

Ongoing Education

From the Editor's Bench

Kim Fowler

Student Focus

This month the magazine focuses on some issues that may be of interest to students and recent graduates. The intent is to present articles that might have immediate interest in our careers.

The article by Bill Brown introduces some of the concerns facing the electronic shop in a railway maintenance facility. When purchasing long-life industrial equipment, such as railcars and locomotives, an organization must be structured around life-cycle maintenance to realize the useful life of the equipment. In Mr. Brown's article, maintenance is complicated by rail equipment with electronic circuit card control systems that are decades old. Rail vehicle electronic assets can reach their intended life by assuring repair of electronic circuit boards down to the component level. This article describes the challenges facing electronic engineers and technicians at the bench level.

The article by Leopoldo Angrisani [and Claudio Narduzzi] provides an overview of the testing that has grown with the development of communications and computer networks. This is an area that all of us will encounter at some point in our careers. Finally, Tutorial 16 is Part 2 of a series on control theory. It presents the elements of analysis and design of systems with feedback, the mathematics, and a discussion of stability - a most important topic in control theory.

The goal of all these articles is to be useful to you, the readers.

Farewell

As I wrote back in April, I am turning over the helm of the magazine to Dr. Shlomo Engelberg. Shlomo is deeply involved in researching and teaching instrumentation and measurement to university students. The important goals of the magazine, introducing scientific fields and engineering disciplines through instructive articles and tutorials and keeping you current with the activities of the society, will continue in Shlomo's capable hands.

I have thoroughly enjoyed working on the magazine for the society. I have met many fine people and exchanged useful and interesting ideas, which we tried to share with you. My thanks go to

those many outstanding people – June Sudduth (my editorial assistant), the columnists, the authors of articles and tutorials, and the people on the AdCom who supported the magazine.

Finally, my thanks to you, the readers of the magazine. Your interest, comments, and support have helped make this magazine a worthwhile venture. It's been great!

Kim

President's Perspectives

Alessandro Ferrero

Reconsidering the Fundamentals

I am writing this column with the fresh memory of the 2008 I²MTC (International Instrumentation and Measurement Technology Conference). This year the conference was held in Victoria, BC, Canada, from May 12-15. It is a very nice memory, not only because of the magnificent venue and organization, but also for the excellent technical program; that is the most important side of a scientific and technical event. So, let me publicly thank the General Chair, Bob Rassa, and the Technical Program Co-Chairs, Emil Petriu, Abdulmotaleb El Saddik, Kim Fowler and Ferdinanda Ponci for the excellent conference they organized.

I also wish to express a special thanks for the keynote plenary speech they selected and the keynote speaker they invited. The keynote speech should always represent an important part of the Conference, since it represents the only technical event of the program addressed to the whole audience, and, because of this, it is supposed to cover topics of interest for all attendees. The selection of such a topic is not an easy task. It's much easier to invite some representative of the local government, or the boss of some local manufacturer, especially if the conference received support from them.

This year, the Technical Program Committee chose to follow the steepest path, and the target has been hit magnificently: the keynote speech reconsidered the very fundamentals of the I & M field - the unit system - and provided a superb survey of the present achievements and the still unsolved problems. The invited speaker was Dr. Terry Quinn. Dr. Quinn is the Emeritus Director of the Bureau International des Poids et Mesures (BIPM), Sèvres, France, where he was Director from 1988 to 2003. He gave a really fascinating speech that had the great merit of giving us a historical perspective of this problem. He reminded us that also the fundamentals of our science are based on the intuition of one of the greatest scientists of the 19th century: James C. Maxwell. In 1870, Maxwell wrote:

“If we wish to obtain standards of length, time and mass which shall be absolutely permanent, we must seek them not in the dimensions, or the motion, or the mass of our planet, but in the wavelength, the period of vibration, and the absolute mass of these imperishable and unalterable and perfectly similar molecules”.

One hundred thirty-eight years later, we haven't yet fully accomplished Maxwell's idea, because the present realization of the mass unit, the kilogram, is still an artefact.

