The IEEE Instrumentation & Measurement Magazine
October 2009 issue

Ongoing Education

From the Editor's Bench

Shlomo Engelberg

Make Sure that Getting There Is Half the Fun

I write this having just returned home from a trip to MadaTech – the Israel National Museum of Science in Haifa. My family spent almost two hours in the museum, and we spent a whopping eight hours in transit. On the face of it, this had to be one of the least "efficient" trips in recent history.

Of course, when you look at the whole picture, you see things differently. My wife and I had decided that we needed to take our children, aged 6, 10, and 12, on an outing. We also decided that we would take them out to eat while we were on the road. Furthermore, we are members of the New York Hall of Science and this membership entitles us to free admission to many other museums (see the sidebar for more details) including MadaTech. The visit to the museum was important to us, but it was only one of several reasons we chose to take the trip. We were trying to structure the trip so that getting to (and from) the museum would be, at least, half the fun.

The Benefits of Membership

Because the New York Hall of Science participates in the ASTC Travel Passport Program, members of the New York Hall of Science can get free entry into many other science museums. By using the Travel Passport Program, my family and I have visited The Franklin Institute (in Philadelphia), the Bloomfield Science Museum (in Jerusalem, Israel), and MadaTech. (We have also visited the New York Hall of Science several times.) To find out about joining the New York Hall of Science, please go to http://www.nyscience.org/join_getinvolved/membership.

It is always a good idea to make sure that getting there is half the fun. I have sometimes had students ask me about my opinion of some very long term goal. When answering, I try to remember to tell the student to make sure that getting there will be at least half the fun. The achievement of almost any worthwhile goal is not something one can confidently look forward to. If getting there is half the fun, then even if you do not get there your time has been well spent.

When working on a long term project, it is important to make sure that the years devoted to the project are well spent and interesting. When building a family, it is equally important to make sure that the building itself is enjoyable.

I find that in writing articles, getting there is usually at least half the fun. The research I do is interesting, and as the years go by, I enjoy the act of writing more too. At the *IEEE*

Instrumentation and Measurement Magazine, we are always looking for people who would like to take on the pleasant burden of sharing their knowledge with us. If you have an idea you would like to research and write up, drop me a line (at shlomoe@jct.ac.il), and I will happily see to it that the idea is considered for possible publication as a column, article, or tutorial.

In this month's issue, we have a wide variety of papers many of which are aimed at our more recent members. We have an article that deals with standardized testing – a subject close to every student's heart, another installment of our series on the history of NIST, an article on the accuracy of voltage references and analog to digital converters, an article about biosensors, a wavelet tutorial, and, of course, our usual lineup of columns. Enjoy!

Shlomo

President's Perspectives

Alessandro Ferrero

Facing the Financial Crisis

Approximately one year ago, the financial crisis hit the whole world. Everybody has been affected by it. The ones who did not lose their jobs have had to face income reduction, purchase order reduction, market reduction ... IEEE and our Society have also been hit by this crisis. This might seem strange for a non-profit organization so I offer a few words of explanation.
The IMS offers these services to its members.

- The publications are probably the best known ones, since every member receives our Magazine and most members receive our Transactions or access them through the IEEE Xplore web site.
- The conferences are organized and sponsored by the Society as are, to varying degrees, the symposia, workshops and continuing education efforts, i.e. the International Measurement University and the Teacher in Service Program 2009 in Uruguay (described in this issue in Membership Notes by Jorge Daher.)
- We support the local Society Chapters.
- We have special emphasis on Student and GOLD Members.

The cost of these initiatives must be covered by the Society incomes, e.g., member dues, conference registration fees, and sale of publications. We also have to keep a minimum level of funds, required by the IEEE, in reserve to cover deficits. We can not start new initiatives without a surplus.

The present crisis hit us in several ways. We had to face a general cost increase (mostly from shipping costs for our publications), the possibility of reduction in revenues from reduced conference attendance and reduction in our reserves which were invested in the Stock Market by the IEEE Financial Analysts, according to the IEEE rules, without any direct involvement of our Society. The last months have been challenging as we worked to balance our budget. We decided to not go the simple route of increasing the membership dues which I thought would be unfair to our members.

We have another solution, though less immediate and more difficult to put in practice. We are cutting all the costs that are not strictly necessary but we are not cutting our services, i.e., we are creating the web tutorials and publishing short papers in the Transactions on Instrumentation and

Measurement. We didn't close any of our conferences. We didn't stop publishing this Magazine; we have plans to renovate its content which we think will make it more attractive to our readers and advertisers.

I am glad to say that we have not seen a decrease in conference attendance and the other changes we made are having results. I am not an economist but these results have confirmed my rooted opinion that using a good amount of imagination can find the best answers during a financial crisis.

