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IEEE Vancouver Humanitarian Initiatives Committee

Nancy Paris
BCIT

Wednesday 16 May

5:30 - 7:00 pm

Room 1425
SFU Harbour Centre
515 West Hastings St
Vancouver

Information
IEEE Vancouver HIC chair
Paul Lusina
paul.lusina@gmail.com

The IEEE membership has identified a need to be involved with the complex solutions associated with humanitarian challenges. In response, the IEEE has created the Humanitarian Initiatives Committee (HIC) to promote development through events, education, projects and collaboration with existing humanitarian groups. IEEE Vancouver has accepted this opportunity and is in the process of defining a local HIC which will involve industry, academic and student members.

Agenda

1. Better health through innovation - the role of engineering in health technology development.
The application of engineering and technology to solve health problems has been a growing field leading to many innovations in healthcare and improvements in health outcomes. This seminar will briefly review the development of the field of biomedical engineering as it related to medical and assistive device development. The applied research being conducted at BCIT in the area of medical and assistive device development will also be discussed and will include a number of case studies of products that have been developed and are now in use worldwide. Lastly the group's work in the area of development of appropriate medical devices for developing countries will also be discussed.

2. 2012 – 2013 program outlook for IEEE Vancouver HIC
IEEE Vancouver HIC will give an overview of its vision for the 2012 – 2013 year. This will include:
- the niche filled by the HIC Vancouver Section
- description of events and topics
- volunteer roles to be filled
- feedback, comments and suggestions

Updates and registration
http://vancouver.ieee.ca/content/HIC_May_Event

Speaker: Nancy Paris, MASc, PEng, FEC is the Director of the Product and Process Applied Research Team (PART) at BCIT. Since 1996 Nancy has been responsible for the growth and management of a twelve person multi-disciplinary team of researchers that conducts applied R&D in emerging and next generation product design in health technologies, energy, consumer electronics, and industrial products for clients in industry, academia, government and the community.

Ms. Paris is also an accomplished researcher and product developer with over twenty years of experience in developing proposals, grants, and contracts to conduct applied research projects and build applied research infrastructure. Her areas of expertise include the product development process, medical and assistive devices, and health technology research. She has received funding from private sector companies, NSERC's I2I program, Western Economic Diversification and WorkSafeBC. She is also an inventor of the PROSTALAC Hip Replacement System which was licensed to Depuy of Johnson and Johnson in 1999. In 2009 Nancy was awarded the Advanced Technology Award from the Applied Science Technologist and Technicians of BC for leadership in the advancement of medical and assistive devices.

Ms. Paris is also responsible for the development of a student project support service for bachelor of engineering and technology diploma programs at BCIT. A range of services are available to students including mentoring in project management, access to our multi-disciplinary research team for technical assistance and access to our advanced product development equipment. In 2009 Engineers Canada bestowed the designation of Fellow upon Ms. Paris in honour of exceptional contributions to the engineering profession in Canada.

Thermoelectric power generation from waste heat

A co-gen application for BCIT's CEER

Mehrzad Tabatabaian
BCIT

Sanja Boskovic
BCIT

Tuesday 24 April
Noon - 115 pm

BC Hydro
Edmonds A01 - Edmonds Centre Auditorium

Information
Power and Energy chair
Rama Vinnakota
Rama.Vinnakota@bchydro.com

The discovery and application of new clean energy sources and optimizing the efficiency of existing systems has become a major focus of today's research. The purposes of research in this area are to reduce energy consumption, expand available resources, and decrease the impact of our actions on the Environment. Our work explores the feasibility of using thermoelectric generators (TEG) to utilise available waste heat in CEER facility at BCIT to generate electricity and increase the overall efficiency by combining heat and power generations. The outcomes of this work could be expanded and applied to a bigger scale industrial plant (e.g. thermo plants, process plants) when our work-in-progress experimental results are ready for analysis.

Our research plan is to have a system with 14 commercial thermoelectric generators constructed to convert heat from the flue gasses to electrical energy. We are starting to perform a set of experiments in order to obtain data for the performance of this system including TEG modules. We are planning to use similar systems around BCIT campus for harvesting electrical energy from available waste heat. We also are looking for industrial partner(s) for bigger demonstration sites and future development of similar and modified systems. For IEEE2012 session we will present a detailed description of the technology and present the results of feasibility study (Phase 1).

Speakers: Dr. Mehrzad Tabatabaian is a Faculty Member- Instructor and Program Head- at the Mechanical Engineering Department, School of Energy at BCIT. He does research on renewable energy systems and modeling. Dr. Tabatabaian is Chair of Energy Research Committee and is actively involved in the energy-initiative activities. He has published several papers in various scientific journals and conferences, holds several patents in the energy field. Dr. Tabatabaian's recent focus is on wind and solar power which has resulted in registered and pending patents. Recently, Mehrzad was instrumental in establishing a new division for Energy Efficiency and Renewable Energy (DEERE) at APEGBC. Mehrzad offers several PD seminars for the APEGBC members on the subjects of wind power, solar power, renewable energy, and Finite-Element modeling method.

Mehrzad Tabatabaian got his BEng from Sharif University of Technology (1979), graduated from McGill University (MEng 1986, PhD 1990) in Montreal, Canada. He has been an active academic, professor, and engineer in leading alternative energy, oil, and gas industries. Mehrzad has also a Leadership Certificate from the University of Alberta. He is a member of ASME and ASEE.

Dr. Sanja Boskovic is Chief instructor and the lead Virtual Classroom Thermodynamics and Applied Mechanics instructor for BCIT's Power Engineering innovative distance education methodologies. The following are significant personal contributions.

- Incorporated new environmental technology in every class, either participating in the research or bringing the new technology to classroom and her students
- Study on the Supercritical Water Oxidation System estimating and modeling heat transfer coefficient
- Developed and patented the construction of impact separator, measuring velocity profiles, estimating separator efficiency in Fluidized Bed Boilers
- Contributed to heat transfer and sulphur caption in Pressurized Fluidized Bed Boilers

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BC's electricity market: the factors driving BC Hydro's outlook for demand and supply

David Ince
BC Hydro

Wednesday 23 May 12:00
Noon - 100 pm

BC Hydro - Edmonds A01
Edmonds Centre
Auditorium

Information
Power and Energy chair
Rama Vinnakota
Rama.Vinnakota@bchydro.com

BC Hydro's load forecast is a key driver of the corporation's long-term development plans; the forecast drives significant investments in new electricity generation and transmission assets. It also forms the basis of BC Hydro's electricity procurement requirements, much of which is sourced from BC's independent power producing sector. David Ince will present an overview of BC Hydro's forecasts, which include projections of mining, forestry, oil & gas and LNG activity. Substantial changes are pending for the provincial economy, and they will summarize what BC Hydro sees as the major economic, demographic and commodity price trends that are expected to drive these changes.