Dr. Quinn proposed a new SI definition with I. M. Mills, B. N. Taylor, E. R. Williams in the milestone paper: "Redefinition of the kilogram, ampere, Kelvin and mole: a proposed approach to implementing CIPM recommendation 1 (CI-2005)" published in *Metrologia*, vol. 43, n. 3, 2005. This proposal is based uniquely on assumptions for the seven physical constants considered by the presently accepted model equations: the seven constants are thus defined with zero uncertainty and this introduces a beneficial simplification in the whole organization of the International Metrology.

I was really glad that this new proposal was presented to I²MTC because it could reach a significant and highly qualified portion of the I & M community. Any proposal aimed at modifying the international system of units has a great impact on our activity, not only because of the changes themselves, but also because of the new opportunities that it opens to researchers, laboratories and institutions to work toward the realization of new standards for the physical quantities. The only constraint is that the provided values are compliant with the value assigned to the seven constants. I do hope that the keynote speech given by Dr. Quinn has started the discussion on these fundamental topics also among I & M members, and we can all provide our contribution in the future.

I also hope this outstanding lecture has shown us and in particular our Student members - to whom this issue is dedicated - that the definition of the unit system is an exciting part of the scientific and technical activity of the I & M field, and reconsidering the fundamentals of our subject from both a technical and historical point of view opens new stirring research perspectives.

Alessandro

Article Summaries

Passenger Rail Vehicle Depot-Level Electronic Maintenance

Bill Brown

For decades, the Woodland Electronic Shop (WES) has been ensuring the careful and necessary maintenance of Southeastern Pennsylvania Transportation Authority (SEPTA) rail vehicles, with much attention paid to life-cycle maintenance. WES carries roughly 500 repair products to cover SEPTA's expanding production line, and still successfully maintains SEPTA vehicles purchased nearly 50 years ago. But as SEPTA continues to progress, WES is facing a few problems that hinder its ability to keep up. In this article, Bill Brown, WES's Maintenance Manager, takes a

look at key issues, including disagreement upon standards as well as proper education goals, and offers practical solutions that could solve these problems relatively quickly.

Summary by Caitlin Woody

Testing Communication and Computer Networks: an Overview

Leopoldo Angrisani and Claudio Narduzzi

“Communications and computer networks are a ubiquitous presence in everyday life and are often considered as important as water and energy utilities. Today’s scientific, manufacturing, social, and financial organizations rely heavily on networks to distribute information and resources to their workers, users, and customers... Multi-vendor, multi-protocol networks are expected to meet increasing demands for access and exchange of information... causing increased complexity.”

“Proper network testing and performance measurement play a key role in assuring the desired and agreed level of quality for the offered services... [In this paper], we present an overview of the measurement context, the commonly adopted instruments and procedures, and the most relevant issues for network testing... [as well as provide] a brief outline of development trends in current research.”

This summary was taken from the article’s introduction.

Tutorial 16: Control Theory, Part 2

Shlomo Engelberg

In the I&M Magazine’s June 2008 issue, the first tutorial of Engelberg’s series on Control Theory was published offering an introduction to the subject, which included an overview of its history, uses, and popular understanding. In the second of the series, Engelberg focuses mainly on the math supporting the theory while strongly emphasizing the importance of systematic stability, demonstrated using the Nyquist Stability Criterion. Gain and phase margins are thoroughly investigated, as are Bode Plots which are shown in a simple manner to measure and

calculate the margins. Compensators and attenuators are also discussed as aids in improving system performance. The series will continue with a third tutorial on delay analysis.

Summary by Caitlin Woody

Column Summaries

By the Numbers

(Summary)

Justin S. Dyer and Stephen A. Dyer

In the I&M Magazine's December 2007 issue, "we discussed and compared some useful approximations to the so-called "error functions" related to the Gaussian random variable, which appears so often in the sciences and engineering..."

"Just as it is often necessary to evaluate $F_X(x)$ for a given x , there are, likewise, many settings in which x must be determined from a given $F_X(x)$. A simple example which arises frequently in practice is that of determining the threshold of comparison for a statistic in hypothesis testing under constraints on the probability of making an incorrect decision.