I do hope that our Members share this same opinion and will renew their subscription to the IEEE and the I&M Society as we go through the years ahead. This is a very good investment for the future!

Alessandro

In Memoriam: Bernard (Bernie) P. Gollomp
August 4, 1926-March 14, 2009

Our friend and colleague Bernie Gollomp passed away on March 14. Many of us knew Bernie from his untiring work with the I&M Society since the 1970s. Here are a few words in Bernie Gollomp's memory by some of his friends.

"Bernie was a truly remarkable man in so many ways. He spent four decades in industry, including the Bendix Corporation which later became part of AlliedSignal, during which time he received two AlliedSignal Technical Achievement awards and was issued dozens of patents. I came to know Bernie around the early 1990s, when he was still working at AlliedSignal in Teterboro, and I was (still am) employed by the same company in Morristown (now Honeywell International).

Bernie was very active throughout his life in the IEEE and other professional societies and was the deserving recipient of many honors and prestigious awards, only a few of which are listed here. He was the Winner of the 1988 Frank McGinnis AUTOTESTCON Professional Achievement Award. Bernie was elected an IEEE Life Fellow in 1991 for achievements in test instrumentation, especially related to test-oriented languages. Bernie was the 1995 recipient of the IEEE Instrumentation & Measurement Society Technical Award. He was the Past-President of the I&M Society. He drafted the constitution and bylaws of the IEEE I&M Society and the charter of the IEEE AUTOTESTCON. Bernie was a founder of the IEEE IMTC. He drafted the charter of this organization and helped launch the first two conferences. Bernie was the membership chair of the IEEE METSAC. He was the Chairman of the Tappan Zee Subsection of the New York Section of the IEEE.

Bernie was the active force behind the 1998 High Temperature Electronics Materials, Devices and Sensors Conference sponsored by the IEEE and the Engineering Foundation. Bernie, Elzbieta Kolawa and I conceived, organized and chaired this conference, as well as co-edited the proceedings. Without Bernie's continuous gentle pushing, help and connections, this conference would never have taken place.

Bernie was a member and officer of the IEEE/OSA Steering Committee since 1983 and he introduced me to the IEEE/OSA committee of the Journal of Lightwave Technology. Bernie

was also active in many other aspects of the IEEE up to the end. He organized and chaired the 2004 IEEE Conference on Lightwave Technologies in I&M. Bernie was a regular columnist in the IEEE *I&M Magazine* with the column, "A Look Back", and he would always send me a preview and ask for comments.

Bernie was a family man and always spoke very highly and frequently of his wife, children and grandchildren, as well as of his ancestors. Bernie came from an illustrious family spanning the globe. For example, there are many streets in Israel bearing the family name.

Bernie was a 1949 Graduate of the Polytechnic Institute of NYU and also held an MBA degree.

Bernie fought in the Second World War in Europe and was seriously wounded in the Battle of the Bulge. Subsequently, Bernie filled important roles serving with the U.S. military in several locations around the world, including Korea.

I always looked at Bernie as a mentor and enjoyed many long conversations with him, on both technical and many other subjects, going back many decades. Bernie's knowledge and wisdom were extraordinary, and he had a truly non-linear, inventive way of thinking. I am going to miss him greatly."

- Ilan Golecki

"It was a shock to me to see Bernie's name listed as having passed away. Bernie was forever. Bernie and I were on the AdCom all through the seventies and into the eighties. Bernie was key to making the society what it is today. When I suggested that we should have our own conference, it was Bernie who took up the baton and acted as the prime mover in generating the first IMTC, converted from the old Canadian EEMTC.

The first group that reinvigorated the society included Bernie, Dave Braudaway, Mike Lucas, Barry Oakes, me and a few others. Bernie pushed for technical committees (although it took Bob Rassa to get the job done). Through all the years that his physical condition would let him, he was extremely active in IMTC and the AdCom. He was also a prime mover in the development of the society magazine.

It was always a pleasure to attend meetings with Bernie and to hear his war stories. What many don't know is that he was also a decorated war hero in World War II.

Among those of us who knew him well, he will be sorely missed.
I send my condolences to Renee."
- Hal Goldberg

"I knew Bernie since the mid-1970s. He brought us the current I^2MTC in 1984 from another organization, and chaired the first I&M version at the Queen Mary Hotel in Long Beach, California. He was chief technologist at Bendix (later Allied Signal) for several years. He and Renee were regular attendees at IMTC as well as AUTOTESTCON. We will miss his presence."
- Bob Rassa

"It was shocking and sad news to learn that Bernie passed away. Bernie was a mentor and a friend to many of us in IMS. He will certainly be missed by all of us. I had the privilege of talking at length with Bernie when we met at conferences, AdCom meetings, and chatting over the phone in the last years.