Speaker: David Ince spent the first 13 years of his career in the Alberta natural gas industry, where he was involved in production & pipelining, and gas supply strategies and contracting. He was in the gas industry during the transition to supply deregulation. In the late 1990s, during Alberta electricity market reforms, he worked on electricity supply strategies and procurement, green energy contracting and development, and he was integrally involved in the transition to market deregulation. David joined BC Hydro in 1999, and has since been involved in electricity supply planning and contracting, electricity trade oversight, and most recently, managing BC Hydro's long-term load and market price forecasts.

Industrial Tour at the **Endurance Wind Power**

IEEE Vancouver
Joint IAS/IES
& PES Chapter



Tour Summary

Unlike large wind power plants, small-scale wind installations provide power to isolated grids, remote communities or stand-alone residential/commercial loads. The opportunities and challenges in the small-wind area are unique. Endurance Wind Power, headquartered in Surrey, BC, has become a global pioneer in this field, in a very short timeframe, and projects itself as..

" Endurance Wind Power is a manufacturer of advanced wind turbines designed specifically for distributed wind power applications. Our line of modern, induction based wind turbines bring efficient reliable safe and quiet renewable energy within reach of homeowners, businesses and institutions across North America and an expanding global market. Our North American-wide dealer network has been serving their communities for decades and are working in close partnership with Endurance to support our customers from sales consultation, site assessment, permitting and incentives through installation and ongoing support. Together our team strives to provide Endurance wind turbine owners with the best products and support in the market today!"

This tour will provide insight into the relevant technologies (research, development & demonstration) as well as Endurance's business model and global reach.

Further information on Endurance can be found at: http://www.endurancewindpower.com/
(Tel: 604.579.9463 Fax: 604.591.3505 Email: info@pattonandcooke.com)

Date: Thursday, Apr 26, 2012
Time: 3.00 pm – 5.00 pm
Venue: #107, 19052 26th Avenue, Surrey, BC, V3S 3V7
Registration is Required,
Please contact: Jahangir khan at <Jahangir.khan@powertechlabs.com>

LIMITED SPACE
First come first serve

IEEE EDS Mini-Colloquium (MC) on Integrating Nano/Micro Electronic & Related Devices

Organized by: Dr. Bonnie Gray (bgray@sfu.ca)

Co-coordinators: Dr. Behraad Bahreyni (behraad_bahreyni@sfu.ca),
Dr. Ajit Khosla (khosla@gmail.com)

Sponsored by: IEEE Electron Devices Society (EDS), SFU Faculty of Applied Sciences Dean's Office, and IRMACS Centre

Friday, May 4, 2012

8:00 – 17:00 IRMACS Theater (Rm10900) and Atrium, Applied Sciences Building, Simon Fraser University, Burnaby, Canada (http://www.irmacs.sfu.ca/about/visitors/getting-to-sfu)

Rationale: This MC attempts to draw experts from multiple areas of interest to EDS (http://eds.ieee.org/field-of-interest.html) to stimulate discussion in how all our areas can work together toward further integration of micro/nanosystems. In addition to individual lectures, a panel discussion at the end of the day will bring together the speakers with the audience to provide insight and lively discussion on the future of integrated micro/nanosystems.

Agenda

8.00 Light breakfast

8:30 MC opening by Prof. Norbert Haunerland, Associate Vice-President, Research

8.45 Distinguished Lecture #1: Juin Liou, "Outlook and Challenges in Electrostatic Discharge (ESD) Protection of Modern and Future Integrated Circuits"

9:45 Invited Lecture #1: Bruce Darling, "High Temperature (0-250 C) On-Chip Temperature Sensors and Voltage References"

10:45 Coffee break

11:00 Distinguished Lecture #2: Meyya Meyyapapan, "Nanotechnology: Development of Practical Systems and Applications"

12:00 Invited Lecture #2: Karl Böhringer, "Heterogeneous Microsystem Integration with Self-Assembly"

13:00 Lunch break co-sponsored by SFU Faculty of Applied Sciences Dean's Office

14:00 Distinguished Lecturer #3: Durga Misra, "High-K Dielectrics for Nanoscale CMOS Devices"

15:00 Invited Lecture #3: Mu Chiao, ""A Magnetically Controlled MEMS Drug Device"

16:00 Coffee break

16:15 Panel Discussion

16:55 Closing remarks and adjourn

Distinguished Lecture #1:
Outlook and Challenges in Electrostatic Discharge (ESD) Protection of Modern and Future Integrated Circuits

Juin J. Liou
Pegasus Distinguished Professor, University of Central Florida, Orlando, Florida, USA
Chang Jiang Scholar Endowed Professor, Ministry of Education, China
Feng Chia Chair Professor, Feng Chia University, Taiwan
Fellow of IEEE, Fellow of IET, Fellow of SIMTech

Electrostatic discharge (ESD) is one of the most prevalent threats to electronic components. It is an event in which a finite amount of charge is transferred from one object (i.e., human body) to the other (i.e., microchip). This process can result in a very high current passing through the microchip within a very short period of time, and more than 35% of chip damages can be attributed to such an event. As such, designing on-chip ESD structures to protect microchips against the ESD stress is a high priority in the semiconductor industry. The continuing scaling of CMOS technology makes the ESD-induced failures even more prominent, and one can predict with certainty that the availability of effective and robust ESD protection solutions will become a critical and essential component to the successful advancement and commercialization of the next-generation CMOS technology.

An overview on the ESD sources, models, protection schemes, and testing will first be given in this talk. This is followed by the discussions of the challenges for designing and realizing ESD protection solutions in modern and next-generation integrated circuits.