In the present installment, we address the problem of recovering x from a given value $p = F_X(x)$. We begin by motivating two quick-and-dirty approximations suitable for many cases and implementable on a hand calculator, and then we proceed to discuss two different approaches based on rational Chebyshev approximations for obtaining very accurate approximations across the entire range of F_X . Although we focus exclusively on the inverse function of F_X , as long as one pays attention to the attendant numerical issues, it is a straightforward exercise in substitution to determine the inverses of related error functions such as those mentioned previously."

Summary by June Sudduth with quotes from the column

Tried and True

(Summary)

Kim Fowler

Some Things That I Have Learned

Kim discusses five general principles that he has learned about good design and development of technical products and projects. The five principles are:

- “There are no silver bullets.
- Integrity is necessary to ultimate success.
- Good processes have five basic components.
- All important actions occur at interfaces.
- All problems have a human origin.”

He explains how each of these principles has a component which center around personal relationships and leaves us with two thoughts:

- “Failure is inevitable but you get to pick the domain.
- Success is defined by you, so be proactive!”

Summary by June Sudduth with quotes from the column

A Look Back (Summary)

Bernie Gollomp

Weibull Methodologies – Accurate Reliability Predictors

Bernie presents a summary of the life and work of Ernst Weibull. The Weibull Statistical Methods, and Failure Modes and Effects Analysis (FMEA) still have ever-increasing effects in improving quality and reliability of manufactured products. There is more in the hard copy!

Summary by June Sudduth

New Products

Robert Goldberg

New 3 GHz Modular Digital RF Signal Generator Added to RF Test Platform

Aeroflex announces the 3020C PXI Modular Digital RF Signal Generator, a new 3 GHz variant to their growing PXI signal generator line. Aeroflex's comprehensive modular RF test platform, the PXI 3000 Series, has the bandwidth and versatility to seamlessly cover the entire RF test process—from R&D through to manufacturing—in any wireless market from cellular to military/aerospace to RFIC.

The new 3020C covers the frequency range of 1 MHz to 3 GHz, supporting applications in high frequency (HF), very high frequency (VHF) and ultra high frequency (UHF) bands. The 3020C has wideband width modulation up to 90 MHz for broadband communications standards or multicarrier test applications as well as RF output power from -120 dBm to +6 dBm.

The 3020C is a lower cost option for wideband test applications below 3 GHz than the flagship 3025C module, which offers the same high RF performance, but with an extended frequency range to 6 GHz.

The 3020C is directly complimentary to the recently introduced 3030C Wideband RF Digitizer. Together they support wideband signal generation and signal analysis for RF component and transceiver testing. The 3020C is used with the 3010 RF synthesizer, which provides a low phase-noise, highly agile local oscillator input, from which modulated and leveled RF output signals are derived. The 3020C is a PXIe (Hybrid compatible module) that can be fitted to PXI chassis' supporting standard cPCI, PXI-1 or PXI Hybrid slots.

Aeroflex has also updated the PXI 3000 Series software to further increase its test speed. Software updates include changes to module drivers, standard and optional measurement libraries and application software. This software is compatible with all Aeroflex 3000 Series PXI modules.

The updated driver software supporting the Aeroflex 3000 Series of PXI-based modular RF instruments is now available to download free of charge from the Aeroflex web site: [http://www.aeroflex.com/products/software.cfm?ProductType=RF%20Modular%20Instruments%20\(PXI\)](http://www.aeroflex.com/products/software.cfm?ProductType=RF%20Modular%20Instruments%20(PXI)). Additional information can be found at www.aeroflex.com.

Portable Radio Tester with One-Button Functionality at Operational, Intermediate Military Levels

Agilent Technologies has introduced a rugged, portable radio tester that enables one-button testing of FM and SINCGARS (SINGLE Channel Ground Air Radio System) radios at both the operational and intermediate military testing levels.

The advanced diagnostics available through the new Agilent L4600A Radio Test Set's one-button operation reduces training and troubleshooting time for quicker identification and repair of equipment failures. In addition, technicians can use the built-in spectrum analyzer, network analyzer, signal generator or signal analyzer, depending on testing requirements, to eliminate the need for multiple pieces of test equipment.