Bernie was indeed an extraordinary man! As Hal wrote, Bernie was a decorated World War II hero and he then served as a radar officer installing radar stations in Alaska.

Bernie was the devoted husband of Renee and father of two: Stephen, a Professor of Neurology at Thomas Jefferson, Chief of Neurology at Lankenau Medical Center, and Debbie. He was a very proud grandfather of two granddaughters, Kandace and Neala. He enjoyed long walks in the fields with his dog Thunder."
- Emil Petriu

Bernie started writing the column "A Look Back and Now" for the I&M Magazine starting with the December 2000 issue. He was a faithful member of the writing volunteers and I could always count on him to submit his column. We had very pleasant telephone conversations over the topics he chose to include. There was so much that he wanted to highlight for the readers of the magazine. He was very kind and I will miss him. I also send my sincere condolences to his family.
- June Sudduth, Assistant to the Editor, I&M Magazine.

Article Summaries

Parameters to Consider in the Construction of Fiber-Optic Biosensors as Alternative Bioanalytical Tools

(Summary)

Evgeni Eltzov and Robert S. Marks

Good analytical devices available now, but new devices are urgently needed to detect environmental pollutants and medical related targets - reliably, cheaply and rapidly. This paper explains how biosensors can meet all of these needs, describes a biosensor, its parts, and how it works, and presents case studies of possible applications.

This summary includes text from the article.

Instrumentation and Measurement in Educational Assessment

(Summary)

Irvin R. Katz

While engineering instruments measure physical properties, educational instruments measure psychological characteristics, such as students' knowledge, skills, and abilities. In this article, the author introduces educational assessment from a measurement perspective, highlighting how key measurement concepts play out when the measurand is psychological.

This summary includes text from the article.

Converter Voltage Reference Performance Improvement Secrets

(Summary)

Miroslav Olijaca and William Klein

During the design process, many designers tend to examine each component separately. In mixed-signal design, however, in which different types of components are used, one must have a complete understanding of the individual components as well their impact on and performance contribution to the overall system. When a design involves Analog-to-Digital converters (ADC) or Digital-to-Analog converters (DAC), the analog signal buffer and the reference voltage source are as critical as the converter selected. This paper discusses reference voltage system noise, reference input pin requirements and capacitive load and stability issues.

This summary includes text from the article.

Third in a Series on the First Years of the National Bureau of Standards: Stratton Builds a Laboratory

(Summary)

James F. Schooley, Sr.

This article is the third in a series of four that describes the establishment of the National Bureau of Standards (NBS), now known as the National Institute of Standards and Technology (NIST). The first article featured the work of Ferdinand Rudolph Hassler, America's first metrologist, who initiated the nation's first coastal survey and a coherent system of weights and measures. The second article discussed the Convention of the Meter and the creation of the National Bureau of Standards by Public Law 56-177 on March 3, 1901. This article follows the remarkable success of Samuel Stratton in building an effective and far-reaching standards laboratory. It introduces some of the outstanding personnel at the NBS and their work from 1901-1904, including the immediate and effective NBS response to the great Baltimore fire of 1904.

This summary includes text from the article.

Tutorial 21: Wavelet Transform: A Mathematical Tool for Non-Stationary Signal Processing in Measurement Science

(Summary)

Ruqiang Yan and Robert X. Gao

Of the various time-frequency techniques, the wavelet transform provides information about a signal in the time-scale domain simultaneously through a series of convolution operations between the signal being analyzed and the base wavelet. As a result, the wavelet transform has been an area of active research for non-stationary signal processing over the past three decades. This article provides an overview of the wavelet transform from both a historical and a technical perspective, together with illustrations of its application in the field of measurement science and technology.

This summary includes text from the article.

Column Summaries

Instrumentation Notes

(Summary)

Shlomo Engelberg

Guaranteeing the Integrity of Data by Using a Digital Signature

This column describes an algorithm that can be used to secure data and the mathematics behind creating a digital signature. A brief introduction to public key encryption and two theorems that underlie it are presented, including Fermat's little theorem and the Chinese Remainder theorem.

This summary was written by Kristy Virostek..

My Favorite Experiment

(Summary)

John Witzel

Have you talked with an astronaut lately?

This column discusses how digital technology, computers and smaller, simpler less expensive radios are a few of the changes that have enabled resurgence in ham radio operation. Several internet-based resources are presented to foster free satellite tracking and interfacing with digital radio programming.

This summary was written by Kristy Virostek.

