IEEE National Capital Area scanner

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Virtual Reality—*M.G. Howard (center) and Jeff Poston (right) watch as Bruce Howard demonstrates the Lightglove, a new type of user interface device that captures hand movements with a sensor unit worn under the wrist.*

IEEE Celebrates 125th Anniversary in 2009

Time sure flies when you are having fun, doesn't it? Did you know that IEEE is turning 125 years old next spring? There will be celebrations all over the world. These will be posted on the website ***www.ieee125.org***. IEEE will celebrate this anniversary milestone by recognizing the ways that electrotechnology and its practitioners make a difference in everyone's lives. IEEE members have been changing the world for over a hundred years.

Do you have an idea that will change the world? The IEEE Presidents' Change the World Competition recognizes students who develop unique solutions to real-world problems using engineering, science, computing and leadership skills to benefit their community or humanity.

Identify a global or local problem, develop a solution, then tell IEEE how you have made a positive impact in the world. You could win $10,000 and a trip to Los Angeles to attend the 2009 IEEE Honors Ceremony. There are also runner-up awards from $1,000 to $5,000. IEEE Student Branch members are eligible to enter this competition, which is the first of its kind in IEEE. The deadline is February 28, 2009.

If you are not a student, you can participate by choosing the People's Choice winner through online voting beginning in March 2009. Details are found at the 125th Anniversary website.

The Northern Virginia, Washington, and Baltimore Sections are planning a big 125th anniversary celebration event. The regional celebration is tentatively set for Philadelphia. Dates and venues will be determined early next year. Stay tuned for more information from the *Scanner*, and visit the website to find out about worldwide celebration events and how you can participate.

EMBS Speaker Demonstrates Lightglove's 'Gloveless' Virtual Reality User Interface

By Paul Otto

In June, the Washington and Northern Virginia chapter of the Engineering in Medicine and Biology Society hosted a presentation and demonstration of the applications of Lightglove, a new type of user interface, by Bruce Howard, co-founder and chief technical officer of Lightglove Corp.

Howard introduced his invention, a new technology worn underneath the wrist that optically images the shape of the hand in real time. A combination of infrared beams, accelerometers, and gyroscopes track hand motion, providing a virtual reality glove function without a physical glove. This technology differs from camera-based gesture tracking systems because it does not require computationally intensive image processing and is insensitive to background image clutter.

The Lightglove has specific uses in flight simulation, surgery training, and medical imagery analysis, but is generally suited for users of assistive technologies. It can emulate mouse, joystick, gaming controller and keyboard functions while allowing the hands to operate in any comfortable position or orientation, which also helps to mitigate repetitive stress injury.

Howard demonstrated the technology as a user interface for manipulating objects on the computer screen and for playing a virtual musical keyboard.

He also showed LightGlove's different modes, which allow the user to switch between a fast dexterous control that can be used for 3-D drawing and a "mitten mode" that allows the user to operate the device for a long period of time without fatigue.

The meeting was held at Mitre Corporation in McLean, VA. Cosponsors included the Antennas and Propagation Society chapter, the Computer Society chapter, the Northern Virginia chapter of the Signal Processing Society, and Graduates of the Last Decade.

For further information about the Lightglove technology, contact Bruce Howard at ***bhoward@lightglove.com.***

Section Meetings Rescheduled

The Washington Section Administrative Committee will meet on Wednesday, November 5 (not Tuesday). Elections for 2008 section officers will be held at this meeting. See Calendar item, p. 3, for details.

In December, the Washington and Northern Virginia sections will hold a joint Executive Committee meeting (officers only) instead of their Administrative Committee meetings. For details, please contact one of the section secretaries (see top of page 2).

Engineering for Autocrossing—*A team from the University of Maryland College Park won the first place trophy at the Formula SAE West competition in June.*

Terps Win Autocross Race Car Design Contest

The University of Maryland's Terps Racing team won the Formula SAE West 2008 competition in June. During the four-day event, the team placed first overall out of 83 teams from all over the world.

The University of Maryland team, which received support from the IEEE Washington Section, consists of about 25 engineering students, including five electrical engineering or computer science majors. Together they designed, built, drove and presented their car to the judges.

"Terps Racing is almost entirely stu-

See **TERPS RACING,** *p. 6*

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eScanner Calendar of Events
The calendar is available at ***www.ieee.org/escanner***. Check here for events submitted too late for print publication.

IEEE National Capital Area Virtual Community
Exchange ideas and participate in discussions with local IEEE members at ***www.ieeecommunities.org/nca***.

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EDITORIAL POLICIES AND PROCEDURES

Calendar Announcements

Please submit calendar items in the format used in the Calendar of Events. You can send email to ***ncac-scanner@ieee.org***. Events must have an IEEE or affiliate sponsor.

If possible, include a synopsis of the event and a biographical sketch of the presenter including academic background, current position, notable achievements, and IEEE and other professional affiliations.

Articles

Other contributions, such as reports on chapter events and other member activities, are most welcome. Please submit articles to the managing editor at ***ncac-scanner@ieee.org***.

Advertising

Contact the advertising manager about ad rates and to place advertising orders. Ads must be submitted by the deadline below.

Deadlines

The editor reserves the right to set policies and procedures necessary to provide members with a newsletter that is informative and timely. Deadlines must be strictly observed to keep the publication on schedule. If you are planning an event and have insufficient information by the deadline, please contact the managing editor. The deadline for the upcoming issue will always be published on this page.

January–February issue deadline: December 1, 2008

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calendar of events

Wednesday, November 5, 2008

Washington Section Administrative Committee Meeting

The Administrative Committee will meet on Wednesday this month only.