The L4600A's rugged, weather-resistant design enables reliable field operation. A magnesium alloy housing provides both a lightweight, durable structure as well as enhanced RF shielding and integrated heat distribution -- a critical element, since the L4600A is fully sealed (no fans or vents) for advanced dust and moisture protection. A water-resistant rubber membrane over the keypad and display seals out water and dirt as well.

Easy, one-button navigation and step-by-step instructions guide users through the testing process without the need for extensive training or technical testing knowledge. In addition, the L4600A's transfective color display enables users to view data in direct sunlight, darkness and shade, providing exceptional flexibility. Backlit keys also allow the tester to operate under all lighting and weather conditions.

The test set's architecture is designed for expansion and in-field upgrades, incorporating additional functionality as newer testing technology becomes available, including JTRS radios up to 2.5 GHz.

The L4600A operates over an expanded frequency range of 2 MHz to 2,500 MHz and features a hot-swappable battery. Full span measurement speed is < 17 ms/point; reference level range is -150 dBm to +100 dBm; operating temperature is -10°C to +50°C (14°F to 122°F); storage temperature is -40°C to +70°C (-40°F to 158°F).

More information about the Agilent L4600A Radio Test Set is available at www.agilent.com/find/radio_test.

Soft Front Panel Application for PXI/CompactPCI Products

KineticSystems announces the launch of SoftView™, a simple yet powerful tool that integrates KineticSystems' entire line of PXI/CompactPCI instruments into a single software package.

At the touch of a button, the user can invoke operations on the instrument such as calibration, reset, data acquisition start and stop. The touch of another button brings up a dialog for configuring all of the instrument's properties such as overall sample rate, individual channel enable, filter range, and input level properties.

Once the instrument is configured, the Start button in SoftView activates data acquisition: the instrument is placed in run mode, and the input signals from enabled channels are displayed in a real-time graph window or a numeric table. Autonomous events (interrupts) are displayed as well. With just a few simple mouse clicks, the user can explore the instrument's functionalities and properties, adjust filter, input range, debounce, and other settings, as well as start acquisition and test the results immediately.

Digital and analog output channels are driven by a simple expression syntax that combines discrete and continuous generation functions with arithmetic operators and conditional logic to create waveforms of arbitrary complexity. This expression syntax can also be applied to input channels, allowing real-time scaling, offsets, change of units, polynomial curve fitting, even

synthesizing results from more than one channel. Output channels can be expressed in terms of analog or digital input values, or triggered in response to autonomous events.

SoftView can manage multiple instruments simultaneously, providing the ability to test a complex system of cooperating instruments. Data from digital and A/D input instruments is collected, manipulated and displayed, and can also be used to drive digital and analog outputs on other instruments.

The SoftView application is included at no charge with all of KineticSystems PXI/ CompactPCI products.

For more information regarding SoftView or PXI/CompactPCI solutions from KineticSystems, please refer to the company's Web site: www.kscorp.com/Products/software/ or www.kscorp.com/Products/pxi/.

USB Oscilloscope with 12 GHz Sampling

Pico Technology has unveiled the PicoScope 9201, a dual-channel PC Sampling Oscilloscope with a bandwidth of 12 GHz. The dual-channel PicoScope 9201 uses sequential equivalent-time sampling to achieve a sampling rate of 5 TS/s. The wide bandwidth allows acquisition and measurement of fast signals with a transient response of 50 ps or faster. Time base stability, accuracy, and a sampling interval of 200 fs [femtosecond = 10^{-15}] allow timing characterization of jitter in the most demanding applications. The ability to trigger on high frequencies up to 10 GHz allows measurements on microwave components with extremely fast data rates.

The PicoScope 9201 is a powerful measurement tool for semiconductor testing, TDR characterization of circuit boards, IC packages and cables, and high-speed digital data communications.