Departments

New Products

Robert Goldberg

Multi-Channel Voltage Data Loggers

Pico Technology announces two competitively priced, multi-channel, USB-powered data loggers. With up to 12-bit resolution and up to 1 MS/s sampling rate, the PicoLog 1000 Series multi-channel voltage data loggers offer a good value for this resolution, sampling rate and number of inputs. In addition, the units offer up to 4 software-configurable digital output lines. The units also offer a current-limited sensor excitation output.

The unit is a compact, portable unit that simply plugs into the USB port of a standard Windows-based PC, without any need for an external power supply.

Designed to suit a wide range of general-purpose voltage, sensor and transducer logging applications, the PicoLog 1000 Series Data Loggers feature independent software-configurable control outputs, an external terminal board to facilitate connections and custom front-end circuitry, and a choice of 10 or 12-bit input resolution. The PicoLog 1000 Series voltage data loggers contain everything needed for immediate use, and the free, comprehensive PicoLog data logging software includes an SDK for customized programming.

Both loggers feature 3 sampling modes to meet most data logging needs: real-time continuous, streaming and block mode. Streaming mode allows channel voltage readings to be logged continuously at 1 kS/s on any number of channels, while real-time continuous mode provides averaged, time-accurate readings with automatic measurements available in PicoLog. Block mode captures at the full 1 MS/s sample rate of the logger for the duration of the 8k sample buffer.

Series 1000 features:

- Up to 1 MS/s sample rate
- USB-connected and powered
- Current-limited sensor excitation output
- Windows XP and Vista (32 and 64-bit) compatible
- Includes API and examples for C/C++/C#, VB, LabVIEW VIs
- Includes terminal board and ready-to-go data logging software

Find more information at www.picotech.com.

Pattern Generator for Pulse Function Arbitrary Noise Generator Tests Analog, Digital, Mixed Signal Devices

Agilent Technologies introduces the 81150A pulse function arbitrary noise generator with a new pattern generator - resulting in an instrument that can test analog, digital and mixed signal devices.

The Agilent 81150A is ideal for general purpose bench tests as it is integrated in one instrument, providing a smaller footprint and reduced test time, therefore improving productivity for manufacturers of computer and communication devices.

Simplification of key R&D tasks is critical to speed up design cycles. The Agilent 81150A is designed for the best signal generation to simplify debugging, characterization or compliance tests whether it is applied for sinusoidal jitter or a distorted PRBS (pseudo-random binary sequence).

Agilent's new pattern generator also supports the new bus standards, such as Flexray, with three level signals, initialization sequences and long patterns. The distortion capabilities of the pattern allow simulation of worst-case situations and provide a new class of tests. The pattern generator supports each development phase for sine waves up to 240 MHz, pulses up to 120 MHz, 14-bit and 2 GSa/s arbitrary waveforms, and PRBS up to 231.

Additional information about Agilent's 81150A pattern generator is available at www.agilent.com/find/81150.

High-Power PXI Signal Generators for RF Component Test

Aeroflex’s new 3021C and 3026C Signal Generators are designed for RF testing applications across a frequency range from 100 kHz to 6 GHz. The 3020 Series are compact, high-precision PXI modular RF signal generators with integrated dual-channel arbitrary waveform generators ideally suited for R&D manufacturing and design verification of RF components and systems.

The addition of the 3021C and 3026C extends the output power range of the 3020 Series to +17dBm for frequencies up to 3GHz and 6GHz respectively.

Weighing in at 1 kg (2.2 lbs.) and occupying just 3 x 3U PXI slots, the 3021C and the 3026C are light weight and compact signal generators offering output power up to +17dBm. In addition, both of these new signal generators achieve low DC power consumption of less than 50 watts, resulting in lower running costs than conventional instruments.

The 3026C, the new flagship signal generator of the Aeroflex PXI line, has a frequency range of 1 MHz to 6 GHz with +17dBm of output power and boasts the highest output power of any PXI modular signal generator on the market today. The 3026C can provide direct input stimulus to power amplifiers without the need for pre-amplification or it can be used to provide a direct high power LO input to frequency converters and modulators. The 3026C is ideal for use in test systems where test-fixture losses are high.

The 3021C RF signal generator has a frequency range of 100 kHz - 3 GHz. Offering the same performance specifications as the 3026C, but with an extended low-end frequency range and a more economical price tag for applications below 3 GHz.

Additional information concerning Aeroflex products can be found on the company's website www.aeroflex.com.