Juin J. Liou

Juin J. Liou received the B.S. (honors), M.S., and Ph.D. degrees in electrical engineering from the University of Florida, Gainesville, in 1982, 1983, and 1987, respectively. In 1987, he joined the Department of Electrical and Computer Engineering at the University of Central Florida (UCF), Orlando, Florida where he is now the Pegasus Distinguished Professor and UCF-Analog Devices Fellow. His current research interests are Micro/nanoelectronics computer-aided design, RF device modeling and simulation, and electrostatic discharge (ESD) protection design and simulation.

Dr. Liou holds 7 U.S. patents (1 more filed and pending), and has published 9 books, more than 250 journal papers (including 16 invited articles), and more than 190 papers (including 81 keynote and invited papers) in international and national conference proceedings. He has been awarded more than $10.0 million of research contracts and grants from federal agencies (i.e., NSF, DARPA, Navy, Air Force, NASA, NIST), state government, and industry (i.e., Semiconductor Research Corp., Intel Corp., Intersil Corp., Lucent Technologies, Alcatel Space, Conexant Systems, Texas Instruments, Fairchild Semiconductor, National Semiconductor, Analog Devices, Maxim, RF Micro Device, Lockheed Martin), and has held consulting positions with research laboratories and companies in the United States, China, Japan, Taiwan, and Singapore. In addition, Dr. Liou has served as a technical reviewer for various journals and publishers, general chair or technical program chair for a large number of international conferences, regional editor (in USA, Canada and South America) of the Microelectronics Reliability journal, and guest editor of 3 special issues in Microelectronics Reliability and Solid-State Electronics.

Dr. Liou received ten different awards on excellence in teaching and research from the University of Central Florida (UCF) and six different awards from the IEEE. Among them, he was awarded the UCF Pegasus Distinguished Professor (2009) – the highest honor bestowed to a faculty member at UCF, UCF Distinguished Researcher Award (four times: 1992, 1998, 2002, 2009) – the most of any faculty in the history of UCF, UCF Research Incentive Award (three times: 2000, 2005, 2010), UCF Trustee Chair Professor (2002), and IEEE Joseph M. Biedenbach Outstanding Engineering Educator Award in 2004 for his exemplary teaching, research, and international collaboration. His other honors are Fellow of IEEE, Fellow of IET, Fellow of Singapore Institute of Manufacturing Technology, Fellow of UCF-Analog Devices, Distinguished Lecturer of IEEE Electron Device Society (EDS), and Distinguished Lecturer of National Science Council. He holds several honorary professorships, including Chang Jiang Scholar Endowed Professor of Ministry of Education, China – the highest honorary professorship in China, NSVL Distinguished Professor of National Semiconductor Corp., USA, Chang Gung Endowed Professor of Chang Gung University, Taiwan, Feng Chia Chair Professor of Feng Chia University, Taiwan, Chunhui Eminent Scholar of Peking University, China, Cao Guang-Biao Endowed Professor of Zhejiang University, China, Honorary Professor of Xidian University, China, Consultant Professor of Huazhong University of Science and Technology, China, and Courtesy Professor of Shanghai Jiao Tong University, China. Dr. Liou was a recipient of U.S. Air Force Fellowship Award and National University Singapore Fellowship Award.

Dr. Liou has served as the IEEE EDS Vice-President of Regions/Chapters, IEEE EDS Treasurer, IEEE EDS Finance Committee Chair, Member of IEEE EDS Board of Governors, and Member of IEEE EDS Educational Activities Committee.

Invited Lecture #1:
High Temperature (0-250 C) On-Chip Temperature Sensors and Voltage References

Robert Bruce Darling
Professor
Devices, Circuits, and Sensors; Electrical Engineering University of Washington

One of the design challenges for ICs which must operate over wide temperature ranges are accurate on-chip temperature sensors and voltage references. Bandgap voltage references and proportional-to-absolute-temperature (PTAT) temperature sensors work well for lower temperature ranges, even the military range of –55°C to +125°C, in both bipolar and CMOS technologies. Above ~150°C, different strategies must be adopted to deal with the increased device leakage and increasingly non-linear temperature effects. Dielectrically isolated IC technologies such as SOI-CMOS and SOS-CMOS offer usable device characteristics up to 250°C and beyond, but they also require characterization beyond what is normally provided by the supplying foundries. The zero-temperature-coefficient (ZTC) bias point of FETs has proven to be remarkably stable over very wide temperature variations, and various circuit techniques will be discussed which make use of this unique property. The physical nature of the ZTC point in various FET structures will also be discussed in relation to the temperature dependence of the threshold voltage and the carrier mobility. Dielectric isolated IC technologies combined with ZTC voltage reference designs offer promising alternatives for circuits whose operating temperatures are approaching 300°C.

Robert Bruce Darling

Robert Bruce Darling has been a Professor at the University of Washington since 1985. He received his BSEE, MSEE, and PhD from the Georgia Institute of Technology in 1980, 1982, and 1985, respectively. His research areas involve electron device physics and modeling, circuit design, microelectronics, optoelectronics, microfabrication, sensors, and instrumentation systems. He founded and is currently the director of the Center for Applied Microtechnology (CAM) at the University of Washington, and he also developed and directs the Electrical Engineering MicroFabrication Laboratory. He is an active industry consultant, and he has been involved with several start-up companies in both WA and CA. In 2003 he was an investigator for the NASA space shuttle Columbia Accident Investigation Board, and he has also participated as a field guide and technical coordinator for several NASA high altitude expeditions to the South American Andes. He has also been a technical advisor and consultant to DARPA and the US Army. He served as the Acting Chair of the Electrical Engineering Department over 2003-2004, and he is currently serving as the Associate Chair for Education.