Time: 6:45 pm

Place: American Association for the Advancement of Science (AAAS), 1200 New York Avenue NW, Washington, DC

Directions: Use the 12th Street entrance. The AAAS building is one block from Metro Center (Red, Orange and Blue lines).

Street parking is free after 6:30 pm (no parking 4:00-6:30 pm). There is a pay parking lot at the intersection of 9th St. and New York Ave., and an underground parking garage at 14th St. and New York Ave. See map at ***www.aaas.org/dcwest.pdf.***

More Info: All interested IEEE members are welcome. Section officers for 2008 will be elected at this meeting.

Contact: RSVP to Tim Weil at ***trweil@ieee.org*** or 301-452-3641.

Thursday, November 6, 2008

♦ Anti-Windup and Bumpless Transfer Controller Design

Sponsors: Control Systems Society, Washington Chapter; Robotics and Automation Society

Speaker: Dr. Mark E. Pittelkau, Aerospace Control Systems, LLC

Time: Reception 11:30 am, presentation 12:00 noon; discussion 12:30–1:00 pm

Place: Fairchild Controls, Building 1, 540 Highland Street, Frederick, MD

More Info: See Diamond story, p. 4.

Cost: Free

Contact: Dr. Haik Biglari at 240-626-9205 or ***hbiglari@ieee.org.***

Wednesday, November 12, 2008

♦ Earth-Moon-Earth Communication: Amateur Techno-Sport

Sponsor: Microwave Theory and Techniques Society

Speaker: Dr. Allen Katz, The College of New Jersey and Linearizer Technology, Inc.

Time: Reception 5:30 pm, dinner 6:00 pm, lecture 7:00 pm

Place: Mitre Corporation, Building 2, 7515 Colshire Drive, McLean, VA

Directions: See ***www.mitre.org/about/locations/mitre2_map.html***. The walkway to Building 2 is accessible from level 2 of the parking garage. Free parking.

More Info: See Diamond story, p. 4 and ***http://ewh.ieee.org/r2/wash_nova/mtt***. This is the first lecture in the MTT-S series for 2008-09. All IEEE members and guests are welcome to attend.

Cost: Lecture free; $15 for optional dinner (reservation required, cash payment preferred).

Contact: Please RSVP for dinner only by close of business, Friday, Nov. 7 to Roger Kaul at ***r.kaul@ieee.org*** or 301-394-4775.

Wednesday, November 12, 2008

Northern Virginia Section Administrative Committee Meeting

Time: 6:30 pm

Place: Olive Garden Restaurant, 8133 Leesburg Pike (Tysons Corner), Vienna, VA

Directions: From I-495, take Route 7 West (Exit 47A) toward Tysons Corner. Turn left at Gallows Road. Parking garage is behind the restaurant.

More Info: All interested IEEE members are invited to attend.

Contact: Chuck Baldi at ***cbaldi@ieee.org*** or 703-675-0678.

Thursday, November 13, 2008

♦ Electrically Controlled Pneumatic Brakes

Sponsor: Land Transportation Committee of the IEEE Vehicular Technology Society and American Society of Mechanical Engineers

Speaker: Tom Engle, President, Integrated Railmotive Systems, Alexandria Bay, NY

Time: 11:30 am to 1:00 pm

Place: American Public Transportation Assoc., 11th Floor Conference Room, 1666 K Street NW, Washington, DC

Directions: Take the Metro to Farragut North station (Red Line, use K Street exit) or Farragut West station (Orange and Blue lines, use 17th Street exit).

More Info: See Diamond story, p. 4. All interested persons are invited. Membership in ASME or IEEE is not required.

Cost: $15 cash at the door for lunch.

Contact: Karl Berger at ***karl.berger@dcm-va.com*** or 703-803-7917 or Ken Briers at ***ken.briers@parsons.com*** or 202-775-3397.

Friday, November 14, 2008

♦ Fall Power Fiesta Networking Event

Sponsors: Power Engineering Society, Industry Applications Society, Professional Communication Society, Society on Social Implications of Technology, National Capital Area Consultants' Network, Women in Engineering, Graduates of the Last Decade (GOLD), and Life Members

Time: 5:00-8:00 pm

Place: Chevy's Fresh Mex Restaurant, Ballston Common Mall, 4238 Wilson Blvd., Arlington, VA

Directions: Ballston Common is two blocks south of Ballston Metro station (Orange line). Turn right at top of Metro escalator, then left on the street, proceed two blocks toward Macy's, turn left and walk toward Ballston Commons Mall. Look for Chevy's on the right. Street parking is limited, and underground parking typically costs $1 for 3 hours.

More Info: Refreshments, soft drinks and door prize awards will be provided. You may bring resumes, business cards and literature. Invite your friends, co-workers and anyone else who could benefit from networking with IEEE members. All are welcome.

Cost: $10 for IEEE members and guests, $5 for IEEE student members, or free for any IEEE member or student member who sponsors a new IEEE member. The new member must join at any grade between Oct. 1 and Nov. 14. For details, see Diamond Story, p. 4.

Contact: Please RSVP to Monica Mallini at ***m.a.mallini@ieee.org.***

Thursday, November 20, 2008

Life Members Meeting

Sponsor: Life Members

Speaker: TBA

Time: 12:00 noon

Place: Dolley Madison Library, 1244 Oak Ridge Ave, McLean, VA

Directions: Take Exit 46 from the Beltway and proceed on Route 123 North to McLean, VA, about 2 miles. After crossing Old Dominion Dr., turn left at the next street, Ingleside Ave., and then left on Oak Ridge Ave. The library is on the left.

More Info: Refreshments will be served.