Data acquisition and measurement analysis are performed in parallel, enabling the instrument to achieve outstanding measurement throughput. The instruments provide fast acquisition speed up to 200 kS/s and waveform performance analysis with automated direct or statistical measurements on both single-valued signals (sine-wave, pulse, impulse) and multi-valued signals (NRZ, RZ).

The PicoScope 9201 was designed specifically for the complex task of analyzing digital communications waveforms. Compliance mask and parametric testing no longer require a complicated sequence of setups and configurations. The important measurements you need are right at your fingertips, including industry-standard mask testing with built-in margin analysis, extinction ratio measurements with improved accuracy and repeatability and more.

With its small size (170 x 255 x 40 mm) (6.7 x 10 x 1.6 in) and light weight (1 kg) (2.2 lb), the portable PicoScope 9201 offers the widest range of measurements and waveform processing capabilities of any multi-gigahertz PC Oscilloscope. It can be connected to the USB port of any Windows laptop or desktop PC.

Find more information at www.picotech.com.

Hipot Tester Now Includes an RS-232 Interface as Standard

Associated Research, Inc. is now adding an RS-232 interface to their Hypot® III series of production line Hipot testers. The Hypot III series provides three separate models: the 3705 is an AC Hipot Tester, the 3765 is an AC/DC Hipot Tester, and the 3770 is an AC/DC/IR Tester.

The addition of an RS-232 interface will allow users to directly connect the Hypot III tester to a PC. This provides users with the benefit of being able to setup the instrument remotely through the PC which allows for quick and accurate configuration of all test parameters. In addition to this in compliance with many safety agency requirements it becomes a very simple process to download all test results directly to a PC for record keeping of electrical safety tests.

The addition of an RS-232 interface to this line of testers now offers customers instruments with the latest technology and safety features together with all the benefits of entry-level automation.

Other features of Hypot III include:

- Graphic LCD Display with simplified interface
- Patented SmartGFI® safety feature
- Patented VERI-CHEK® and CAL-ALERT® features
- 10 Memories with 3 steps per memory
- Remote Interlock Safety Feature

For more information visit www.asresearch.com

New Low-cost 8-bit Digitizer

GaGe, announces its new low-priced BASE-8 CompuScope digitizer designed for OEM customers who require analog-to-digital conversion in their systems but who also need to keep the cost as low as possible.

BASE-8 digitizers provide a single digitizing channel with 8-bit resolution, 200 MHz bandwidth, and sampling speeds up to 500 MS/s. To off-load CPU intensive processing from the host PC, custom on-board eXpert™ (FPGA) signal processing functionality is also available.

BASE-8 digitizers can also be customized for those users who have additional requirements such as higher simultaneous channel counts (2 or more channels), higher sampling rates of up to 2 GS/s and more.

OEMs can quickly and easily integrate the BASE-8 digitizer into their own systems using one of GaGe's Software Development Kits (SDKs) for C/C#, MATLAB®, or LabVIEW® and other

popular programming environments. BASE-8 digitizers are also compatible with GageScope® oscilloscope software that allows users to acquire and analyze signals without writing a single line of programming code.

For further information please visit www.gage-applied.com.

Transposers Deliver Seamless Coverage In Digital And Analog Broadcasting Networks

Rohde & Schwarz is adding the R&S XLx8000 transposer family to its product portfolio in the UHF/VHF low-power range. Together with the R&S SLx8000 low-power transmitters, the transposers provide a highly flexible solution for filling coverage gaps. The equipment's extremely high level of integration provides a very favorable price/performance ratio. The R&S XLx8000 supports the ATSC, MediaFLOTM, DVB-T/-H, DAB/T-DMB and DTMB standards as well as analog TV standards.

The R&S XLx8000 transposers make it possible to easily fill coverage gaps or expand transmission areas. When used as gap fillers in single-frequency networks, signals can be efficiently amplified without occupying additional frequency resources. Rohde & Schwarz offers two options to convert the transposer into a gap filler. Depending on the desired transmission power and environmental variables, the very favorably priced software option for echo cancellation usually suffices. Enhanced echo cancellation, which increases the performance of the software algorithm by means of additional hardware, is recommended for high power applications and extreme conditions.