Distinguished Lecture #2:
Nanotechnology: Development of Practical Systems and Applications

M. Meyyappan
NASA Ames Research Center
Moffett Field, CA 94035

There are strong nanotechnology research programs across the world in the fields of chemical sensors, biosensors, instrumentation, electromechanical devices, actuators, nanodevices, composites, and numerous other applications. Basic discoveries have progressed at an amazing pace, as evidenced by the accumulation of publications in the literature. At present, the development of practical systems and commercial products is the next big challenge. Nanoscale is not a human scale. In many cases, development of practical systems demands seamless integration of nano-micro-macro to produce scaled components and processes. While the ultimate vision in nanotechnology may be an entirely bottom-up approach to building systems, it is unrealistic to expect this to happen anytime in the foreseeable future. Only realistic possiblity to achieve tangible results in a reasonable time frame, before the stakeholders run out of patience, is to use nanomaterials in a hybrid approach that involves a systamatic nano-micro-macro integration. Such an approach will also allow us to utilize the existing infrastructure in the micro area (MEMS, microelectronics) from the last couple of decades, which would make economic sense . This talk will expand on this theme on product and system development using nanomaterials and nanotechnology. Examples will include a carbon nanotube (CNT) based chemical sensor that has been monitoring air quality in the crew cabin in the International Space Station since January 2009 and under development for security applications; a CNT based biosensor for water quality monitoring; CNT-based X-ray tubes for security and other applications; supercapacitors, and several other developments we have been working on for the last 5-8 years. The author thanks all past and present NASA Ames colleagues for their contributions to the application development efforts, especially Jing Li, Yijiang Lu, Jessica Koehne, Cattien Nguyen and Michael Oye.

Meyya Meyyappan

Meyya Meyyappan is Chief Scientist for Exploration Technology at the Center for Nanotechnology, NASA Ames Research Center in Moffett Field, CA. Until June 2006, he served as the Director of the Center for Nanotechnology. He is a founding member of the Interagency Working Group on Nanotechnology(IWGN) established by the Office of Science and Technology Policy (OSTP). The IWGN is responsible for putting together the National Nanotechnology Initiative.

Dr. Meyyappan has authored or co-authored over 215 articles in peer- reviewed journals and made over 200 Invited/Keynote/ Plenary Talks in nanotechnology subjects across the world. His research interests include carbon nanotubes and various inorganic nanowires, their growth and characterization, and application development in chemical and biosensors, instrumentation, electronics and optoelectronics.

Dr. Meyyappan is a Fellow of the Institute of Electrical and Electronics Engineers (IEEE), Electrochemical Society (ECS), American Vacuum Society (AVS), Materials Research Society (MRS), Institute of Physics (IOP), American Institute of Chemical Engineers (AIChE) and the California Council of Science and Technology. In addition, he is a member of the American Society of Mechanical Engineers (ASME). He is currently the IEEE Nanotechnology Council (NTC) Distinguished Lecturer on Nanotechnology, IEEE Electron DevicesSociety (EDS) Distinguished Lecturer, and was ASME's Distinguished Lecturer on Nanotechnology (2004-2006). He served as the President of the IEEE's Nanotechnology Council in 2006-2007. He currently serves as the Vice President of IEEE-EDS for Educational Activities.

For his contributions and leadership in nanotechnology, he has received numerous awards including: a Presidential Meritorious Award; NASA's Outstanding Leadership Medal; Arthur Flemming Award given by the Arthur Flemming Foundation and the George Washington University; IEEE Judith Resnick Award; IEEE-USA Harry Diamond Award; AIChE Nanoscale Science and Engineering Forum Award; Distinguished Engineering Achievement Award by the Engineers' Council; Pioneer Award in Nanotechnology by the IEEE-NTC. For his sustained contributions to nanotechnology, he was inducted into the Silicon Valley Engineering Council Hall of Fame in February 2009. For his educational contributions, he has received: Outstanding Recognition Award from the NASA Office of Education; the Engineer of the Year Award(2004) by the San Francisco Section of the American Institute of Aeronautics and Astronautics (AIAA); IEEE-EDS Education Award; IEEE-EAB(Educational Activities Board) Meritorious Achievement Award in Continuing Education.

Invited Lecture #2:
Heterogeneous Microsystem Integration with Self-Assembly
Karl Böhringer
John M. Fluke Distinguished Chair of Engineering
Professor of Electrical Engineering and Bioengineering,
Microelectromechanical Systems (MEMS)
University of Washington

Self-assembly is the spontaneous and reversible organization of components into ordered structures, representing an alternative to the conventional manufacture of systems made of components from milli to nano scales. First commercial applications of self-assembly have appeared in recent years, for example in the fabrication of radio frequency identification (RFID) tags.

However, the full impact of this new approach towards hetero system integration will only be realized once self-assembly can be programmed on demand. This presentation gives an overview of several projects that aim at programmable self-assembly. A key concept is the “programmable surface” – an interface whose properties can be controlled with high spatial and temporal resolution. Several crucial topics are discussed: real time control of interfacial properties; optimization of binding site designs; and algorithms for the modeling and control of self-assembly. Promising novel manufacturing methods are emerging that combine the precision and reproducibility of semiconductor fabrication with the scalability and parallelism of stochastic self-assembly and with the specificity and programmability of biochemical processes.

Karl Böhringer

Karl Böhringer is Professor of Electrical Engineering and Bioengineering at the University of Washington, Seattle and Faculty Director of the College of Engineering Microfabrication Facility. He received both his M.S. and Ph.D. degrees in Computer Science from Cornell University and his Diplom-Informatiker degree from the University of Karlsruhe, Germany. He was a visiting scholar at the Stanford Robotics Lab and Transducer Lab and a postdoctoral researcher at the University of California, Berkeley, before joining the faculty at the University of Washington. He received an NSF postdoctoral associateship in 1997, an NSF CAREER award in 1999, and was an NSF New Century Scholar in 2000. His work was featured among the Top 100 Science Stories in Discover Magazine's 2002 "Year in Science". In 2004, he received the IEEE Robotics and Automation Society Academic Early Career Award and a sabbatical fellowship from the Japan Society for the Promotion of Science (JSPS). Since 2010, he holds the John M. Fluke Distinguished Chair in Engineering at the University of Washington. He is a member of the editorial board of the ASME/IEEE Journal of Microelectromechanical Systems and the IEEE Transactions on Automation Science and Engineering. He was co-chair of the 2011 IEEE International Conference on Microelectromechanical Systems.

