA, and is a Fellow of IEEE, AAAS, the Optical Society of America, and the Institute of Physics (UK). He received B.S., M.S., and Ph.D. degrees in electrical engineering from the University of Illinois.

The biographies of the IEEE Presidents and IEEE Executive Director are available [here](#).

The IEEE presidents can be reach by sending an e-mail to presidents@ieee.org.

GMS Executive Committee

Pascal Nsame — Chair
Paul Hines — Vice Chair
Gene Shlatz — Treasurer
Peter habitz — Secretary

Welcome to New Members

Chad Weber, Anthony Abrami, Karina Wytrado Delgado, Gary D Grise, Kenneth Ryan Knight, Greg McConnell, Joy Pemberton, Martin Sean Power, Pooya Raze, Michael Andrew Robinson, Andrew L Seier, Nicholas James Strayer, Matthew Ward.

Contact

Pascal Nsame at 802 769-0672 or via email at: pnsame@us.ibm.com

IBM
1000 River
M/S 967A
Essex, VT 05452