

Nanotechnology

From the Editor's Bench

Shlomo Engelberg

Own Up to Your Actions

After seeing a title like “Own Up to Your Actions,” you expect to see something about how you need to admit to your mistakes. Admitting to your mistakes is hard to do, generally unpleasant, and important, but it is not the subject of this column. Frequently you see stories about good deeds, in particular those done by institutions, where a financial motive is imputed to the doer of the deed. The *New York Times* had a story titled “Rah, Rah, Résumé” (by Jan Hoffman which ran on August 2, 2009) in which the author described how colleges are trying to help their alumni who are looking for jobs by putting the college’s resources at the disposal of the alumni. The article seemed to say that this is being done, at least partially, because it would be good for the college’s long-term bottom line.

This may be true, but as someone who has been hanging around colleges for a long time, I am doubtful that the financial reason given is the real reason. The real reason was probably that there was someone in the job placement office who said, “We need to help as many people as possible to find jobs. We can’t help the whole world, but I bet that we can help our alumni.” This individual then ran with the idea, and the college allowed the individual to do this good deed. If the financial motivation was mentioned, it was probably either an afterthought or a way of convincing the school’s administration that should the school be audited the school could defend its good deed.

It is upsetting that it is sometimes necessary to hide our good deeds this way – or that it is often assumed that less than noble motive exists for our good deeds. It is a pity that institutions cannot say “I see a need for a good deed, and I will do it because it does not conflict with my mission and because it will not harm my bottom line too much.” Instead they are forced to make it look like they do good deeds for the crassest of reasons – in order to make more money.

When you choose to write for the magazine, we will help you to own up to your better nature. We will let you write an article in order to help your peers understand what you understand, and we guarantee not to pay you. You will have no choice but to admit that you are doing something because you feel that the world will be a better place if you do it.

In this month’s issue we have the fruits of many people’s better impulses. We have a tutorial about applications of nanophysics and nanotechnology to sensors, part two of a series of articles that consider some of the intellectual property issues faced by engineers, and articles that consider technologies used for glucose monitoring, the role of measurements in the smart grid

era, and synthesizing accurate voltages with superconducting quantum-based standards. We have a new columnist, Dr. James Schooley; he will be writing the new column, "History of Physical Standards". Thanks to him and the rest of our regular columnists, we have our usual complement of columns. Enjoy!

Shilomo

President's Perspectives

Kim Fowler

Elected IMS members run the Administrative Committee (AdCom). AdCom operations require significant effort by these volunteers and by dedicated paid staff. Here, I briefly address the high-level framework within the AdCom. I will cover more volunteer efforts and the society staff in the next installment of this column.

Officers guide the operations of the AdCom and the Society. The I&M AdCom officers are the President, the Executive Vice President, the five Vice Presidents of committees, the Treasurer, and the Junior and Senior Past-Presidents. The Nominating Committee within AdCom considers potential candidates and generates a slate. The current AdCom votes on the slate at the fall meeting. Each officer serves during the year that follows the fall election.

The Vice Presidents are the keys to operation of the AdCom. They chair committees: Finance, Conferences, Publications, Membership, and Technical Standards. We currently plan to convert the ad hoc committee on Education to a standing committee and to add a Vice President of Education; we hope to complete the conversion in 2010. I will cover committee activities in a future column.

AdCom committees create and bring forward initiatives for the society to conduct and accomplish, such as book publishing and the International Measurement University. The committees lead specific efforts and some are more visible than others. The Finance Committee, for instance, is necessary to just about every activity that the society performs, but the committee work is all behind the scenes. The Conferences Committee, on the other hand, supports conferences, and that effort is quite visible to anyone who attends a conference, symposium, or workshop.

Committees work on initiatives and lead volunteer efforts during the year between meetings. Usually, the goal is to prepare the proper foundation so that the committee may prepare motions for new or continuing projects. The committees meet, discuss their activities, and prepare motions before the general AdCom session. They then present their motions for discussion and vote by the entire body.

But wait; it is not all that simple. Committees need to discuss their plans with the Long Range Planning (LRP) Committee to make sure that the planned activities fit the scope and strategy of the AdCom. After LRP, the committees must go to the Finance Committee and determine if the planned activities fit the proposed budget. This winding path of approval usually begins about two years before the activities begin. Sometimes a specific initiative can be discussed and

approved (or rejected) via the management website that AdCom uses to keep track of its work. This can sometimes short-circuit the long-term approval loops. An example of rushing through a motion and an activity was the donation from the I&M Society to help purchase instrumentation for the University of L'Aquila after the earthquake struck Aquila, Italy on April 8, 2009.

The Junior and Senior Past Presidents provide a wealth of experience, wisdom, and continuity of operations and strategic direction. The Junior Past President is the most recent ex-officio president; Alessandro Ferrero is the Junior Past President. The Senior Past President is the president who served before the Junior Past President; Steve Dyer is the Senior Past President. I lean heavily on both Alessandro and Steve for guidance and insight. Other committees are LRP, Organization, and Nominating and are chaired by a past president. This is to provide continuity and consistency brought by the experience of these ex-officio officers. Alessandro Ferrero is chair of the LRP and Nominating committees. Steve Dyer and Alessandro are co-chairs of the Organization committee.