Micro-Flow Differential Pressure Sensors

Microbridge Technologies, Inc. announces a family of Nano-Air-Flow Differential Pressure Sensors. The new devices incorporate a thermal anemometer element and CMOS Analog conditioning circuitry with a micro-flow channel having very high flow-impedance that allows accurate sensing of low differential pressures over a wide dynamic range. The flow-impedance is pre-defined at the die-level, requiring only 2.5nl/sec of air flow and thus dramatically relaxing demands on subsequent packaging operations, resulting in a smaller, lower-cost solution.

Microbridge's approach allows the sensor to be constructed with flow impedances of up to several hundred thousand Pascals. Microbridge claims this to be more than 1,000 times greater than other competing technologies. Key advantages of this nano-air-flow approach are the virtual elimination of leakages, greatly reduced susceptibility to poor filtration, a smaller footprint (often less than 50% of alternative solutions) and the enablement of very low cost package options. Additionally, the Microbridge approach facilitates the use of long hoses, dissimilar diameters, with or without filtration, with no impact to calibration. These Sensors are an ideal solution in medical respiration applications where it is necessary to measure full-scale differential pressures of approximately 15" H_2O, with a greater than 10^4 dynamic range, and with extreme resistance to contamination.

The CMOS die itself consists of the sensor element, amplification and analog adjustability through the use of Rejustors, enabling near zero TC-Span without digital compensation. Sensitivity is less than 0.1 Pascal, (0.004 inches of H_2O) and ideal for detecting small changes in air flow for respiration and ventilation in medical applications; heating and cooling in industrial HVAC environments; and intrusion detection in secured environments.

For more information on Rejustors, please click on http://www.mbridgetech.com/whitepaper.php for a Microbridge technical whitepaper on Rejustors.

Rockwell Hardness Tester

Wilson® Instruments, an Instron company and the originator of the Rockwell® Hardness Tester, introduces its new 574 Rockwell Hardness Testers – high-precision-depth measurement instruments with proven performance and the best repeatability in its class.

Designed to meet a range of Rockwell testing applications within the automotive and aerospace industries, the 574 hardness testers are ideal for flat and cylindrical work pieces in both laboratory and workshop testing.

Available in regular, superficial, and twin-scale models, this affordable hardness testing solution provides a rugged industrial design, an all-new, easy-to-use control panel with an intuitive LCD display, and a built-in USB for easy data transfer to Microsoft® Excel® or other applications.

The 574 hardness testers are compliant with various international standards, and are available in six languages: English, German, Spanish, French, Italian, and simplified Chinese.

Information is also available on the company's website at: www.wilsoninstruments.com.

Ultra-Rugged Hand Held Computer Features True Xenon Flash System

Two Technologies, Inc.® introduces the Hydrus® Luna, an ultra-rugged and powerful hand held computer designed for long-term daily operation in the harshest working conditions. With a high battery capacity of 37 Watt-hours, the Hydrus Luna functions for over 40 hours, working for long periods on various field applications.

Poorly lit offices, dark warehouses and overcast skies can make it difficult to capture a perfectly detailed image. The New Hydrus Luna features an integrated Xenon Flash System that brings subjects to life in demanding photographic applications.

IP67/IP68 rated for protection against dust and water, the Hydrus Luna is ideal for outdoor use in extreme environments. Double wall case construction of GE Xenoy® provides impervious sealing against environmental conditions, with drop and shock protection covering internal components.

A 5MP (4MP processed) True-Camera-System captures color images and bar codes with real auto focus, LEDs and a True-Flash-System. Users can capture then relay images and data from virtually any remote field location and transmit them back to a main office or centralized location.

A 55-key alpha numeric keypad with application-specific graphics plus an eight-position joystick allows for individual or combined operations. Customized keypads allow for intuitive, user-friendly operations and finger tip control. Individual hard keys are uniquely suited for operation with gloved hands.

The Hydrus Luna offers wireless communications and networking capabilities via Bluetooth®, WLAN and 802.11b/g. RS-232 and USB ports are available for adding peripherals and accessories that extend the product's utility. Integrated precision GPS is optional.

A powerful computer with 256MB SDRAM and up to 32GB of data storage, the Hydrus Luna uses Microsoft® Windows® CE .NET 5.0 operating system and a Marvell® PXA270 processor operating at 624MHz.

For more information on the Hydrus Luna, go to the company web site at http://www.2t.com.

Panel Meter Selector Tool Simplifies and Speeds Correct Product Selection

Red Lion Controls, Inc. announces a panel meter selector tool that is now available on the company's website. The panel meter selector tool enables users to quickly and accurately identify from Red Lion's broad offering of panel meter solutions the one or more meters that best match their criteria. Users simply answer several questions about their application requirements, and the compatible panel meter/s are listed by part number/s. A short description of each meter as well as outputs and communications information are also listed for quick reference, and users can simply click on specific models for more detailed product information.