Contact: Amarjeet Basra at 703-324-2821 or ***amarjeet.basra@ieee.org.***

Tuesday, November 25, 2008

Ontology

Sponsors: IEEE Computer Society; American Society for Quality (ASQ) Section 509 Software SIG; and the Society for Software Quality (SSQ)

Time: 6:30 pm

Speakers: Dr. Glenda Hayes, Mitre Corporation

Place: Video teleconference with sites in McLean and Silver Spring. Addresses are provided at the URL below.

More Info: Dr. Hayes chairs the DoD Metadata Working Group. All interested IEEE members and guests are invited to attend. Pizza and soda will be served.

Cost: Free

Contact: Advance registration is required to enter the facilities. Please register online at ***www.asq509.org/ht/d/sp/i/2499/pid/2499***. If your plans change, please email ***ankums@mitre.org*** to cancel your reservation.

See **CALENDAR**, *p. 4*

CALENDAR, *from p. 3*

Wednesday, December 3, 2008

Capitol College Graduate School Virtual Open House

Sponsor: Capitol College
Time: 7:00 pm
Place: Online
More Info: Capitol College is an IEEE Education Partner. Learn about its master's degree programs, meet faculty and staff, and experience the online classroom. For information about IEEE tuition discounts, see ***www.capitol-college.edu/academicprograms/partnerships/ieee.***
Contact: RSVP required. Please send your name, email address, phone number and program of interest to Laura Broughton at ***gradadmit@capitol-college.edu.***

Tuesday, December 9, 2008

♦ Ceramic Railroad Wheels

Sponsor: Land Transportation Committee of the IEEE Vehicular Technology Society and American Society of Mechanical Engineers
Speaker: Gerald Arnold, P.E., Booz Allen Hamilton
Time: 11:30 am to 1:00 pm
Place: American Public Transportation Assoc., 11th Floor Conference Room, 1666 K Street NW, Washington, DC
Directions: Take the Metro to Farragut North station (Red Line, use K Street exit) or Farragut West station (Orange and Blue lines, use 17th Street exit).
More Info: See Diamond story, p. 5. All interested persons are invited. Membership in ASME or IEEE is not required.
Cost: $15 cash at the door for lunch.
Contact: Karl Berger at ***karl.berger@dcm-va.com*** or 703-803-7917 or Ken Briers at ***ken.briers@parsons.com*** or 202-775-3397.

Tuesday, December 16, 2008

IT Roadmap Conference & Expo

Sponsor: Network World
Cosponsor: Washington Section
Time: 7:30 am - 6:30 pm
Place: Walter E. Washington Convention Center, Washington, DC
More Info: Innovative technology advancements. Compelling integrated solutions. Best practices. Real-world implementations. Only IT Roadmap has it all. This event is designed by IT pros for IT pros who want to cover multiple industry topics in one day.
Cost: Free for qualified IT professionals.
Contact: Register at ***www.networkworld.com/events***. Direct questions to ***seminars@nww.com*** or 1-800-643-4668.

Tuesday, December 16, 2008

♦ Service Oriented Acquisition

Sponsors: IEEE Computer Society; American Society for Quality (ASQ) Section 509 Software SIG; and the Society for Software Quality (SSQ)
Time: 6:30 pm
Speakers: Chris Gunderson
Place: Video teleconference with sites in McLean and Silver Spring. Addresses are provided at the URL below.
More Info: See Diamond story, p. 5. All interested IEEE members and guests are invited to attend. Pizza and soda will be served.
Cost: Free
Contact: Advance registration is required to enter the facilities. Please register online at ***www.asq509.org/ht/d/sp/i/2499/pid/2499***. If your plans change, please email ***ankums@mitre.org*** to cancel your reservation.

diamond♦stories

Thursday, November 6, 2008

♦ Anti-Windup and Bumpless Transfer Controller Design

Windup occurs in a controller with slow or unstable modes when an actuator saturates. When windup occurs, the controller states and output grow large and become inconsistent with the plant states and outputs. Windup can also occur when switching between controllers or when switching to manual control. Windup can cause an unacceptable response of the control system such as excessive overshoot, long recovery and settling times, and limit cycling. This is of concern in process control systems, motion control, robotics, flight control, and spacecraft attitude control systems. Anti-windup control refers to any of several design methods to prevent windup and to achieve good behavior of the control system. These methods will be reviewed and simulation results for two systems without and with anti-windup will be presented. An idea for using anti-windup control to aid in actuator failure detection will be discussed.

Mark Pittelkau is a consultant at Aerospace Control Systems, LLC. Dr. Pittelkau received his B.S. and Ph.D. degrees in electrical engineering from Tennessee Technological University and his M.S. from Virginia Tech. His recent work includes attitude control system design, control-structure interaction and stability analysis, and pointing performance evaluation. His principal interests include attitude determination and control system design for precision-pointing of agile spacecraft, the development of algorithms and software for precision attitude determination and sensor calibration, and system identification in general. Dr. Pittelkau developed the Redundant IMU Attitude Determination and Calibration (RADICAL) filter for on-board real-time calibration of attitude sensors and gyros, automated ground-based processing, and desktop analysis and design.

Wednesday, November 12, 2008

♦ Earth-Moon-Earth Communication: Amateur Techno-Sport

Allen Katz is a professor of electrical engineering at The College of New Jersey and founder and president of Linearizer Technology, Inc., a company dedicated exclusively to distortion correction. He has more than 25 years of experience in the microwave and satellite industries.

Dr. Katz holds doctorate and baccalaureate degrees in electrical engineering from New Jersey Institute of Technology and a master's degree in electrical engineering from Rutgers University. His work spans the frequency range from UHF to above Ka-band and has involved both hybrid and MMIC circuits including the design of the first practical MMIC linearizer. He holds 15 patents and has written more than 75 technical publications. He is a Fellow of the IEEE and has been a Microwave Theory and Techniques Society Distinguished Lecturer.