So . . . all that said, where do the president, executive vice president, and treasurer fit in? The president leads by maintaining the vision and strategy of the AdCom. Typically the president does not initiate motions but works to insure that the AdCom is running correctly. The executive vice president, like the president, works to maintain the smooth running of the society. The executive vice president runs the AdCom meetings, making sure that conduct follows IEEE policy and Robert's Rules of Order. Also, the executive vice president monitors the action items generated within the AdCom meetings and reminds assignees of their responsibility to deal with their action items. Typically, the executive vice president is being groomed to become the next president. The treasurer makes sure that the IMS budget is followed but does not plan the budget. The treasurer approves all expenditures when they align with the budget. Each IMS officer must be an IEEE member in good standing, a member of the I&M Society, and have had time and experience in the AdCom. The president must also have been a vice president.

The next installment will cover the remainder of the AdCom members and the support staff of the I&M Society. If you have ideas for how the I&M Society might provide more value to you and the society, please contact any AdCom members. They are listed on the last page of the magazine and on the I&M Society website: <http://www.ieee-ims.org/main/>. Look under the "About IMS" tab and click on the Administrative Committee roster link.

Kim

Article Summaries

Synthesizing Accurate Voltages with Superconducting Quantum-Based Standards

Sam Benz

(Summary)

Over the past three decades, the quantum behavior of superconducting Josephson junctions has been exploited to dramatically improve the accuracy of dc voltage measurements. Within the past couple of years, new superconducting devices, circuits, systems and measurement techniques have been developed that have begun to impact ac voltage applications. This article

reviews the capabilities and measurement techniques of three unique quantum-based systems and summarizes their use as accurate dc and ac references for voltage and power metrology and as low-distortion arbitrary-waveform sources for the characterization of stability and nonlinearities in analog and digital electronics.

This summary includes text from the article.

Possibilities for Continuous Glucose Monitoring by a Functional Contact Lens

Ilkka Lähdesmäki, Angela J. Shum and Babak A. Parviz

(Summary)

The continuous evolution of health care technology includes a push toward increased information content from medical measurements. One area of development is inventing techniques that make it possible to quantify health-related parameters that could not be addressed previously, i.e. genome sequencing which will probably be added for medical diagnostics in coming years. In addition to such new techniques, information provided by existing technologies can be increased by expanding their capabilities. An example is extending the monitoring of fluid-borne health indicators (hemoglobin, cholesterol, glucose etc.). These indicators are now monitored with laboratory-based batch assays. Continuous in vivo sampling would be much better in many circumstances. Bringing the measurement technology from discrete to continuous mode would increase data content and would result in a more complete understanding of a person's health status. In this paper, the authors present an overview of the current methods of monitoring in vivo, explain the technology being used for glucose monitoring, and then describe their new technique of incorporating a sensor in a functional contact lens.

This summary includes text from the article.

Being Aware of Details in Preparing a Patent Disclosure, Part 2 in a Series on Protecting Your Inventions with Limited Resources

Reuven Mouallem

(Summary)

In Part 1 of the series, the author explored the issues involved in securing provisional patent protection at the nascent stage of invention. This is a way to defer costs for inventors and entrepreneurs. I explained the Provisional Patent Application (PPA), patentability requirements including what defines a patentable invention, how to search for patentability, and a suitable PPA disclosure. In Part 2 of the series, the author discusses what it means for innovations to have some aspect of transformation in the real world, the implications of including multiple inventions in one PPA, and more specific details about the contents of the PPA disclosure. A checklist of "Dos and Don'ts" for the specification is included, and the discussion makes clear how

apparently minor subtle differences in the description can have a major impact on patentability and the breadth of scope of the invention.

This summary includes text from the article.

The Role of Measurements in the Smart Grid Era

Lorenzo Peretto

(Summary)

The creation of a smart energy distribution grid is a current goal of many companies and nations. Functionally, a smart grid should be able to provide new capabilities such as self-healing, high reliability, energy management, and real-time pricing. Many skills and expertise in electrical engineering, information technology, communication, control and automation, education, and nanotechnology will be required to meet these goals, not just those fields strictly related to power and energy topics. In this article, the author gives an overview of the main features of Smart Grids along with the motivations that are pushing us toward this new revolution in the field of electric energy management. The discussion focuses on measurement topics that highlight new challenges facing the development of the smart meters, and the characteristics of electric energy to be monitored for improving the availability of power systems.

This summary includes text from the article.