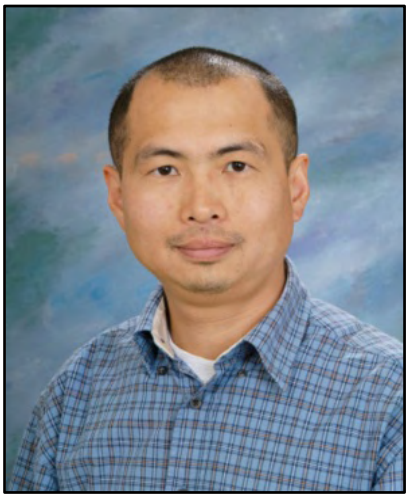
Distinguished Lecture #3:
High-K Dielectrics for Nanoscale CMOS Devices
Durga Misra
Professor, Electrical and Computer Engineering Department
New Jersey Institute of Technology

Current and future of technology challenges, especially focusing on the convergence of nanotechnology with electronics, photonics, energy, and biology will be discussed in this talk. Role of nanoelectronics will be addressed to outline the More Moore and More Than Moore states of next generation technologies. Stringent power requirements by the International Technology Roadmap for Semiconductors (ITRS) dictate integration of high-k metal gates and novel devices such as FINFETs in CMOS technologies. The talk will also discuss nano-energy generator for energy harvesting. Concept of e-nose and e-tongue with nanowires will be outlined. Printable and flexible electronics is discussed with nano materials. The integration of nanotechnology and nanoelectronics will also be covered.

Durga Misra

Dr. Durga Misra is a Professor in the Department of Electrical and Computer Engineering of New Jersey Institute of Technology (NJIT). He received his M.S. and Ph.D. degrees both in Electrical Engineering from University of Waterloo, Waterloo, Canada in 1985 and 1988 respectively. He has been a faculty member since the fall of 1988 at NJIT. His current research focus is study of nanoscale CMOS gate stacks. He received several research awards from the National Science Foundation, NASA and industry. In 1997 he worked at the VLSI Research Department at Bell Laboratories. He is currently a Distinguished Lecturer of Electron Device Society of IEEE and received IEEE Membership and Geographic Activities Board's International Leadership Award. He is a Fellow of the Electrochemical Society (ECS) and served as the Chair of Dielectric Science and Technology Division of ECS. He has edited and co-edited more than 25 books including several of them on High-k gate stack ECS Transaction Series. He has published more than 200 articles in journals and international conferences.

Invited Lecture #3:
A Magnetically Controlled MEMS Drug Device
Mu Chiao
Associate Professor
Dept of Mechanical Engineering, University of British Columbia (UBC)



MEMS- based drug delivery devices have been around for over a decade. Both commercial and academic efforts have been successful. However, limitations including power source and long-term drug delivery concentration have limited the technology. This talk will summarize MEMS drug delivery device research activities in the Department of Mechanical Engineering, UBC. A remote-controlled MEMS drug delivery device will be discussed. Device construction methods, characterization, on-demand long-term drug delivery process and in vitro cell study will be presented.

Mu Chiao

Dr. Mu Chiao received his B.S. and M.S. degrees from National Taiwan University in 1996 and a Ph.D. degree in Mechanical Engineering from the University of California at Berkeley, USA in 2002. From August 2002 to Feb 2003, he was with Berkeley Sensor and Actuator Center, University of California at Berkeley as a post-doctoral research fellow. His research effort was on MEMS power source and nanowire/tube synthesis. From March 2003 to July, 2003, he was a senior MEMS engineer at Intpax, Inc, USA, working on MEMS sensors for automotive applications. Dr. Chiao has been with the Department of Mechanical Engineering, The University of British Columbia since September, 2003 and is now Associate Professor. His current research interests include design and fabrication of MEMS and nanodevices for biomedical applications. His research is supported by the Natural Sciences and Engineering Research Council (NSERC), Canada, Canada Foundation for Innovations (CFI)and Canada Research Chairs (CRC) program.

IEEE EDS Technical Meeting: Nano-Systems and -Sensors in Healthcare and Environment Monitoring

Organized by: Dr. Ajit Khosla (ajit_khosla@sfu.ca)

Co- Organizer: Dr. Bonnie Gray (bgray@sfu.ca)

Sponsored by: 4-D Labs SFU, School of Engineering Science, IEEE Electron Devices Society (EDS).

Friday, May 11, 2012

10:30 – 15:00 4D LABS, Seminar Room SSB 7172, South Sciences Building, Simon Fraser University, Burnaby, Canada.

Agenda

10:30 Coffee and Snacks sponsored by 4-D Labs SFU, IEEE Electron Devices Society (EDS), School of Engineering Science

10:45 Special Talk Series Opening by **Prof. John Jones**, Director, School of Engineering Science

11:00 Invited Lecture #1: **Prof. Vijay K. Varadan**: Nano-Sensors. E-Bra. Prinatble Electronics and Smart Devices for Point Of Healthcare

11:50 Invited Lecture #2: **Prof. Anja Boisen**: Miniaturized cantilever-like sensors

12:40 **Lunch break** sponsored by IEEE Electron Devices Society (EDS), 4-D Labs SFU, School of Engineering Science Distinguished

13:30 Lecturer #3: **Prof. Peter J. Hesketh**: Microcantiliver Sensors Using Metal Organic Framework Films and Ultra-Low Micro-bridge Gas

14:20- 15:00 Discussions, Closing Remarks and Adjourn

Distinguished Lecture #1

NANO-SENSORS, E-BRA, PRINTABLE ELECTRONICS AND SMART DEVICES FOR POINT-OF-HEALTHCARE

Prof. Vijay K. Varadan

Twenty First Century Endowed Chair in Nano-, and Bio-Technology and Medicine
Distinguished Professor of Electrical Engineering
Distinguished Professor of Biomedical Engineering
Director, NSF Wireless Nanosenors and Systems Center
President, Global Institute of Nanotechnology in Engineering and Medicine

Professor of Neurosurgery, College of Medicine
University of Arkansas, Fayetteville, AR 72701
&
Professor of Neurosurgery, Pennsylvania State University
Hershey Medical Center, Hershey, PA 17033

In medicine and healthcare, the growing need and market demand for Point of Care (POC) systems to improve patient's quality of life, are driving the development of wireless nanotechnology based smart systems for diagnosis and treatment of various chronic and life threatening diseases. This talk addresses the recent development of nanodiagnostic sensors and nanotherapeutic devices with functionalized nanowires

and nanotubes on a flexible polymer or textile based thin film electronics to monitor and control of major life threatening diseases including 1) neurodegenerative diseases, 2) cardiovascular diseases, and 3) diabetes and metabolic diseases.