Thursday, November 13, 2008

♦ Electrically Controlled Pneumatic Brakes

Since its invention by George Westinghouse in 1872 the pneumatically controlled railway brake has been universally accepted. It continues to provide safety, economy, and speed to ever larger freight trains. Though simple in concept, the application has been fertile ground for sophisticated pneumatic technology for more than 130 years. A major challenge is to overcome the propagation delay of the pneumatic signal in a long train. Brake actuation can be made instantaneous by overlaying an electrical control signal on the pneumatic system. The advantages are well proven in passenger trains and transit cars: uniformity and accuracy of brake application, graduated release, and rapidity of response. Extending this technology to mile-long freight trains faces severe but not insurmountable challenges. **Tom Engle** will discuss his involvement in the development of electrically controlled pneumatic brakes and will offer a unique and realistic perspective on the possible advantages of the technology.

Friday, November 14, 2008

♦ Fall Power Fiesta Networking Event

Don't miss the premiere networking event of the National Capital Area, the Fall Power Fiesta. Originated in 2005 by the Power Engineering Society, the Fiesta has been very popular due to a diverse mix of attendance—students, recent graduates, representatives of industry, consultants, life members—resulting in "a fantastic synergy," as one attendee described the atmosphere. This year, the Fiesta welcomes two new cosponsors, the Society on Social Implications of Technology, and the new Professional Communication Society chapter.

Get free admission to the Fall Power Fiesta by sponsoring a new IEEE member or student member! To obtain your free admission, register for the Fiesta by sending an email to Monica Mallini at ***m.a.mallini@ieee.org***. Include your name, IEEE section, grade and member number, and the same information for the new IEEE member that you have sponsored. The new member must join IEEE between October 1 and November 14 to be eligible. You and the new member will both receive free admission to the Fall Power Fiesta. Door prizes will be awarded, and there will be special prize drawings for new IEEE members and their IEEE member sponsors.

Don't forget to ask the new IEEE member to reference your name and IEEE member number so you will get credit for the referral in the IEEE Member-Get-A-Member promotion. Questions about the MGM promotion should be directed to your Section's Membership Chair: Monica Mallini for the Northern

Virginia Section, or Tim Weil at *trweil@ieee.org* for the Washington Section.

See you at the Fiesta! ¡Olé!

Tuesday, December 9, 2008

♦ Ceramic Railroad Wheels

Ball or roller bearings have much in common with a railway wheel running on a rail. Both have high Hertzian stresses and are subject to rolling contact fatigue. Silicon nitride (Si3N4), a technical ceramic, has now firmly established itself in the engineering marketplace as part of a hybrid bearing, where the rolling elements are silicon nitride and the races are steel. **Gerald Arnold** will explore the possibility of a silicon nitride/steel wheel/rail combination and will show that, because silicon nitride has a higher modulus of elasticity, it is not suitable as a direct replacement on existing systems, because it would produce a smaller contact patch and greater contact stress.

The low toughness of silicon nitride in comparison to steel could be an obstacle to its general railway use, however, it could made into a composite material in the same manner as carbon reinforced silicon carbide (C/SiC) is used in brake discs. There is a possibility that, under the right conditions, silicon nitride could return very low wear rates, because of its extreme hardness, and because of its excellent resistance to rolling contact fatigue (noted in hybrid bearings). This could give a wheel high mileage, without the need to remove fatigued material by controlled wear or by turning.

Tuesday, December 16, 2008

♦ Service Oriented Acquisition

DoD has been pursuing its net-centric strategic vision and enabling the service oriented architecture (SOA) paradigm for 10 years. Other federal agencies have pursued various "e-Gov" initiatives aimed at implementing best commercial IT practices, e.g. SOA, into federal acquisition projects. However, despite billions spent in the federal IT budget over those years, progress has been disappointing, as indicated by a constant stream of GAO reports and media exposés. This presentation will explore why the SOA paradigm is so difficult to implement.

Successful SOA deployment requires a rapid, adaptive, collaborative and iterative Service Oriented Acquisition paradigm. Despite policy statements to the contrary, government IT acquisition process artifacts favor long, serial, rigid, risk-averse, stove-piped process.

Government-industry collaborations tend to be successful when government furnishes affordable, safe, useful and interoperable infrastructure upon which industry may competitively innovate, e.g., the Global Positioning System, Interstate highways, the Internet, etc. To date government investment in SOA has been focused on specialized applications associated with the sponsor's mission.

Chris Gunderson is a Research Associate Professor of Information Science at the Naval Post Graduate School. He is on a special assignment sponsored by the Defense Information System Agency's Joint Interoperability Test Command to establish a Netcentric Certification Office (NCO). The NCO will link distributed DoD laboratories in partnership with industry to create a public-private e-Business portal for delivery of government certified net-ready software products and services.

Gunderson retired from the U.S. Navy in 2004 as a Captain following 27 years of service. His last assignment was as Commanding Officer of the Fleet Numerical Oceanographic and Meteorological Center, a super computer network operation center in Monterey, CA. He holds a B.S. from the U.S. Naval Academy, an M.S. from the Naval Postgraduate School, and is a Fellow of the American Meteorology Society.

Virtual Manufacturing Automation Competition Enters Second Year with Continuing IEEE Grant

Stephen Balakirsky, Raj Madhavan, and Chris Scrapper have received a continuing grant from the IEEE Robotics and Automation Society for the creation of a National Virtual Manufacturing Automation Competition (VMAC). The three work in the Intelligent Systems Division of the National Institute of Standards and Technology (NIST) in Gaithersburg, MD, where the 2009 national competition will be held.