Nanophysics and Nanotechnology Applied to Sensors, Part 1: Tutorial 25

Edward Wolf

(Summary)

This tutorial is about new developments in sensors that are based on miniaturization in the semiconductor industry. These have led to improvements in sensors and electronic devices generally. The Moore's Law revolution has been one contributor in the appearance of sensors which operate on quantum mechanical principles and which attain quantum limits of performance. In Part 1 of this tutorial, the author focuses on new principles of device operation based on quantum physics: the quantum mechanical operating principles used currently in the "giant" magnetoresistance and tunneling magnetoresistance devices in disk drive readers. A discussion of the limiting size of magnetic domains and descriptions of optical sensors of single virus particles and carbon nanotube detectors of polar molecules are included. Part 2 of this tutorial will present image-forming sensors such as magnetic resonance imaging (MRI) and the scanning tunneling microscopes (STM).

This introduction includes text from the article.

Column Summaries

Instrumentation Notes

Shlomo Engelberg

Autonomous Sensors: from Standard to Advanced Solutions

B. Andò, S. Baglio, and C. Trigona

(Summary)

An autonomous sensor is a device that is generally able to perform its task without being connected to the interrogation unit. Its power supply is integrated in the device, and very often a harvesting mechanism is used for its energy production and is able to totally or partially power the device operation. There has been broad and rapid evolution in the field of autonomous sensors. Emerging application fields, the need to increase the life of electronic devices, increased computational capabilities that require more energy and drastic reduction in device volume have been drivers of this field. Power management and wireless connection are becoming major issues in many applications. Research communities all over the world are working to find solutions and harvesting methods to optimize the power issue in sensors with the specific goal of implementing autonomous sensors. The authors discuss these concepts and two examples: an autonomous sensing device and an energy harvester.

This summary contains text from the column.

History of Physical Standards

James Schooley

IEEE Thermometry: “A Matter of Degree”

(Summary)

This column provides a survey of the landmark temperature measurement systems in history, from the “air thermoscope” invented by Italian physician Santorre in 1612 through the development of the Kelvin thermodynamic scale. Recent experimentation at the National Institute of Standards and Technology is discussed, as current research is almost certain to lead to a new definition of temperature that is independent of the choice of any particular substance.

This summary was written by Kristy Virostek and includes text from the column.

My Favorite Experiment

John Witzel

Experiments in Probability and Randomness

(Summary)

Take a US penny and give it a spin by flicking it with your finger on a tabletop. What are the chances of it coming to rest heads-up once it stops spinning? With an undamaged coin, a spirited flick and a clean level tabletop, 50-50? Or how about if you flip the same coin into the air and let it bounce on the ground and come to a stop? What are the chances of it landing heads-up now, again 50-50? And given the choice of what's behind door number one, should you stick with your first choice or switch to what's behind door number two or door number three? The answers may surprise you. This column discusses how probability and randomness are two different, although closely related concepts.

This summary includes text from the column.

Departments

New Products

Robert Goldberg

Handheld Vector Network Analyzer

Agilent Technologies claims the N9923A FieldFox RF Vector Network Analyzer (VNA) to be the world's most accurate handheld with a measurement stability of 0.01 dB/degree Celsius. It also offers integrated QuickCal calibration capability. QuickCal enables consistent measurement results and confidence in the data while eliminating the need to carry a calibration kit into the field.

The FieldFox RF VNA expands Agilent's handheld instrument portfolio and is designed for field engineers who characterize or troubleshoot RF components for mission-critical communication systems. As a full 2-port network analyzer, the FieldFox RF VNA allows operators to simultaneously measure and display all four S-parameters. The FieldFox RF VNA is for engineers requiring more network analysis functionality than the flagship Agilent N9912A FieldFox RF analyzer for wireless installation and maintenance. The Agilent FieldFox family of analyzers, weighing less than 6.2 pounds, sets a new standard for ease-of-use, ruggedness and portability.

As with any vector network analyzer, calibration is a critical component. Traditional calibration procedures require calibration kits and hardware accessories that not only need to be carried into the field but also maintained. The FieldFox RF VNA addresses these frustrations head-on with QuickCal, the industry's first and only built-in calibration capability. Users can calibrate the FieldFox RF VNA without an external cal kit and without mechanical standards. Another challenge with many handheld instruments is the equipment's own drift over temperature. This is a problem outdoors, where large temperature variations are prevalent. The FieldFox RF VNA has a stability specification of 0.01 dB/degree Celsius making the FieldFox RF VNA a stable handheld vector network analyzer over time and temperature.

For more information please visit www.agilent.com/find/fieldfox.

Ultra-Thin Absolute Pressure Transducer for Surface Air Flow Measurements

Meggitt Sensing Systems has announced the debut of Endevco[®] model 8515C, a miniature, high-sensitivity piezoresistive pressure transducer, designed for surface air flow and other

aerodynamic measurements requiring high output in a small, lightweight package.

The ultra-low profile design of Endevco® model 8515C has an overall thickness of 0.030 inch (0.76 mm) and diameter of 0.250 inch (6.3mm). Units are available in ranges of 15 and 50 psia, with 200 mV full scale output, and frequency responses of 180 kHz and 320 kHz, respectively. The transducers offer stable performance over a temperature operating range of -65 to +250°F (-54 to +121°C), with combined non-linearity, non-repeatability and pressure hysteresis error of less than 0.50% FSO. In addition, model 8515C is designed to survive 10,000 g shock and 10,000 g acceleration, with minimum 5X burst pressure.