We have developed an *e-bra* which is used as a platform on which the various textile based nanosensors for cardiac health monitoring are integrated into the fabric via smart phone. Selected movies illustrating the applications of both invasive and non-invasive wireless nanosensor systems to patients and surgical procedures will be shown at the talk. Movies on heart rate variability sensors will illustrate the use of the flexible nanosensors on both women and men, and the optimum workout needed for persons jogging, running on treadmill, etc.

Biography

Vijay K. Varadan is currently the Twenty-First Century Endowed Chair in Nano-and Bio-Technology and Medicine, and Distinguished Professor of Electrical Engineering and Distinguished Professor of Biomedical Engineering (College of Engineering) and Neurosurgery (College of Medicine) at University of Arkansas. He is also a Professor of Neurosurgery at the Pennsylvania State University College of Medicine. He also holds honorary doctorate degrees in Nano-, and Bio-Technologies and Medicine from India, Australia and Finland. He joined the University of Arkansas in January 2005 after serving on the faculty of Cornell University, Ohio State University and Pennsylvania State University for the past 39 years. He is also the Director of the Center of Excellence for Nano-, Micro-, and Neuro-Electronics, Sensors and Systems and the Director of the NSF Center for Wireless Nanosensors and Systems (WiNS). He is the President of Global Institute of Nanotechnology in Engineering and Medicine (GINTEM). The purpose of this Institute is to create a global effort to solve current and future medical concerns using advanced nanotechnologies by developing Research Hospitals at selected overseas countries. The GINTEM is a non-profit organization that also promotes research and education pertaining to the design and development of Nano-, Bio-, and Info-Tech Sensors and Systems. This Institute currently has affiliation with various leading Universities around the world helping work force and economic development in Nanomaterials, Nanotubes and Nanocomposites, Low cost Flexible Electronics, Health-care and Health diagnostics, Renewable and Green Energy driven systems, and Information Technology. This non-profit institute focuses on encouraging cutting edge research and education facilitating a 3+1 dual degree program to be offered by the home institution and the host institution. A similar program is under consideration for those students pursuing degree in medical fields (such as MBBS, MD) and nursing who may be interested in one semester lab education and training in nanotechnology laboratory at the leading Universities via Global Institute.

Varadan has concentrated on the design and development of various electronic, acoustic and structural composites, smart materials, structures, and devices including sensors, transducers, Microelectromechanical Systems (MEMS), synthesis and large scale fabrication of carbon nanotubes, NanoElectroMechanical Systems (NEMS), microwave, acoustic and ultrasonic wave absorbers and filters. He has developed neurostimulator, wireless microsensors and systems for sensing and control of Parkinson's disease, epilepsy, glucose in the blood and Alzheimer's disease. He is also developing both silicon and organic based wireless sensor systems with RFID for human gait analysis and sleep disorders and various neurological disorders. He is a founder and the Editor-in-Chief of the Journal of Smart Materials and Structures. He is the Editor-in-Chief of the Journal of Nanotechnology in Engineering and Medicine. He is an Associate Editor of the Journal of Microlithography, Microfabrication and Microsystem. He serves on the editorial board of International Journal of Computational Methods. He has published more than 500 journal papers and 14 books. He has 15 patents pertinent to conducting polymers, smart structures, smart antennas, phase shifters, carbon nanotubes, and implantable device for Parkinson's patients, MEMS accelerometers and gyroscopes. He is a fellow of SPIE, ASME, Institute of Physics, Acoustical Society of America. He has many visiting professorship appointments in leading schools overseas.

Distinguished Lecture #2

Miniaturized cantilever-like sensors

Prof. Anja Boisen,
Department of Micro- and Nanotechnology
Technical University of Denmark
2800 Kgs Lyngby, Denmark

Small mechanical structures such as diving boards, bridges and lids can be used as sensitive and label free sensors. A biochemical reaction at the surface of the structure can be monitored as a bending, due to a change in surface stress. Minute temperature changes can be registered by exploring the bimorph effect. Furthermore, mass detection can be achieved by using resonating structures and monitor how the resonant frequency changes as a function of the added mass. In order to obtain high sensitivity the structures need to have micrometer and sometimes nanometer dimensions. They are fabricated by cleanroom processing using either silicon or polymer based materials.

Often cantilever-like structures are used as the sole mechanism of sensing, either for fundamental studies of i.e. surface stress generation or for specific sensor applications. We hypothesise that a combination of sensing principles facilitates increased robustness and reliability of generated data. In recently initiated projects we therefore combine cantilever-based sensing with other sensing techniques like electrochemistry, Surface Enhanced Raman Spectroscopy, calorimetry and colorimetry. Either two sensor principles are integrated in a single chip or several different sensors are used for independent analysis of the same sample. In all projects the final aim is to achieve highly sensitive, reliable and miniaturized sensors. By high throughput data collection, statistical data treatment is possible. We will show examples from explosives detection, water analysis and nano-particle monitoring.

Biography

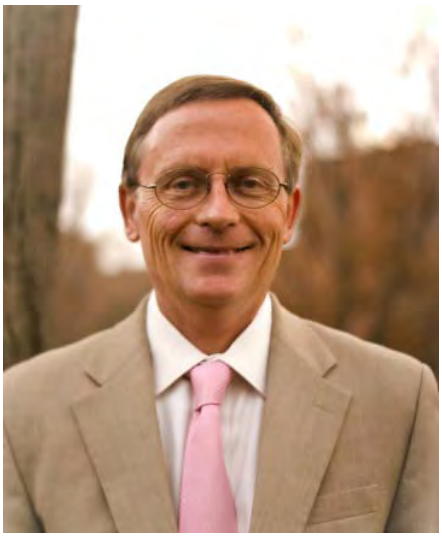
Anja Boisen is professor and head of the Nanoprobes research group at the department of Micro and Nanotechnology at the Technical University of Denmark. She has a thorough knowledge on micromechanics and nanotechnology and has more than 10 years experience in microfabrication and cantilever-based sensing. Her research group focuses on development and application of micro and nano mechanical sensors and microfabricated solutions for oral drug delivery. Anja is cofounder of the company Cantion A/S, which was established in 2001. She has chaired several conferences and workshops – for example the international conference on Micro and Nano Engineering (MNE) in Copenhagen, September 2007. She is member of the board of the Danish National Advanced Technology Foundation and the Danish Academy of the Technical Sciences. In January 2008 she was awarded the largest research prize in Denmark, the so-called Villum Kann Rasmussen award, for her pioneering research in nanomechanical sensors and in 2012 she was awarded the EliteForsk Award from the Danish ministry of Research, Innovation and Higher Education