This joint NIST/IEEE effort is based on the successful VMA Competition (***vmac.hood.edu***) held in April 2008 and the RoboCup Rescue Virtual Competitions (***www.robocup-us.org***). This will also be an official competition at the International Conference on Robotics and Automation (ICRA'09) to be held in Kobe, Japan in May 2009.

Under this effort, we are soliciting faculty members and their interested students from universities to be introduced to this time-critical research area. Researchers from multi-agent cooperation, robotic mapping and localization, communications networks, and sensory processing backgrounds are particularly encouraged to participate. The participants will be provided with the necessary knowledge needed to join the robotics and automation research community in the area of manufacturing automation.

We are planning a series of tutorials around the country to introduce and discuss the simulation platforms and other associated details. The first of these tutorials was held on October 23 at Carnegie Mellon University in Pittsburgh.

Participants are provided with all relevant software. Since all code used in the competitions is open source, participants are able to learn from their competitors and self-sustain their research in their areas of expertise.

A workshop flyer is available from the competition organizers at ***robosim@nist.gov***. An article about last year's competition appeared on page 1 of the July–August 2008 issue of the *Scanner*, which is available at ***www.ieee.org/escanner/Scan08n4.pdf***.

IEEE Members Offered Opportunity to Judge Science Fairs

By Paul Hazan, Senior Life Member

Global competition is creating an urgent need to motivate and attract some of the best and brightest students into science and technology careers. In the U.S. Congress, K-12 education is receiving renewed bipartisan support in both the House and Senate.

To help meet this need, the Washington Academy of Sciences (WAS) is expanding its STARS (Science and Technology Aptitude Recognition for Schools) youth-in-science outreach program.

In recent years, this program has included not only active participation in several senior high school science fairs, but also science events at elementary and middle schools. IEEE members volunteering as judges have been key to the success of the STARS program for the past five years.

During the 2009 school year, we are planning nine major events at the region's schools, involving over 1,600 students. We will offer Challenge Cups, cash prizes, plaques, certificates and other awards. Award winning student projects will also be recognized in the WAS *Journal* and website, and in the *Scanner*.

Our biggest asset is your expertise and dedication, and that of your fellow professionals. No special preparation is needed to be a science fair judge. Typically judging takes four hours at a participating school in Washington, Maryland or Northern Virginia, sometime in the December to March time frame.

The number of schools and students benefiting from the STARS program depends directly on your commitment to participate. IEEE is the largest of the 60 professional affiliates making up WAS.

If you are interested in serving as a judge, please send a one-line email to ***pmhazan@comcast.net*** by November 30 saying that you would like to be included in the 2009 WAS Judges' Roster. Include your name, email address, affiliation, address, and telephone number. You will be notified as soon as schools provide the dates (no later than early January).

We believe you would find your interaction with fellow judges, the schools, and those enthusiastic students to be a worthwhile, rewarding, and fun experience, and look forward to our collaboration in this exciting 2009 WAS and IEEE initiative.

PerMIS'08 Workshop Explored Functional Intelligence Topics

The 2008 Performance Metrics for Intelligent Systems (PerMIS'08) Workshop took place in August. It was the eighth in the series that started in 2000, targeted at defining measures and methodologies of evaluating performance of intelligent systems.

Elena Messina and Raj Madhavan of the National Institute of Standards and Technology (NIST) served as General and Program chairs, respectively.

PerMIS'08 was aimed at identifying and quantifying contributions of functional intelligence towards achieving success. In addition to the main theme, as in previous years, the workshop focused on applications of performance measures to practical problems in commercial, industrial, homeland security, and military applications.

PerMIS'08 featured five plenary addresses and seven special sessions. This year, there was a special session for every (parallel) general session. Over the course of three days, 58 papers were presented across 12 sessions related to performance of intelligent systems covering an array of topics from medical systems to manufacturing, mobile robotics to virtual automation, human-system interaction to biologically inspired models, and much more.

PerMIS'08 was sponsored by NIST with technical co-sponsorship of the IEEE Washington and Northern Virginia chapter of the Robotics and Automation Society and in cooperation with the Association for Computing Machinery (ACM) Special Interest Group on Artificial Intelligence (SIGART).

The proceedings of PerMIS'08 will be indexed by INSPEC and Compendex, will be available online on ACM's Digital Library, and released as a NIST Special Publication. All papers from PerMIS'08 and the agenda are available from the workshop website at ***www.isd.mel.nist.gov/PerMIS_2008***. Selected papers from the workshop are being considered for inclusion in *Performance Evaluation and Benchmarking of Intelligent Systems*, a volume edited by Madhavan, Messina and Edward Tunstel, and published by Springer.

NASA Goddard's Test and Integration Facility Simulates Space Environment

By Tim Weil, Vice Chair, Washington Section, and Elsie Grant, *Scanner* Managing Editor