Model 8515C is supplied with an integral cable and is typically surface mounted onto curved surfaces for minimal effect on laminar air or hot gas flow. A flush mounted fit may also be achieved by recessing both transducer and lead wires into the mounting surface, while using a supplied protective screen to prevent particular impingement. Modified versions of model 8515C are also available for wider temperature compensation. Because of its uniquely high overload capability, high frequency response, very low base strain sensitivity and excellent temperature performance, model 8515C is ideally suited for small-scale wind tunnel testing models, helicopter or turbine blade surface pressure measurements, as well as aerodynamic surface measurements required during flight test.

For detailed specifications, drawings or additional information about Endevco® model 8515C or other products, visit www.endevco.com.

Rugged, Precision Servo Inclinometer Family Withstands Severe Shock and Vibration

Sherborne Sensors has announced the North American market introduction of the LSI series, a family of cost-effective, rugged, closed loop gravity referenced servo inclinometers. The LSI series is specially designed to withstand severe shock and vibration inputs, for precision measurement capabilities in even the most demanding of environments.

The LSI series incorporates a unique, flexure-supported torque balancing system, which is rugged enough to withstand shock inputs of 1500 g, yet still provides excellent accuracy and repeatability over a wide operating temperature range. For added durability, sensor components and associated electronics are contained within IP64 environmentally sealed housing. Units are available in ranges of $\pm 14.5^\circ$, $\pm 30^\circ$ and $\pm 90^\circ$ and offer a high level, 5-Volt analog DC-output signal, proportional to the sine of the angle of tilt. LSI series models are fully self-contained, and are able to connect to a DC power source and a readout or control device to form a complete operating system.

LSI series inclinometers are 100% factory tested and calibrated and are issued with a calibration certificate prior to shipment. The units carry a two-year comprehensive warranty and are part of the new Sherborne Sensors Guaranteed On-Time Delivery program.

Additional details are available by visiting www.sherbornesensors.com.

Handheld Pressure Calibrator Features Built-In Electric Pump System

The new JOFRA® handheld pressure calibrator from AMETEK Calibration Instruments offers electrical generation of pressure or vacuum with the touch of a key. The calibrator features a unique built-in electrical pump system. No manual pump is required.

The versatile HPC 600 is a true multifunction solution offering features and functions that make it ideal for a wide range of high-accuracy pressure calibration applications from simple tool type jobs to complex custody transfer systems.

The multifunctional HPC 6000 is designed to work as a pressure indicator, pressure calibrator, a complete mA loop calibrator (including 24-volt supply), a voltmeter, thermometer and pressure/vacuum generator. All are in a single ruggedized housing with an easy intuitive operating system that fits in the palm of the hand.

The HPC 600 features a user configurable information display, 15 different pressure units, transmitter supply, mA input/output, % error calculation, voltage measurement, serial communications and an external pressure module capability. The accuracy of the HPC is specified in % of reading to ensure even better accuracy and more applicable pressure range. The HPC 600 is a superior pressure calibrator for field use that brings laboratory accuracy into the field. The calibrator is delivered as a ready-to-test system complete with hose, fittings and soft case equipped to meet any need for pressure calibration. An international traceable calibration certificate, including vacuum and electrical parameters, comes standard, and each unit is temperature compensated from -10°C to 50°C / 14° to 122°F for on-site operations.

For more information on this or other JOFRA® products, please visit www.ametekcalibration.com.

Fanless Core Duo Processor

Sealevel's Relio R5200 embedded computer offers many I/O features with the benefits of solid-state operation with no fans or other moving parts. The computer is powered by a 2.2GHz Intel® Core™2 Duo CPU that is designed to run fanless up to 45°C . The compact chassis has expansion slots for one PCI Express X16 and one full-height PCI card. The system supports up to 4GB of DDR2 667MHz RAM and is ideal for harsh, industrial environments.

An optional 2.5 in (6.4 cm) solid-state SATA hard drive can be integrated and preloaded with Microsoft Windows or Windows Embedded operating systems. Linux is also supported. Operating from a solid-state hard drive, the fanless design offers the ultimate in reliability—no moving parts.

The R5200 standard I/O features including dual Gigabit Ethernet, six USB 2.0 ports, four serial ports, and VGA video. The system includes an external power supply and US power cord that accepts 100-240 V AC input and outputs 24 V DC @ 120 W. The metal enclosure allows for versatile mounting to walls, under counters, and on tabletops.

For more information please visit www.sealevel.com.

Data Logger Designed For a Wide Range of Environmental Applications

CAS Data Loggers has announced the new dataTaker DT82E environmental data logger. The DT82E is a robust, stand alone, low power data logger featuring support for SDI-12 sensors, USB memory sticks, 18 bit resolution, extensive communications capabilities and built-in display. Based on the dataTaker DT80 line of data loggers, the new DT82E provides an extremely versatile, easy to use solution for a wide range of environmental data logging projects

where standard AC power may not be available. Rugged design and construction provide reliable operation in extreme weather conditions, and the unit can operate on battery or solar power for an extended period of time.