Key differentiating features for product selection include:

- Signal input
- Display size
- Output requirements
- Communications requirements

To download the information, or to find the Red Lion distributor nearest you, go to www.redlion.net.

Miniature Wireless Thermocouple Connectors

Omega's new MWTC Series of Wireless Thermocouple Connectors are available in standard J, K, T, E, R, S, B, C, or N type calibration. Each battery powered, compact, patented connector transmits temperature readings, signal strength and battery status back to a mating USB receiver up to 90 m (300') away. All readings are displayed on your PC screen in real time using the free provided software. Software functions include data logging and chart recording. The low power operation and sleep mode provides long battery life. Models are FCC, Industry Canada and CE Certified. A free thermocouple sensor and long life battery is included with each connector. The Miniature Wireless Thermocouple Connectors are perfect for labs and industrial automation.

Find more information on this and other Omega products by visiting www.omega.com.

Space Saving Ethernet Analog I/O Modules

Acromag introduces new 16-channel Analog Input modules with Ethernet communication in a space-saving unit to simplify installation and significantly reduce the cost of interfacing sensor signals to remote controllers.

The new 993EN and 994EN models provide a 16-channel 16-bit A/D interface for single-ended analog voltage or current input signals. The space-saving inch-wide units make it very easy to retrofit older control systems for Ethernet Modbus TCP/IP networking and greatly reduce the

cost per channel in new installations. Users can select industrial-grade or commercial versions for significant savings in applications that do not need the extra performance and safety approvals. Industrial-grade units add superior accuracy, a signal integrator/totalizer function, -40 to 70°C capability, and are designed to meet UL/cUL Class 1 Division 2 ABCD (Zone 2) requirements.

Two models, each with 16 single-ended analog inputs, support a variety of I/O ranges. The 993EN accepts DC current with ±20mA, 0-20mA or 4-20mA input ranges. 994EN models accept ±5V or ±10V DC. Fast scanning updates all 16 channels in just 8mS. Dual-format data registers support 16-bit integer and 32-bit floating point formats. Users can read raw channel data based on 16-bit signed integer or 32-bit scaling registers, configurable on a per-channel basis, to minimize CPU or HMI software processing time. Surge protection and 3-way 1500V isolation between I/O, power, and network circuits increase reliability.

A sample averaging function is also configurable. Averaging improves performance in noisy or fluctuating environments and increases the performance of single-ended inputs. On industrial-grade units, an integration function can totalize inputs with non-volatile counter registers on all channels.

These input modules are very easy to use. No software is required as the units are configured using any web browser to set operating parameters on embedded configuration menus. An auto-copy function lets users rapidly apply a saved configuration to multiple units. The automatic calibration function uses built-in precision sources and on-demand self-test capability verifies the calibration. Front-panel LEDs provide a visible confirmation of proper operation.

For more information about Acromag products visit www.acromag.com.

New USB RS-232 Serial Adapter Designed for Challenging Environments

The SeaLINK® single-port USB to RS-232 serial adapter utilizes Sealevel's expertise in military-grade designs by incorporating a ruggedized, overmolded enclosure into the new SeaLINK+232-DB9. This enclosure improves reliability and durability in industrial and mobile applications such as GPS navigation systems, barcode readers, signature input devices, serial printers, scales, and similar applications.

The serial port appears as a standard COM port to the host computer enabling easy setup and providing compatibility with legacy software. The SeaLINK+232-DB9 features programmable baud rate and data formats with 128-byte transmit and 384-byte receive buffers. The USB serial adapter is compatible with all standard PC baud rates and supports high-speed communication to 921.6K bps. The adapter is powered by the USB port and status LEDs molded into the enclosure indicate serial data activity and connection to the host.

All SeaLINK USB serial adapters ship with Sealevel Systems SeaCOM™ suite of Windows drivers and diagnostic utilities. WinSSD, a full-featured application providing powerful testing and diagnostic capabilities, is also included. Use WinSSD for Bit Error Rate Testing (BERT), throughput monitoring, loopback tests, and transmitting test pattern messages.

Standard operating temperature range for SeaLINK adapters is 0 - +70°C, and extended operation (-40 - +85°C) is available. The attached 44" cable is fully shielded to protect the adapter from RF and EMI interference, which are common in mobile and industrial environments.

Please visit www.sealevel.com for more information.

Hand-Held Scanner Delivers Better Accuracy, Speed and Performance

Hexagon Metrology, Inc. announces the Leica T-Scan TS50-A hand-held laser scanner, which interfaces with the Leica Absolute Tracker. The new Leica T-Scan delivers improvements that result in a doubling of the data acquisition rate, a fifty percent improvement in scanned point density, and scanner accuracy improved by a third. Together, these changes deliver 6DoF laser scanning performance that makes contact-free measuring faster, more accurate, and more efficient.

