

Ultra-Wide Dynamic Range, MEMS Capacitive Sensors and Actuators

Speaker: Robert B. McIntosh

HORIZON TECHNOLOGY GROUP, INC
Williamsburg, VA

Date/Time: Thursday, March 16, 2005 at 6:30 PM

Location: Aberdeen Barn

<http://www.aberdeenbarnvabeach.com>

5805 Northampton Blvd **757.464.1580**
Virginia Beach, VA 23455

Cost: Members and guests \$20; Students \$10



Mr. McIntosh will highlight innovative portions of his January 2006, IEEE Sensor Journal paper: "Capacitive Transducers with Curved Electrodes" of particular interest to student members. He will also discuss approaches to R&D that illustrate both successes and failures, and what he believes are fundamental rules of success for new engineers and managers.

After the presentation, McIntosh will be available to talk with members having specific interest and experience in sensing technologies. His recent paper shows that the sensitivity and dynamic range of capacitive sensors and actuators with curved electrodes are higher and wider than devices with parallel electrodes. An electrical advantage is obtained from the permittivity of a fixed dielectric film and a mechanical advantage from its thinness. Transducers were constructed with silicon diaphragms that bend and polymer membranes that stretch in response to applied stress. Ocean bottom sensors with silicon diaphragms can measure dynamic pressure changes over a linear range of 125 dB. An 885% change in capacitance was obtained for a sensor in air with a thin diaphragm. By comparison, electrostatic collapse limits the capacitance change of conventional devices with parallel-plate electrodes to about 20%.

Sensors with polycarbonate membranes demonstrated the ability of a low-cost transducer to measure pressure, fluid flow, displacement, and tilt. Arrays of micromachined capacitors are ideally suited for sonar and ultrasonic imaging applications. An active capacitive bridge circuit was developed to linearly measure capacitance changes up to 1000% and to control electrostatic actuators by force-balanced feedback.

Biographical Sketch: See Page 3

Reservations: Please forward RSVP to Kurt Clemente [+1 757 676 6004, kurt.clemente@ieee.org] or William LaBelle [+1 757 619 9050, +1 757 421 8695, w.labelle@ieee.org].

Checks: Checks should be made out to IEEE and brought to the meeting.

Directions: See page 3

Upcoming Meetings

Apr 20 Anti-microbial coatings - Michael Kelley

May 18

Social – Virginia Marine Science Museum
(tentative)

Inside this Open Channel

Page 2 From the Chair

Page 3 Biography – Robert B. McIntosh

Page 3 Directions to Aberdeen Barn

Page 3 U.S. IEEE Members Wanted for Congressional Visits
Day 2006

Page 4 NIST ATP Launches Free Newsletter Service

Page 4 2006 PEC Engineer of the Year

Page 4 SoutheastCon 2006

Page 4 IEEE Launches Phase 1 of Revamped Web Site

Page 5 IEEE Travel Offers Global Online Hotel Booking

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All materials for THE OPEN CHANNEL are due by the 22th day of the month preceding the issue month. Address all correspondence to:

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From the Chair

Gearing up for the Spring...



Many thanks to all of the individuals that have helped to start this year off on the right foot for our IEEE monthly meetings. This includes all of the students who gave their time and energy (directly and indirectly) for the student paper competition, the school facilitators, the Student Activities Chair, the monthly speakers, the members that have been able to attend the presentations, and all of the behind the scenes support cast that hammer out all of the coordinating details for each meeting. I anticipate a good year ahead of us as we head into The Spring.

I was reminded last week of how diverse our IEEE community is in the area. The presentation by Dr. Demetris Geddis on Macro Fiber Composite Actuator Tuned Fiber Bragg Grating Ring Lasers for Real Time Structural Health Monitoring was fascinating. Although not my particular field of experience again, it was to many of the members that did attend. It was great to talk with Mr. Bill Lorber again and hear that this topic directly applied to his profession. This is why I do not see a problem with monthly meeting attendance averaging in the 20's. We would like to sell out each meeting, but we also understand that interests vary. There are not too many topics that will apply or appeal to all members in our area, but do let us know of any that come to mind. Or any professional topic that is of interest to you. Whether you can give the presentation, know of a particular presenter, or just require clarification on a particular topic. Chances are that several other people are interested, too. Oh, and by the way, Fiber Bragg Grating is derived from Bragg's Law that expresses the condition under which a beam of X-rays is reflected with maximum directness by a crystal. At least that is what my illustrated dictionary of electronics states...