Analog and digital channels, along with high-speed counter inputs, allow the DT82E data logger to easily connect to most sensors and data measurement sources. It can measure temperature, voltage, current, 4-20mA loops, resistance, bridges, strain gauges, frequency, digital and serial devices. The dataTaker DT82E's Dual Channel Isolation allows four 2-wire differential or six common referenced analog inputs to be used in many combinations. Measurements can all be scaled, logged and returned in engineering units or within statistical reporting.

With support for SDI-12 sensor networks and 12V regulated output to power sensors, the DT82E is ready for most any environmental or industrial monitoring project. The DT82E can store up to 10 million data points in internal memory, with the ability to log as much or as little as you need with independent control of schedule size and mode. Communications features include RS232 with modem support, Ethernet and USB ports.

Complete specifications are available at www.dataloggerinc.com/dt82e.html.

Complex Bar Code Reader

Banner Engineering Corp. introduces the iVu Bar Code Reader (BCR), the first industrial touch screen bar code reader. The iVu BCR reads 11 industry-standard bar codes to facilitate advanced traceability—a critical strategy for ensuring highest product quality in packaging, material handling, pharmaceutical and many industrial applications.

Sharing the same integrated touch screen design as the first iVu series model—the iVu TG Image Sensor—the iVu BCR allows users to efficiently configure, monitor and modify an inspection on-site. The iVu BCR deciphers bar codes of varying types to verify correct content at production speeds of hundreds of parts per minute—all within a single compact, rugged package.

For more information, visit www.bannerengineering.com.

Feature-Rich Touch Screen Jogbox

Hexagon Metrology, Inc. announces the availability of the Universal Jogbox, a new handheld input device for Brown & Sharpe and Sheffield branded Coordinate Measurement Machines (CMMs) shipped from the North Kingstown, Rhode Island factory. Incorporating a modern touch screen interface with an ergonomic design and soft-touch materials, the Universal Jog Box was designed first and foremost to be extremely tough, to withstand the rigors of industrial use with improved resistance to drops and similar shocks.

The Universal Jogbox uses a combination of traditional mechanical “hard” buttons, dials, and a joystick along with an industrial color touch screen for “soft”, contextual input and output. Traditional mechanical inputs are ideal for speed control and machine movement – these controls are by necessity always available to the user. The touch screen, on the other hand, is highly configurable. For instance, CMM operators may wear gloves to avoid transferring heat and oil from their hands onto the parts being measured. A special screen was developed to accommodate gloved hand operation with widely spaced buttons. Furthermore, the new touch screen controls employ universal symbology for enhanced usability across many languages. An upgrade version of the Universal Jogbox is offered with features to interact directly with PC-DMIS software,

avoiding the need to move back and forth between the CMM and computer screen and keyboard. More information is available at www.HexagonMetrology.us.

Universal Wideband Injection Transformer

OMICRON Lab's new universal injection transformer B-WIT 100 was particularly developed for the stability analysis of switched mode power supplies and control loops of any kind. Due to its special design, the B-WIT 100 combines a very wide frequency range (1Hz - 10 MHz) with a 600V CAT II compliant output. Together with OMICRON Lab's vector network analyzer Bode 100, the B-WIT 100 is used to achieve quick and accurate results on the stability characteristic of DC/DC converters.

The 600V CAT II compliant output of the injection transformer enables the analysis of switched mode power supplies with output voltages ranging from a few volts up to line voltage. The wide frequency range of the B-WIT 100 ensures its usability for slow, low bandwidth control loops as well as for fast, high bandwidth circuits. Due to this feature combination, a wide range of measurement applications, which demanded different injection transformers in the past, can be now covered with only one device – the B-WIT 100.

For more information please visit OMICRON Lab (www.OMICRON-Lab.com).

Amplifier for D/A-Boards and Signal Generators

Meilhaus Electronic presents the ME-5, also known as the ME-PowerHouse, a one-channel amplifier for analog signals. Output signals from an analog-output board or a signal generator of ± 10 V can be amplified to ± 24 V or up to ± 100 V. The function of the amplifier is very simple and transparent so no software modifications are necessary. It is simply positioned between an analog output and the application requiring a higher voltage. The ± 100 V ME-PowerHouse is available in a rugged metal housing, whereas the ± 24 V versions are available as DIN-rail mountable modules or as OEM-PCBs for simple integration. Other voltage ranges and mounting possibilities are available on demand.

The devices are connected via BNC (DIN-rail and PCB versions) or SMB/LEMO (versions in the metal housing). SMB to BNC and a LEMO counter-connector are also included. The ME-5 can be connected to devices by Meilhaus Electronics or any other signal generators, as long as the ± 10 V input voltage limit is met. The bandwidth is at least 100 kHz. Pluggable Phoenix terminals serve as power connections. Transient diodes protect the device from over-voltage for additional security.