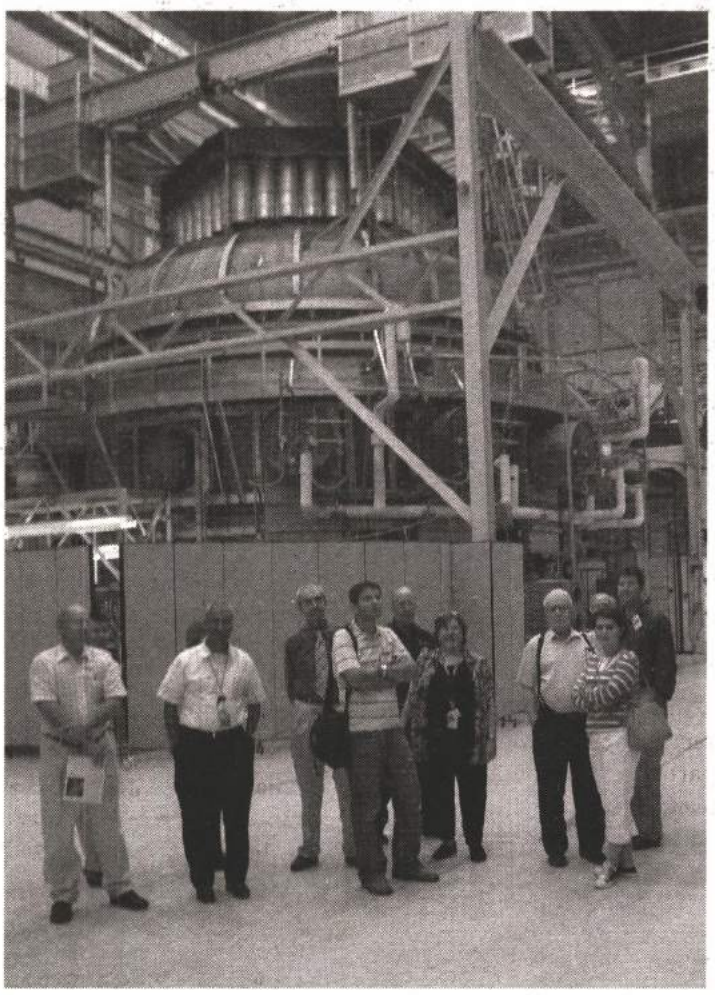
Everything at NASA is extraordinarily large—in concept, in time, and in space.

That's what you discover when you visit NASA Goddard Space Flight Center in Greenbelt, MD, starting in the Visitor Center with a moon rock that shows meteor impacts from 4 billion years ago. Nearby is an exhibit explaining the Wilkinson Microwave Anistropy Probe, which is focused on the oldest light in the universe, believed to be emanating from 13.7 billion years ago, and a display about ICESat, which is gathering global topography data and measuring ice sheet mass balance in polar regions.

Among the 5,000 scientists and engineers who work at Goddard (including contractors) is Dr. John C. Mather, an astrophysicist who shared the 2006 Nobel Prize in Physics for his work on the Cosmic Background Explorer, which provided critical evidence to support the Big Bang theory.

To build and test spacecraft for its earth sensing and space science missions, Goddard has the largest clean room in the world, a powerful centrifuge that can produce G forces six times stronger than the world's most intense roller-coaster, and an enormous thermal vacuum chamber that can chill a payload down to minus 310 F or heat it up to a sizzling 302 F.

Even a simple tour for IEEE members, sponsored by the Aerospace and Electronic Systems Society and the Geoscience and Remote Sensing Society, turned out to be larger than expected. So many members signed up for the September tour of Goddard's test and integration facilities that organizers Roger Oliva, AESS Chair, and Dr. James Tilton, GRSS Chair, arranged for two additional tour times to accommodate more than 50 visitors.



NASA Scale—*Tour participants (left) gather in front of Goddard's largest thermal vacuum chamber. Engineers use the chamber to subject spacecraft to the extreme heating and cooling cycles that will be encountered in the vacuum of space. Goddard also has the world's largest clean room (right), most recently used to assemble and test hardware for the upcoming Hubble Space Telescope repair mission. The wall of filters at the right cleanses incoming air of tiny dust particles.*

Science on a Sphere

Before visiting the test and integration facilities, participants viewed the Visitor Center's "Science on a Sphere" presentation, which consists of video imagery projected from the four corners of a large darkened room onto a six-foot diameter sphere suspended in the middle of the room. This creates the effect of a three-dimensional earth, sun, Mars or other planet rotating right in front of you.

Using a remote similar to a Wii game controller, Karen Miller, Education Program Manager at the Visitor Center, spun the images, slowed them down, and replayed the most interesting parts. One animation showed global weather patterns during the past 30 days. Other animations included solar flares on the surface of the sun, clouds

Engineering Students Take 1st Place Overall in Race Car Competition

TERPS RACING, *from p. 1*

dent run," said team member Joe Gordon. "The students who have recently graduated come back to help run the team and give guidance. And the students who have been on the team for many years become the team leaders. Every year we even have several high school interns who come and work for the team."

Formula SAE is an international design competition where students produce a prototype race car for the weekend autocrosser.

Autocrossers compete for the best time in their class (based on vehicle type) by driving a temporary course marked by traffic pylons. Each run typically takes 40 to 70 seconds, depending on the course layout and car.

The Formula SAE college competition is organized by SAE International (formerly the Society of Automotive Engineers). Judges rate the cars in seven categories, with the combined score determining a team's overall place. The Terps Racing car was first in acceleration, third in skidpad, fourth in autocross, fourth in endurance/fuel economy, sixth in cost, ninth in presentation, and tied for tenth in design.

"Terps Racing gives students a chance to apply all the information they are learning in their classes. Many Terps Racing alumni say building a car was great experience for their jobs, since it is a very intensive team project oriented class," Gordon said.

Design goals for the team include ultra-high driving performance, low cost, and low weight. Their car weighs 475 pounds and accelerates from 0 to 60 in 2.9 seconds.

The electrical engineering students on the team are Ajay Chandhok, Buck Stafford and graduate student mentor Mike Stanley. Representing computer science are Joe Gordon and Aditya Joshi. They are responsible for creating a clean, lightweight, water-resistant wiring harness that is simple enough for a mechanical engineer to debug (no printed circuit boards). In the 2008 car, the electronics were somewhat complex and didn't have clean routing. For example, if the dashboard failed the car wouldn't run.