The core of the product improvements lie with the unit's laser and optics system, which result not only in greater scanner accuracy, but also improved data quality, with a reduction in system noise, and an improved ability to scan all types of surfaces, particularly ones that are shiny or dark, under all lighting conditions. The scanner is capable of self-adjustment to lighting conditions, independent of the operator. Combined with the Leica Absolute Tracker system, the new T-Scan has improved system specifications of up to 25%.

Ergonomic handing, robust design for shop floor and even outdoor environments, and improved accuracy specifications make the T-Scan TS50-A scanner solution an ideal solution for automotive, aerospace, wind power, shipbuilding, defense and heavy equipment applications. The T-Scan TS50-A is available for immediate shipment with Leica Absolute Trackers.

Find more information at www.hexagonmetrology.com.

Low Cost, Low Power Design & Development Platforms

Saelig Company announces the availability of ARM7-based Model DS2148WZ and Spartan-3AN FPGA-based Model DSX50WZ, two powerful new, low-cost, low-power design and development platforms for embedded and network-oriented applications.

Model DS2148WZ combines NXP's LPC2148 ARM7 microcontroller with WIZnet's W5300 network IC, providing a tested, ready-to-implement "shortcut" within embedded design projects requiring Ethernet or USB interface. The small factor board is configurable as a highly efficient web server, without sacrificing the availability of most LPC2148 resources. The unit's on-board W5300 Ethernet Controller makes complex TCP/IP packet and web page processing functions no more challenging than working with a universal asynchronous receiver/transmitter (UART). DS2148WZ is ideal for creating a <1W internet appliance, with performance characteristics similar to traditional servers, and providing the added advantage of hardware features such as USB, PWM, UART, I2C, SPI, A/D and D/A.

Model DSX50WZ offers a pre-packaged development board which combines Xilinx's XC3S50AN Spartan-3AN FPGA and WIZnet's W5300 hardwired network protocol Ethernet (TCP/IP) controller. With ~33k available gates, Model DSX50WZ allows for fast creation of a low power networked product, capable of serving rich web pages. The compact Spartan-3 board

serves web pages in less than 50ms from internal flash memory. Its accompanying demo http server runs on PicoBlaze, leaving 66% of Spartan resources still available. This small factor board may also be configured as a very efficient web server, with equivalent performance to larger, traditional servers, while still retaining availability of most XC3S50 FPGA resources.

For detailed specifications, free technical assistance, or additional information, please visit www.saelig.com.

High Power RF Amplifier

Mini-Circuits ZHL-16W-43+ offers high power (16W) with rugged reliability over a broad frequency range from 1800 to 4000 MHz. This model includes temperature sensing circuits for automatic shutdown and output load protection to operate into a short or an open making it ideal for use in laboratory or field applications.

Offering a unique combination of output power over a broad frequency range, the ZHL-16W-43+ is ideal for laboratory and other test applications which require a high degree of flexibility to delivery power over a wide array of applications including:

- PCS, UMTS, LTE and wireless
- WiMAX
- Radar
- Microwave radio and ISM

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Report on the I²MTC Graduate Panel Discussion

Kristen Donnell

This May the Graduate Student Panel Discussion made its sophomore debut at the 2009 International Instrumentation and Measurement Technology Conference (I^2MTC) in Singapore. The Panel Discussion was introduced at I^2MTC 2008 as an opportunity for the student attendees of I^2MTC to attend a session regarding topics of interest for graduate (and undergraduate) students.

This year there were 5 student panelists representing Romania, India, and the United States. The Panel Discussion was also fortunate to have three members of the I&M Society Administrative Committee (AdCom) in attendance; Professor Alessandro Ferrero, the President of the I&M Society, Professor Reza Zoughi, the Editor-in-Chief of the IEEE Transactions on Instrumentation and Measurement, and Professor Shreekanth Mandayam, the Vice-President of Finance and Chair of the Education Committee. We were also pleased to have a special Guest Panelist from Singapore, Mr. Guo Xiong Lee.

Mr. Alexandru Nechifor, an undergraduate student at Politehnica University of Bucharest, Romania and the 2009 Undergraduate Student Representative to the AdCom of the I&M Society,

spoke to the group about the Romanian Education System. Mr. Nechifor's talk highlighted unique differences between the Romanian and United States education systems.