Find more information at www.meilhaus.com.

Ultra-Fast Current-Voltage System

Keithley Instruments, Inc. introduces the Model 4225-PMU Ultra Fast I-V Module, the latest addition to the growing range of instrumentation options for the Model 4200-SCS Semiconductor Characterization System. It integrates ultrafast voltage waveform generation and current/voltage measurement capabilities into the Model 4200-SCS's already powerful test environment to deliver the industry's broadest dynamic range of voltage, current, and rise/fall/pulse times, expanding the system's materials, device, and process characterization potential dramatically. Just as important, the Model 4225-PMU makes ultra-fast I-V sourcing and measurement as easy as making DC measurements. Its wide programmable sourcing and measurement ranges, pulse widths, and rise times make it well-suited for applications that

demand both ultra-fast voltage outputs and synchronized measurement-from nanometer CMOS to flash memory.

Unlike previous solutions, which required up to three different test stands to characterize a device, material, or process thoroughly, the Model 4225-PMU's broad dynamic range allows characterizing the full range of materials, devices, and processes with a single set of instrumentation. Each 4225-PMU module provides two channels of integrated sourcing and measurement but takes up only one slot in the nine-slot chassis. Each chassis can accommodate up to four modules for a maximum of eight ultra-fast source/measure channels. Each channel combines high speed voltage outputs (with pulse widths ranging from 60 nanoseconds to DC) with simultaneous current and voltage measurements. The module provides high speed voltage pulsing with simultaneous current and voltage measurement, at acquisition rates of up to 200 megasamples/second (MS/s) with 14-bit analog-to-digital converters (A/Ds), using two A/Ds per channel (four A/Ds per card).

For more information, visit <http://keithley.acrobat.com/p77402742/>.

Digital Thermometer for Resistance Temperature Detector Sensors

Omega's new DTG-RTD100 Series features a large backlit display with 25mm (1") digits that can be read as far as 10.7 m (35') away. Reading features include, process, Min, Max, Alarm condition and battery status. An additional analog output signal is standard on all models. The rugged, splash proof, 316 Stainless Steel enclosure is designed specifically for wash down, sanitary or marine applications. Models are available with or without integral standard or sanitary sensors.

Low power operation and sleep mode provides long battery life. Software and a USB cable is included that allows for easy setup and calibration via your computer. The Wireless Transmitter Option sends readings to remote locations and allows for PC-based chart recording and data logging. This proprietary product is also CE compliant.

Find more information at www.omega.com/DTGRTD100.

Optical Strain Gages for Extreme Requirements in Experimental Strain Analysis

HBM has now developed its K-OP type optical strain gages (SGs) so that they offer several decisive advantages compared to electrical SGs. They are, for example, ideally suited to material tests of new fiber composites. Tests with up to 10 million load cycles with an alternating strain of $\pm 5.000 \mu\text{m/m}$ are now possible.

The K-OP type optical SGs are based on so-called fiber Bragg gratings. As the strain is measured purely optically, an electric signal is not necessary. This makes utilization in explosive atmospheres, electro-magnetic interferences or even high voltage applications possible without difficulties. In addition, several optical SGs can be attached to a fiber, enabling implementation of parallel measurements. Glass fiber lengths of several hundred meters are possible.

The user receives a data sheet with the optical strain gages, which, amongst other things, includes the important gage factor of each individual SG, already tested by HBM according to the new VDI/VDE2660. Measurement data acquisition and evaluation with optical SGs are very simple. HBM offers the user all necessary components from one source. These range from optical SGs with the appropriate accessories via interrogators to the data acquisition software

catman®AP, which includes a special EasyOptics module for optical SGs.

Further information may be found at www.hbm.com.

Servo Drives Offer 32 Unique Motion Profiles

ORMEC Systems Corporation announces the global launch of the XD-Series, a new family of Indexer Servo Drives, providing high-reliability motion control capabilities for even the most challenging applications. The unique features of the XD-Series are built upon the proven success of ORMEC's high performance, networked, multi-axis integrated motion controllers, of which thousands have been successfully installed in the field. The product philosophy behind the XD-Series centers on the critical importance of understanding application requirements and the ability to specify parameters, to achieve optimal motion control performance.

The XD-Series allows programming of 32 individual motion profiles, which can be mapped to I/O points, 1 or 2 functions per point, initiated via Modbus/TCP, and chained or looped together. The adaptable I/O, with 14 inputs and 8 outputs, can be mapped to change from position, velocity or torque modes during program execution. Motion can be synchronized with supported machine I/O, allowing for start, stop or trigger speed changes, with inputs at any point in the chain, and user-defined units for axis position speed and acceleration, further simplifying implementation. By employing an HMI or optional Fieldbus communication, the XD-Series allows motion parameter adjustments, remote commanded motion, and real-time indexer status read capabilities.