Distinguished Lecture #3

MICROCANTILVER SENSORS USING METAL ORGANIC FRAMEWORK FILMS AND ULTRA-LOW POWER MICROBRIDGE GAS SENSORS

Prof. Peter J. Hesketh

Director of the MEMS Group
George W. Woodruff School of Mechanical Engineering
Georgia Institute of Technology ,Atlanta, GA 30332-0405



Sensors and sensor systems are vital to our awareness of our surroundings and provide safety, security, and surveillance, as well as enable monitoring of our health and the environment. A transformative advance in the field of sensor technology has been the development of miniature low power NEMS/MEMS sensors. NEMS/MEMS – Nano/Micro-Electro-Mechanical Systems is the application of nanotechnology with integrated circuit engineering to create sensing devices. Two examples of NEMS/MEMS gas sensors are microcantilevers and microbridge sensors.

Microcantilever sensors can be exquisitely sensitive and operate at low voltage and power levels. A new generation of coatings using nanoporous Metal-Organic Frameworks (MOFs) has been successfully demonstrated [M. D. Allendorf, et al., J. American Chemical Society, Vol. 130, pg. 14404 (2008)]. MOFs are a new class of crystalline nanoporous materials with salient features such as tailorable nanoporosity, high surface area and analyte specific adsorption. N-doped piezoresistive microcantilever array sensors were fabricated using microfabrication technology with dimensions 230 μm in length and 100 μm in width [J.-H. Lee, et al., Solid-State Sensors, Actuators and Microsystems Workshop, Hilton Head, SC, 2010]. Thin films of MOF were grown on the silicon cantilever sensors at room temperature on SiO2, SAM and Si3N4. Different volatile organic compounds (VOCs) including methanol, isopropanol, toluene, and acetone were detected with the cantilever sensors.

Miniature, ultra-low power, and sensitive, microbridge-based thermal conductivity gas sensors have been realized [R.J. Aguilar, et al., Transactions ECS, Vol. 33, pg. 245 (2010)]. The batch fabricated sensors are built with CMOS compatible processes using surface micromachining techniques. Doped polysilicon was used as the structural material of the bridge with critical dimensions of 1 μm and 0.5 μm. These different size sensors have been tested with nitrogen, carbon dioxide, helium, hydrogen, and methane. Heat loss from the sensor was observed to be a function of the thermal conductivity of the gas ambient, resulting in different magnitude of resistance change for each gas. The response time of each of these sensors was found to be rather fast (~micro-seconds) while their stability was excellent.

Biography

Peter Hesketh received a B.Sc. in Electrical and Electronic Engineering from the University of Leeds (1979) and was a Thouron Fellow at the University of Pennsylvania, obtaining an M.S. (1983) Ph.D. (1987) in Electrical Engineering. He worked in the Microsensor Group at the Physical Electronics Laboratory of Stanford Research Institute and then Teknekron Sensor Development Corporation before joining the faculty at the University of Illinois in 1990 in the Department of Electrical Engineering and Computer Science. He is currently a Professor of Mechanical Engineering at Georgia Institute of Technology, Member of the Parker H. Petit Institute for Bioengineering and Biosciences, and Director of the MEMS Group in the School of Mechanical Engineering. His research interests include microcantilever chemical and biosensors, microvalves, miniature gas chromatography systems, and detection of contamination in foods. He has published over seventy journal papers and edited fifteen books on microsystems. He is a Fellow of the AAAS, ASME, ECS, a member of ASEE, AVS, and IEEE.

Smart meters and home area network standards

Trevor Cox
Schedule2Go

Monday 14 May
7:00pm

Rm 2020 Fred Kaiser Bldg
2332 Main Mall, UBC

Information
Joint Communications
Vicechair
Alain Bergeron
agbergeron@shaw.ca

BC Hydro's nearly $1B Smart Meter program is well into the deployment phase and has received a lot of media publicity. The presentation will include an overview of the of the program, followed by a more in-depth discussion of Home Area Networks (HAN). HAN applications include enabling approved third-party devices to connect to utility meters to provide real-time consumption feedback and encourage energy conservation. With the massive deployment of HAN-capable meters around the world, competing evolving standards like ZigBee SEP 1.x and SEP 2.x are jockeying for position, while stakeholders promote the respective merits of underlying physical layer options like Wi-Fi, 802.15.4, and IEEE 1901. In this environment, vendors and utilities have had challenging decisions to make. However, regardless of the technology, the benefits are ultimately dependent on consumer behaviour.

Speaker: Trevor Cox, MBA, P.Eng., served as Home Area Network (HAN) Technical Lead on BC Hydro's smart meter project. Currently, in addition to consulting to BC Hydro and others, he is the founder of a mobile software start-up (Schedule2Go), and is Program Co-Director for Shad Valley UBC , a non-profit summer technology, science and entrepreneurship program for exceptional high school students. Trevor has a Computer Engineering degree from UBC and an MBA from EDHEC Business School in France, and has worked in the BC technology industry for 20 years

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Vancouver section honours presented at the AGM and gala 26 March 2012

Student Scholarship Awards
Hector J. McLeod Scholarship - Alex Chystov, BCIT Thurb Cushing Scholarship - Mohammad Akhlaghi, SFU John Deane Scholarship - Benny (ChunYin) Chan, UBC

2011 Chapter and Sub-Unit Awards:
Outstanding large Technical Chapter - Joint Communications Chapter (Alon Newton, Chair) (for Highest number of meetings in 2011)

Outstanding Large Technical Chapter - Power & Energy Society Chapter (Glen Tang, Chair) (Most successful meetings in 2011)

Outstanding Chapter - Women in Engineering (Zahra Ahmadian, Chair) (Best overall performance at the Section level in 2011)