Mr. Michael Bloom and Mr. Ulrich Schwabe, both graduate students at Rowan University in New Jersey, USA, discussed a novel program at Rowan known as the Engineering Clinic Program. The Clinic Program is a unique program that emphasizes and develops engineering design principles in a multidisciplinary team environment. During the discussion following Mr. Bloom and Mr. Schwabe's presentation, Professor Zoughi addressed the topic of publishing while in graduate school.

Mr. Madhu Mohan, a graduate student at the Indian Institute of Technology Madras, in Tamilnadu, India, discussed the relationship between IEEE and graduate students in India. Mr. Mohan's presentation included an interactive discussion among the group.

Ms. Kristen Donnell, a graduate student at Missouri University of Science and Technology and the 2009 Graduate Student Representative to the I & M Society AdCom., spoke about the unique aspects of attending a conference focusing on Instrumentation and Measurement.

The I&M Society would like to thank the students who served as the 2009 Panelists, as well as the attendees of the Panel Discussion. Look for the Panel next year at I^2MTC 2010 in Austin, Texas, USA, featuring "Life after Graduation in Instrumentation and Measurement". Panelists from industry and academia will discuss different career paths in the field of Instrumentation and Measurement. Be sure to check the Student Activities section of the I&M Website, http://www.ieee-ims.org/site/membership.php, for updates.

Membership Notes

Jorge Fernández Daher

Activities in Uruguay Chapter

In this issue, we have a report from our Chapter in Uruguay. A very important event was organized locally with many results.

From May 9th – 10th, the Teacher in Service Program (TISP) from IEEE, a Latin-American workshop, was held in the Montevideo Sheraton Hotel. This event was declared by the Ministry of Education as of National Interest and was supported by the "Consejo de Enseñanza Secundaria" (Secondary School Council), the "Universidad del Trabajo del Uruguay" (Technology University of Uruguay) and the local IEEE Section.

More than 250 professors from secondary schools and technological schools, both private and public, attended the workshop. Also more than 20 engineers and 14 officers from IEEE Region 9 attended the meeting coming from different countries like Mexico, Peru, Bolivia, Chile, Argentina and Brazil.

One of the goals of the workshop was to train professors in new ways of teaching subjects related to technology. This allows for a better relationship with students and generates a stronger motivation in them. The administrative committee for this event included officers and members from the Uruguay Section and the Power and Energy Society and Instrumentation and Measurements Society Joint Chapter.

Benefits and metrics
Attendance Goal: 280 people. We had 250 professors from different schools, 12 volunteers from Region 9 and 20 volunteers from the Uruguay Section. The goal was achieved!

Benefits (short list):

- Consider new ways to teach
- Participation of different sectors and teachers
- Well aligned with science and technology education standards
- Social networking and discussions on ways to teach science
- Workshop with different teachers and different subjects
- Materials easy to find in the local market
- Crafts hands on modules, design test and optimize design
- Good approach to technology and engineering
- Teamwork, creative ideas, motivation, event coordination
- To be able to work with real models instead of only with a blackboard.
- To make teachers think in ways to communicate practical issues
- Lot of suggestions and ideas to develop and investigate in a Group
- Very good idea to spread scientific concepts through practical implementation

Benefits to the Uruguay IEEE Section

- IEEE was written about in the local media
- The event was declared of National Interest by the Ministry of Education
- Funding was granted by the EAB to extend this workshop during one year in the whole country
- More than 30 students, not members of IEEE, attended the workshop and were introduced to IEEE and its benefits
- Two Student Branches were reactivated during the event and two more branches decided to start reactivation
- The IEEE membership was increased in 10% with 27 new student members

Benefits to the Chapter

- Thanks to the support of the I & M Society new students became members.

- The I &M Society supported the publicity of the event, preliminary meetings with students and membership development.

- The Power and Energy Student Chapter was created in the Universidad de la República.

- Students from the Universidad de la República decided to create the I & M Society Student Chapter. Six new students became members of our Society

- Students from the Universidad de la República Branch are meeting weekly with the student counselor and the Chapter Chair, Nicolas Daoudian, to coordinate technical activities. They are planning technical visits to industrial facilities to understand automation and measurement systems and equipment.

- There are plans for new research and development projects in technical areas of our societies.

If you want to learn more about this workshop you can contact the Uruguay Chapter Chair, Nicolás Daoudian (ndaoudian@ieee.org) or Gustavo Giannattasio (gianna@ieee.org). There is also a blog at http://wwwtispmontevideo.blogspot.com/

New chapter

We are glad to welcome a new Chapter, the North Jersey Section. Congratulations to all the members that worked hard and to the Chair, Russell Pepe. We wish them success in all their activities.

Web site

Our web site has been renewed and updated with more information. If you have a look to the membership section you will see the links to the different chapter web sites. Remember the URL, http://ieee-ims.org/main/