In addition, the XD-Series features a built-in Motor Wizard, which simplifies non-standard motor integration and enables users to quickly commission unproven motors. Software includes extensive support for monitoring and optimizing an application, allowing the application program to be quickly honed to perfection.

For more information on the XD-Series visit www.ormec.com.

Membership Notes

Mihalea Albu

After only one year of membership in the IMS AdCom, I was honored to become Vice President of the Membership Development Committee. I started work on January 1, 2010 and I will be part of the Fowler team for the next two years. It is a privilege to me to work more closely with the I&M Society members and have the opportunity to serve with a team of outstanding Membership Committee members. They include these committed individuals:

- Daniel Rosenthal, an experienced AdCom member, who will help to achieve a closer link to the Chapter chairs.
- Ferdinanda Ponci who will bring her energy to her first year of appointment to the AdCom.
- Kristen Muñoz Donnell who will serve the needs and convey the views of our youngest IEEE members. Until recently, Kristen signed the outstanding reports in the I&M magazine from the GOLD society members, a task that will be carried on by Sanna Gaspard.
- Alexandru Nechifor, the undergraduate student representative, who plans to make the virtual

space of the society enjoyable for student members using the SecondLife platform.

All of this will be possible with the tremendous help of Judy Scharmann, who turns valuable membership-related ideas into future actions. Remember that members of the I&M Administrative Committee (AdCom) are available to meet with currently existing Chapters or with groups of members who are interested in creating new Chapters. Please contact Kristen (kmdgfd@mst.edu), the Chapter Chair Liaison, to arrange a visit by an AdCom member. I would like to encourage all of our members to participate in our activities and suggest ideas that will make our Society better serve your needs. I may be contacted by email at albu@ieee.org.

New I & M Senior Members, as of January, 2010:

Alessandra Flammini
Frank Spitzer
Jeffrey Andle
Masahiro Aoyagi
Sergio Rapuano
Venkata Chandrasekhar Sarma Tummalapalli

I&M Distinguished Lecturers:

Abed (Abdulmoteleb) El Saddik, University of Ottawa, Ontario, Canada, abed@mclab.uottawa.ca. Area of expertise: Haptics Technologies: Theory and Applications.

Kang Lee, National Institute of Standards and Technology, Gaithersburg, MD, USA kang.lee@nist.gov. Area of expertise: IEEE 1451: Empowering the Smart Sensor Revolution.

Pawel Niewczas, University of Strathclyde, Glasgow, UK, p.niewczas@strath.ac.uk. Area of expertise: Advanced Optical Sensors for Power and Energy Systems' Applications.

Shervin Shirmohammadi, University of Ottawa, Canada, shervin@discover.uottawa.ca. Area of expertise: Instrumentation and Measurement Applications for Virtual Environments.

Branislav Djokic, University of Belgrade, Serbia, b_djokic@yahoo.com. Area of expertise: new instrumentation and measurement methods for both highest-accuracy and industrial applications for AC electrical power.

Recently Formed Chapters:

The IEEE Nanjing/Shanghai/Wuhan Jt. Section's Instrumentation and Measurement Society Chapter, organizer: Ruqiang Yan (ruqiang@seu.edu.cn).

The IEEE New Zealand Central, South, and North Joint Section's Instrumentation and Measurement Society Chapter, organizer: Subhas Mukhopadhyay (s.c.mukhopadhyay@massey.ac.nz).

Current Chapter Chairs:

Sudhjr Agashe, headinst@vsnl.com, Bombay Section
Rini Akmeliawati, rini.akmeliawati@eng.monash.edu.my, Malaysia Section
Frank Aloe, frank.aloe@microchip.com, Toronto Section
Goce L. Arsov, g.arsov@ieee.org, Rep. of Macedonia Section
Vedran Bilas, vedran.bilas@fer.hr, Croatia Section
Marcelo Castelli, mcastelli@um.edu.uy, Uruguay Section
Michael Dewey, miked@geotestinc.com, Central New England Council
Volodymyr Dubovoy, dub@faksu.vstu.vinnica.ua, Ukraine Section
Carmen Golovanov, cgolov@electro.masuri.pub.ro, Romania Section

Voicu Groza, groza@site.uottawa.ca, Ottawa Section
Mincho Hadjiski, hadjiski@uctm.edu, Bulgaria Section
Gary Hinkle, gary@auxilium-inc.com, Oregon Section
Kyle Iverson, iversonk56044@yahoo.com, Twin Cities Section
A’Kos Jobbagy, jobbagy@mit.bme.hu, Hungary Section
S. Joshi, shri.joshi@marquette.edu, Milwaukee Section
Izzet Kale, izzet.kale@emu.edu.tr, UKRI Section
Olfa Kanoun, kanoun@uni-kassel.de, Germany Section
Vincent Lalli, vincent_r_lalli@yahoo.com, Cleveland Section
Yeou-Song (Brian) Lee, brian.lee@ieee.org, Santa Clara Valley Section
Janusz Mindykowski, janmind@am.gdynia.pl, Poland Section
Dario Petri, petri@dit.unitn.it, Italy Section
Scott Proffitt, sproffitt@acstestlab.com, Atlanta Section
Anatoly Sachenko, as@tanet.edu.te.ua, Ukraine Section
Katsunori Shida, shida@cc.saga-u.ac.jp, Japan Council
Gordon Silverman, Gordon.silverman@manhattan.edu, New York Section
V. Singh, vrsingh@ieee.org, Delhi Section
T.K. Srinivas, tks@ieee.org, New Jersey Coast Section