Teams from universities and colleges from the United Arab Emirates, Japan, Sweden, Brazil, China, Mexico, Canada and Venezuela, as well as several dozen from across the U.S., competed in Formula SAE West 2008, which was held at California Speedway in Fontana, CA.

The University of Maryland team is already working on improvements for its 2009 car by adding features such as a wing package and an iPod touch dash.

"Thanks to [IEEE's] and others' sponsorship, we were able to raise enough money to build a winning car. We hope to do this again this year," Gordon said. "We are also looking to start an endowment so there will continue to be a Terps Racing team for years to come."

of dust drifting from one continent to another, earthquake locations over time, nighttime lighting, and changes in the Arctic ice sheet over the past several years. The latter video showed a dramatic increase in the seasonal Arctic ice melt each year.

The videos are compiled from imagery and data collected by science spacecraft, many of which are planned, built, tested and controlled in-orbit by Goddard, and by weather satellites operated by the National Oceanic and Atmospheric Administration.

There are 27 Science on a Sphere exhibits around the world. Locally, they can be found at the Maryland Science Center in Baltimore; the Smithsonian National Museum of Natural History in Washington; the National Maritime Center in Norfolk; and James Madison University, where the system is used for research.

Hold On!—*IEEE member Ken Innes (left) attempts to grasp a power connector while wearing bulky astronaut gloves. The power unit is identical to a replacement unit installed in HST and was used in the High Bay Clean Room to train astronauts for the repair mission. Goddard's 120-foot-diameter centrifuge (above) can accelerate a 2.5 ton payload up to 30 Gs, well beyond the force experienced during a launch.*

Hubble's Hospital Room

One of Goddard's best-known science missions is the Hubble Space Telescope (HST). Soon astronauts will travel to high earth orbit to replace instruments and install other components during the last HST serving mission. Before the HST hardware is cleared for launch, it passes through the world's largest clean room.

"The High Bay Clean Room is to Hubble what hospital operating rooms are to patients," said Mike Weiss, Hubble's technical deputy program manager at Goddard. "Surgeons wear sterile gowns, gloves and masks during surgery, and operating rooms must be kept free of germs to keep patients healthy. In our case, Hubble is the patient."

One wall of the clean room consists of three layers of high-efficiency particulate air (HEPA) filters. Nearly one million cubic feet of air per minute is pushed through the filters into the room and exits at the opposite side through a porous wall. The elaborate filtering system protects spacecraft optics from tiny dust particles. The room encloses 1.3 million cubic feet and is large enough to hold two shuttle payloads.

At a second-floor observation window, Miller offers the tour group a well-worn pair of $100,000 astronaut gloves to try on and explains that astronauts assigned to HST repair missions train in the clean room with the flight hardware.

However, except for a couple test ribbons moving gently in the breeze, there was no activity in the clean room to observe. The previous week, the HST flight hardware was shipped to Florida for the final Shuttle mission to service the telescope. (On October 1, NASA announced that the mission will be delayed until 2009 due to a new problem with HST's control system.)

Thermal Vacuum

Goddard's thermal vacuum chambers expose payloads to the conditions they will experience in space—not just a vacuum but extreme heat while in direct sunlight and extreme cold while in the earth's shadow. Massive mechanical vacuum pumps are joined by cryopumps that use liquid nitrogen to condense the remaining gases out of the chamber after the mechanical pumps remove most of the air.

A Unique Centrifuge

Housed in its own circular building is a 120-foot-diameter centrifuge that can accelerate a 2.5 ton payload up to 30 Gs (30 times the earth's gravity), well beyond the force experienced during a launch.

Built in 1962, the centrifuge is powered by two 1,250 horsepower motors. A dark streak on the wall of the dimly lit room marks the spot where a poorly secured payload failed the test. The mark hasn't been painted over; it's there as a cautionary reminder.

More Facilities

The tour includes a number of other test facilities. One is a large reverberant acoustic chamber where spacecraft and payloads are exposed to high intensity acoustic noise from speakers (horns) 10 feet in diameter. Another is the vibration exciter. Both simulate launch conditions.

The Lunar Reconnaissance Orbiter, visible through the window of a smaller clean room, is being prepared for prelaunch testing. It will circle the moon for a year in a low polar orbit to gather data on safe landing sites for astronauts, potential resources, and radiation in the lunar environment.

Visiting NASA Goddard

The Visitor Center is open to the public year round. It offers earth and space science galleries and an outdoor rocket display. A new film, *Footprints*, is being shown on the Science on a Sphere projection system. For hours and directions, see ***www.nasa.gov/centers/goddard/visitor/home***.

Goddard also held an open house the weekend before the IEEE tour, for the first time since 2001.

Senior Members

Congratulations to the following new Senior Members in the Northern Virginia (NV) and Washington (W) Sections:

Philippe Burlina (W)
Yunxiang Chen (W)
Jose Luis Contreras (W)
John Footen (NV)
Gerald Friedman (NV)
Constance Heitmeyer (W)
Omid Kia (W)
Nilotpol Kundagrami (W)
Gary Luckenbaugh (W)
Josh Pfefer (W)
Jeffrey Poston (NV)

If you are interested in becoming a Senior Member, please see ***www.ieee.org/seniormember*** for qualification requirements. For help with references, contact Monica Mallini at ***m.a.mallini@ieee.org*** for Northern Virginia Section members, or Tim Weil at ***trweil@ieee.org*** for Washington Section members.

Share Your Expertise

The American Association for the Advancement of Science seeks senior scientists, engineers and doctors to assist science teachers in public schools in the metropolitan Washington area, and to work with students in elementary, middle and high schools, during the 2008-09 school year.