The meeting topic in April is tentatively scheduled to be on sensors. Whether underwater or not is still to be determined. More details shall follow as they become available.

The position of the Secretary is still open. If anyone is interested in becoming involved, please contact me. Mr. Dan Ulinski is both Treasurer and Acting Secretary and his efforts are duly noted and appreciated. As always, I look forward to catching up with everyone at the monthly meetings this year. See you soon.

Regards,
Brent D. Phillips, PE
2006 Chair
Hampton Roads Section
bphillips@ieee.org

Biography – Robert B. McIntosh

Mr. McIntosh founded Horizon Technology Group, Inc., Alexandria, VA, in 1986 to assist industry and government to develop semiconductor manufacturing technology and silicon micromachined sensors. He managed two, Navy Phase-II, SBIR contracts to develop underwater pressure sensors and seismometers, and a BMDO, Phase-II SBIR contract, awarded by the Air Force Materials Laboratory, to develop low-cost manufacturing methods for precision electronic and optical substrates. Most recently, Mr. McIntosh was Principal Investigator for a USDA, Phase-II SBIR grant to develop automated grain inspection systems and transducers for aeration control systems. He currently is performing follow-on, NAVSEA funded, patent prosecution of inventions made under Navy SBIR contracts.

In 1987, McIntosh assisted the University of Wisconsin to acquire a NSF-funded, Center of Excellence for X-Ray Lithography and provided planning assistance for a DARPA sponsored government, industry, and university semiconductor technology program that included initial funding of SEMATEC. From 1986 to 1989, he provided marketing and strategic planning assistance to over 40 government, industry, and university organizations.

From 1974-1986, at Perkin-Elmer Corp., Mr. McIntosh managed hardware and R&D programs for optical and x-ray lithography, high-energy lasers, and space optical components. He introduced chemical-mechanical polishing, selective chemical etching, and low-temperature bonding to fabricate laser and synchrotron optical components from silicon. McIntosh was responsible for major proposals prepared by the Optical Technology and Semiconductor Technology Groups and was a member of the Corporate Portfolio Planning Committee and the Large Optics and Automation/Robotics Advisory Boards.

McIntosh was Program Manager for the Infrared Scanning Radiometer that thermally imaged the dark surface of the moon, the first Apollo experiment to achieve perfect qualification and flight unit acceptance reviews. Earlier he contributed to the development of space-borne radiometers, a solid-state satellite stabilization sensor, gun-flash detection systems, star trackers, low-level TV, and Doppler navigation systems.

Mr. McIntosh obtained a BSEE from the University of Pennsylvania, a MSEE from New York University, and is a Senior Member of the IEEE. He has 12 patents related to capacitor transducers.

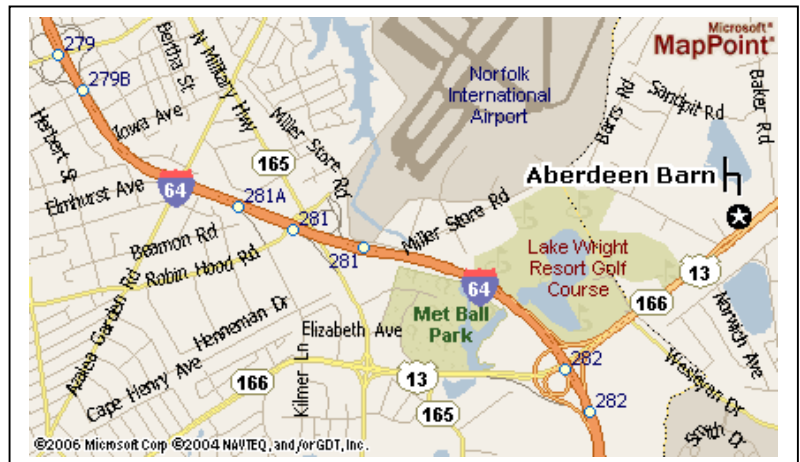
Aberdeen Barn:

Directions from Norfolk:

1. I-64 West to Northampton Blvd (exit 282)
2. At exit 282, US 13 North/SR 166 take RIGHT ramp.
3. Turn RIGHT into Aberdeen Barn parking lot (0.8 miles)

Directions from Williamsburg:

1. Take I-64 East to Northampton Blvd (exit 282)
2. At exit 282 take ramp onto US 13 North/SR 166.
3. Turn RIGHT into Aberdeen Barn parking lot (1.1 miles)



U.S. IEEE Members Wanted for Congressional Visits Day 2006

The 11th annual Congressional Visits Day is set for 28-29 March, and is expected to bring more than 250 scientists, engineers, researchers, educators and technology executives to Washington to raise visibility and support for science, engineering and technology. The two-day event culminates with visits to Capitol Hill and opportunities to meet face-to-face with members of Congress and their staff. Interested members are encouraged to contact Deborah Rudolph at +1 202 785 0017, ext. 8332, or by e-mail at d.rudolph@ieee.org.

For more information, visit: <http://www.ieeeusa.org/policy/cvd/>

NIST ATP Launches Free Newsletter Service

The National Institute of Standards and Technology's Advanced Technology Program (ATP) has launched ATP Discovery, a free newsletter and database service designed to inform corporations, managers, researchers, universities, entrepreneurs and others about the innovative technologies and new ventures funded by ATP.

ATP Discovery connects ATP-supported innovations and new ventures with corporate partners, investors, universities and others to help commercialize breakthrough technologies. This free service will allow you to efficiently identify and access alliances that can help your company leverage in-house R&D and product revenue, gain access to new products and markets, and provide investment and partnering opportunities for your business. Strategic alliances can include licensing, co-development, venture investing, OEM, marketing, manufacturing and acquisition.

For more information on ATP Discovery, visit: <http://www.atpinnovationnetwork.org/aboutatp.asp>



SOUTHEASTCON brings together electrical, electronics, and computer engineering professionals, faculty and students to share the latest information through technical sessions, tutorials and exhibits. It is the most influential conference in the southeast for promoting awareness of the technical contributions made by the electrical and computer engineering profession to the advancement of engineering and science, education, and to the community.

This annual Region 3 conference will be held in Memphis, Tennessee March 31 – April 2, 2006. For more information visit the conference web site at:

<http://www.secon06.org/>

IEEE Launches Phase 1 of Revamped Web Site

IEEE members and other visitors to <http://www.ieee.org> have likely noticed some changes since year end. The updates are the first of several planned enhancements to the organization website and are intended to make the site a more valuable resource for members, the technical profession, and the general public.

The initial updates, which are based on both user comments and Web site best practices, include:

- * Additional search capabilities; Users can search for IEEE content using the IEEE Web site, the entire Web (using Google) and the IEEE Xplore® digital library database
- * Refreshed design, more reflective of the organization's diverse activities and audiences
- * Shorter, more user-friendly URLs
- * Migration toward a more streamlined navigation utilizing information portals and "What Do You Want to Do" options to help visitors locate content relevant to their interest area

As the first step in an iterative process, these enhancements will pave the way for ongoing improvements. The IEEE encourages visitors to take a tour of the revamped site (link from the "What Do You Want to Do?" Section of the IEEE Home Page at <http://www.ieee.org>) and to continue to share feedback <http://www.ieee.org/web/services/general/feedback.html> as the site evolves.

IEEE Travel Offers Global Online Hotel Booking

Travel Services has launched www.ieee-hotels.com, a free, online hotel reservation service enabling users to receive IEEE-negotiated corporate rates. Powered by hotel.de, Germany's most-requested hotel reservation service, www.ieee-hotels.com includes over 150,000 international hotels and accepts payments in both U.S. dollars and Euros. The site is available in English, German, Italian, French and Spanish and includes a Freenights Bonus Program, which lets site visitors earn points that can be redeemed for complimentary hotel stays.