Society News

Kang Lee

Report on ICEMI 2009

The I&M Society made its presence in IEEE Region 10 again. The Society was a technical cosponsor of the 9th International Conference on Electronic Measurement & Instruments (ICEMI 2009) held in Beijing’s Hot Spring Leisure City, August 16–18, 2009. ICEMI 2009 was hosted by the IEEE Beijing Section and by the Chinese Institute of Electronics (CIE). It was organized by the Electronic Measurement and Instrument Society of CIE, Beihang University, and the Journal of Electronic Measurement and Instrument.

Over four hundred people attended the Conference. Although the majority were from China, other attendees came from 12 foreign countries, including Brazil, Croatia, Czech Republic, Germany, Italy, Japan, Korea, Malaysia, Netherlands, Sweden, USA, and UK. Academician Wei Li, the General Chair of the Conference and Beihang University President, opened the Conference to welcome the attendees. The Assistant General Secretary of CIE, Runhua Lin, then addressed the Conference and stated that, “The symbol of the modernization of a nation is mainly embodied in the level of electronic measurement and instrumentation of the nation.” Afterwards, Kang B. Lee, I&M Society Vice President of Technical Activities and Standards, spoke to the attendees about the IEEE and in particular, the I&M Society, the fields of interest common to both the Society and the Conference, and the Society’s support for the Conference. Several hundred complimentary copies of the I & M Magazine were offered to the attendees as a way to introduce the Society’s technical activities to the attendees. This Conference took a slightly different approach in planning the keynote talks. Thirteen experts and scholars invited by the Program Committee addressed the attendees on state-of-the-art subject matters: from

transducer design to test and instrumentation to new frontiers in measurement to next generation test system to smart sensor networks and standards. This diverse selection of topics was well received. In two years, the 10th International Conference on Electronic Measurement & Instruments (ICEMI 2011) will be held August 15-18, 2011 in Chengdu, Sichuan Province, China.

IEEE AUTOTESTCON 2009 Report

Bob Rassa, General Chair,
IEEE AUTOTESTCON 2009

Thanks for attending AUTOTESTCON 2009! The 45th edition was a successful activity, thanks to the organizing committee, exhibitors, attendees, and the Disneyland Hotel staff.

To the attendees, we hope that you obtained the kind of advance technical information on automated test systems that you were seeking, and that your role in the field of ATE has been enhanced via your participation. We hope that you were able to visit the vendors in the exhibit halls and take advantage of the tremendous advancements in ATE and TPS technology that they offer to the community. We also hope that you enjoyed the social activities that we provided to enhance your overall IEEE AUTOTESTCON experience at the Disneyland Resort & Conference Center.

The presentations given during the Plenary session are available at http://ieeaeess.org/main/index.php?option=com_docman&task=cat_view&gid=962&Itemid=108.

An after-conference CD containing the presentations and a selection of conference photos is in preparation and will be mailed shortly to all registered attendees. If you have any feedback for us for future consideration or enhancements of this Conference, please provide your feedback to AUTOTESTCON Board Executive Assistant, Judy Scharmann at j.scharmann@ieee.org.

To our exhibitors, we hope that you also enjoyed the Conference and found the venue to be suitable for the furtherance of your business objectives. We would enjoy any feedback or suggestions that you have to offer for future AUTOTESTCONs. Please send comments to AUTOTESTCON Board Executive Assistant, Judy Scharmann at j.scharmann@ieee.org.

AUTOTESTCON 2009 Best Paper Awards were received by:

David M. Goodman Award for the outstanding Management Paper:
Mark Zachos, Dearborn Group, Inc., US
Vehicle Embedded Health Monitoring and Diagnostic System

Walter E. Peterson Award for the best Technical Paper
Anthony Estrada, BAE Systems, US
Proper Frequency Planning in a Synthetic Instrument RF System

Best Undergraduate Student Paper
Andrew Flanyak, Rowan University
Design-For-Testability On A Small Scale

Best Graduate Student Paper
Mikhail Itskovich, University of Maryland
Area Efficient Vector Multiplication for IDDT Test Calibration

Best Graduate Student Paper Runner-up
Anton Pirker-Fruhauf, University of Technics, Vienna, AT
A knowledge-based test program following the ATML Standard

The Frank McGinnis Professional Achievement Award in Automated Test went to:
Les Orledge, Textron/AAI Corp, Hunt Valley, MD

We hope to see you at IEEE AUTOTESTCON 2010, Orlando Florida, September 13-17, at the
Marriott Orlando World Center!