The activities range from making presentations on technical topics to participating in the Science Volunteer Project. If interested, contact Sarah Ingraffea at 202-326-6670 or ***singraff@aaas.org***.

Sections Congress Brings Together IEEE Leaders from Around Globe

By Monica Mallini, P.E.
Vice Chair
Northern Virginia Section

Sections Congress is a unique IEEE event, a triennial gathering of grassroots leadership from IEEE Sections worldwide to share ideas and solutions to serving the needs of members. Our local sections hosted Sections Congress in Washington in 2002.

The 2008 Congress was held September 19-22 in Quebec City, concurrently with that city's yearlong 400th anniversary celebration. This was the largest Sections Congress ever, including 1,072 attendees from 89 countries representing 293 Sections.

The 2008 Sections Congress was preceded by Regional caucuses, where each Region formulated its recommendations for policies, programs, and changes in IEEE's service to its members. During the Congress, working groups gathered additional inputs and shaped the recommendations for consideration by the entire delegation. Each Section in attendance was allowed to designate one voting delegate. During the closing session, voting delegates cast electronic votes to indicate their degree of support for each of 21 final recommendations. The votes were compiled immediately, and the top 10 ranked recommendations will be presented to the IEEE Board of Directors at its November meeting. The Board will refer each recommendation to an appropriate IEEE business unit for action.

The theme of the Sections Congress, "celebrating volunteer achievements worldwide," was echoed throughout the conference. In addition to the business of steering the direction in which IEEE improves service to its members for the next three years, Sections Congress was about networking with new and old friends and counterparts.

The first person we encountered upon arrival from the airport to the conference hotel was 1996 IEEE President Wallace "Wally" Read, whom I had met several times when I was Chair of the Beaumont Section. He introduced us to Helen, his bride of six years.

On Sunday morning, Read participated in a panel session of nine IEEE Presidents, who described how they joined IEEE and what it has meant to them. He told a story of entering college in Newfoundland at age 15 and being forced to major in engineering due to the terms of a paper industry scholarship that he had won. As a young engineer in industry, he sought career advancement advice from his boss, and to his surprise, he was told simply to join IEEE. His reaction: "Now I was in a pickle. Unless I did just that, I might be out on the street the next day looking for another job. I took heed of the advice and won again." For 56 years, IEEE has opened numerous doors for him and has provided many fulfilling networking opportunities through volunteer involvement.

The IEEE Honors Ceremony on Saturday evening attracted the largest attendance ever for an Honors Ceremony. IEEE President Lewis M. Terman presented 22 awards at the ceremony, including the IEEE Medal of Honor to Dr. Gordon E. Moore, co-founder and chairman emeritus of Intel Corporation.

Video highlights from the IEEE Sections Congress, including the IEEE Honors Ceremony, are available on at ***www.ieee.org/web/volunteers/sections-congress/2008.*** About halfway through the Sections Congress Highlights video, Northern Virginia delegates Wally Lee and myself, and Chris McManes of IEEE-USA, can be seen in a view of the plenary session audience.

Quebec City Conference Leads to Unexpected Reunion

By Monica Mallini, P.E.

My early IEEE volunteer experience was partnered with attending graduate school at Lamar University in Beaumont, Texas. In fact, I enrolled in graduate school as a result of attending an IEEE meeting, but that is a story for another day.

My advising professor at Lamar, Dr. Brana Perunicic, had come to the university from Bosnia, where there were no IEEE sections. She was the only professor in the electrical engineering department who was not a member of IEEE. Her extensive engineering credentials qualified her for a high membership grade, so a colleague had given her an IEEE Senior Member application. The paper version of the application was rather daunting, and it came to rest on the professor's desk, under a stack of papers, where it remains probably to this day.

Reunion—*During the recent Sections Congress in Quebec City, Monica Mallini (left) and husband Wally Lee enjoyed dinner with Dr. Brana Perunicic, founding chair of the IEEE Bosnia Section and Mallini's former graduate advisor.*

In due time, the position of Section Chair fell to me. That happened on the evening of the day that I defended my master's thesis. I was introduced at the IEEE meeting as "our newest M.S. graduate." I was nominated and elected unanimously as Section Chair by a handful of attendees, including my professor, who was still not an IEEE member.

As Section Chair, I felt obliged to help Brana get IEEE membership. Noting that a Senior Member application could be submitted as a nomination, I completed the paperwork myself and nominated Brana as an IEEE Senior Member. I found three senior members to endorse the application, which was no easy task, for I was acquainted with only *two* senior members in our small section.

Brana was surprised and pleased when IEEE sent her a bill a few weeks later. Eventually, her Senior Member elevation was approved, and our section had its third active senior member (of my acquaintance).

Eventually, Brana returned to Bosnia and to her old job at the University of Sarajevo. She founded an IEEE Student Branch and the IEEE Bosnia Section and served as its founding Chair.

We lost touch until this year. Then, in Quebec City in September, as I entered the IEEE Sections Congress 2008 for the opening plenary session, Brana was the first person I saw, sitting outside the entrance to the conference. We had a warm reunion and agreed to meet every day during the conference and to stay in touch in the future.

2008 Sections Congress Top 10 Recommendations

- Provide members with an annual entitlement to free IEEE Xplore downloads.
- Develop flexible payment methods for members in developing countries.
- Publish a leadership training handbook for section officers.
- Provide low cost teleconferencing, webinars, and collaborative technologies.
- Provide digital library content in small, flexible packages for member purchase.
- Improve the implementation of Sections Congress recommendations.
- Implement member benefits worldwide.
- Provide a web-based payment solution for local section events.
- Provide full featured, easy-to-use Section web sites.
- Implement multi-year membership renewal.