Best performing Small Technical Chapter - Signal Processing Chapter (Jane Wang and Mehrdad Fatourechi, co-chairs)

Outstanding Subsection - Northern British Columbia (Jernej Polajnar, Chair)

Outstanding Student Branch - BCIT Student Branch, (Koji Otomo, Chair and Glenn Pellegrin, Student Branch Counselor) (for their contributions to the Section's Centennial)

Service Awards - Departing Chapter Chairs & Volunteers:
Glen Tang (for service as Power & Energy Chapter Chair) Mehrdad Fatourechi & Z. Jane Wang (Signal Processing Chapter Chairs) Jesse Malm & Victor Tsang (Webmaster and Media team) Andy Tsai (GOLD Chapter Chair) Koji Otomo (BCIT Student Branch Chair)

2011 Centennial Volunteer Awards and Recognitions
Certificate of Recognition and Honourable Mention:

Fiorenza Albert-Howard Alain Bergeron Glen Chapman Hermann Dommel Neda Eskandari Bonnie Grey Dana Hoffman Nick Keenan Jose Marti Alon Newton Glenn Pellegrin Patrick Sándi Meliha Selak Harshul Srivastava Joseph Yan

Certificates of Appreciation - for Contributions to Centennial Events and Initiatives:

Mohammad Akhlaghi Frankie Angai Nasim Arianpoo Christan Beharrell Duncan Chan Valentina Dabic Christopher Morrissey Aryan Navabi Shahrzad Rostamirad Coco Sun Victor Tsang Jodie Vigar Chad Watson

Centennial Awards - for Outstanding Contributions and Support to Centennial Events and Initiatives

Zahra Ahmadian Kouros Goodarzi Charles Henville Steven McClain Nina Selak Chris Siggers William Tigor Ljiljana Trajkovic

Centennial Awards - for Outstanding Leadership and Contributions to Centennial Events and Initiatives

Gruja Blagojevic Pieter Botman Koji Otomo Chris Scholefield

2012 Annual General Meeting - summary

The Vancouver Section's Annual General Meeting and Gala was held on March 26, 2012 at the Vancouver Convention Centre.

Over 100 Section members and guests gathered to socialize, renew friendships and enjoy a delicious meal.

Past Chair of the Section Mazana Armstrong reviewed the highlights of the Section's Centennial Celebrations in 2011, and presented a composite video illustrating some of the numerous activities and the many people involved. Mazana stressed that Centennial related work will be continuing in 2012, as the Section builds and installs its Centennial Monument.

Mazana thanked the Centennial Sponsors, whose contributions helped cover many costs associated with our Centennial activities. General Sponsors - BC Hydro, BCIT, SFU, UBC, Telus Silver sponsors - MDA, Stantec, APEG BC Bronze sponsors - Lex Engineering, Vector Drive Systems, GE Special sponsor – IEEE Canadian Foundation

Section Historian, Dr. Chris Scholefield, spoke about the historical records gathered last year and the production of the special Centennial Booklet, which was edited by him. Dr. Scholefield and the History Committee will be continuing in 2012 to collect and process historic materials. Volunteers and contributions are welcome.

For ongoing and up-to-date information on the Section's Centennial please visit our special website: http://vancouver.ieee.ca/Centennial

Kouros Goodarzi, 2012 Section Chair, reviewed the performance of the Vancouver Section, which included a very high number of events at both the Section and Chapter level. During 2011 the Section also formed several units, including a Consultants' Network (CN) chapter; Humanitarian Initiatives Committee (HIC); University of Northern British Columbia (UNBC) Student Branch; a Teacher In Service Program (TISP); and Oceanic Engineering Society Chapter.

Kouros outlined some of the priorities for the Section in 2012, which included new members, increased support for new units in the Section, and development of additional volunteers.

During 2011, several Section members and units gained significant recognition from elsewhere within the IEEE:
PES/DEI Joint Chapter - recognized by the IEEE Power and Energy Society; Dr. Hermann Dommel - received 2011 IEEE PES Charles Concordia Power Systems Engineering Award; Dr. Wenyuan Li of BC Hydro - received 2011 IEEE PES Roy Billinton Power System Reliability Award; Dave Michelson - received 2011 Betty Fata Award for Conference Leadership; UBC-O student Emily Landry - received $5000 IEEE Canadian Foundation scholarship; Harshul Srivastava received the Larry K. Wilson Regional Student Activities Award for 2011/2012 for his contributions to the student branch.

Dr. Paul Lusina presented information about the Vancouver Section's newly formed Humanitarian Initiatives Committee. To learn more about this new committee or to become involved, please visit the section website at: http://vancouver.ieee.ca

Section Vice Chair Alon Newton and Treasurer Steven McClain presented the Section final financial report for the past year.

The Vancouver Section's own annual awards were presented for outstanding performance and contributions during 2011. This year the Section awards list was lengthier than usual, due to the addition of special Centennial awards. [Please see separate article for list of Section award winners]

After the close of the formal business meeting, attendees enjoyed a very interesting and thought provoking presentation on inventions, given by Dr. Dan Gelbart of SFU. Dr. Gelbart was thanked by Vice Chair Alon Newton and all members present.

For additional information regarding the Vancouver Section, including its activities and organization, please visit the Section's website at: http://vancouver.ieee.ca Additional photos and material from the 2012 AGM and Gala will be made available through the website as well.

The date for the 2013 AGM and Gala was set for Monday March 25, 2013. Be sure to reserve the date, and make plans to attend!

Senior members update

At the last A&A (Admission and Advancement) review panel meeting, held on 24 March 2012 in Panama City, Panama, the following IEEE Vancouver members were elevated tosenior member status:

McClain, Steven
Nasiopoulos, Panos

They join the following elevated earlier in the year:

Moshref, Ali Palizban
Ali Young, Sheldon

The Vancouver Section congratulates its new senior members on their accomplishments and achievements! Senior members can obtain a new membership certificate on-line, by logging in to myIEEE. All eligible members are encouraged to apply for senior member upgrade. For additional information on the requirements for senior membership please visit: http://www.ieee.org/membership_services/membership/senior/application/index.html

(We will try to recognize all senior members elevations
but if we miss any, kindly let us know at n.keenan @ieee.org and we'll recover)