The following options are available: an integrated GPS module, an internal DVB T/-H monitoring receiver, as well as an SNMP agent or parallel interface as remote control interface. Local operation can be performed using either a display and keyboard, or with a computer and conventional web browser, which is also suitable for remote control. The operation-relevant data of the R&S XLx8000 is stored in the unit on a compact flash memory card that is directly transferred from one transmitter to the next if servicing is required.

Find more information at www.rohde-schwarz.com.

Ultra-Small Resettable Overcurrent Protection Device

Littelfuse, Inc. has introduced the 0603L series Polyfuse® PPTC (polymer positive temperature coefficient thermistor), a new micro form-factor resettable over-current protection device. Its extremely small size, excellent electrical ratings, and TUV and UL safety standard certification meet the need for reliable circuit-protection in ever-shrinking consumer electronic devices.

The 0603L PPTC series is available in four hold current / maximum voltage ranges, including 0.10A/15Vdc, 0.20A/9Vdc, 0.25A/9Vdc and 0.35A/6Vdc.

Each device has a maximum fault current rating of 40A and is certified by both TUV and UL.

These devices can serve a wide range of end device applications including small consumer electronic products such as mobile phones and computers, Flash drives, USB thumb drives, hard disks, computer peripherals, and many others.

PPTCs are over-current protection devices that increase resistance as temperature increases due to increased current flow. They are designed to limit unsafe currents while allowing constant safe current levels. The resistance resets automatically when the current and temperature return to a safe level. PPTCs are typically used in sensitive applications where frequent over-current conditions occur or where constant system uptime is required.

For additional information about the Littelfuse Polyfuse® 0603L PPTC series, please visit www.littelfuse.com/series/0603L.html,

Modular Vision Sensor Platform Allows For Rapid Development of Machine Vision Systems

LMI Technologies, Inc. has developed a complete modular vision sensor platform of hardware and software components under its FireSync™ brand. The system allows fast and easy integration of components into a scalable machine vision system along with microsecond synchronization.

The FireSync™ platform from LMI Technologies allows developing a single unified design for building vision applications ranging from smart sensors to complex web scanning systems anywhere from specification to final assembly. According to LMI Technologies, FireSync™ solves the classic problem of synchronization between lighting, camera and processing components and allows developing a fully scalable design.

The FireSync™ platform consists of a number of tightly integrated OEM hardware and software components. Components include sensor controllers, camera and embedded sensors, machine vision software, industrial computers, lighting and others. Components selected can be configured in a number of different ways, depending on the need and application.

With high performance image streaming, these components are combined with proportional/functional control of sub-components, the synchronization of image collection to within microsecond accuracy, simple cabling and impressive stitching.

Besides the four different independent camera channels, the FireSync™ system includes support for pre-processing, DSP algorithms and Gigabit networking.

The sensor controller precisely controls the camera light and DSP functions. Once de-serialized, image data is transferred directly to host memory, compressed through processing by the DSP and transferred to PC systems over Gigabit Ethernet for further distribution and reduction.

High speed CMOS cameras have from VGA to Megapixel resolution, the pulsed laser and LED sources provide for maximum lumen output at low duty cycles for long life and the Network routing control allows for flexible control of large scale and distributed topography.

For more information on the FireSync™ platform, please visit www.LMItechnologies.com.

Hall-Effect Sensors Enable Reliable Data Transfer in Harsh Automotive Environments

The Micronas HAL 2830 and HAL 2850 both include a microcontroller, a temperature sensor, advanced on-chip compensation, and a digital output format. The HAL 2850 features a PWM (Pulse-Width Modulated) interface, while the HAL 2830 has a SENT interface used particularly for low-cost automotive sensors in high-noise environments.

Electrical noise is severe in automotive applications, especially under the hood. An accurate sensor is of little use if its output does not reach the microcontroller accurately. Since electrical noise primarily affects the amplitude of a signal, one way to insure accurate results is to use the width of the signal to represent the value being measured. The HAL 2850 uses pulse-width modulation; this pulse is sent to the system microcontroller, and its width is measured with a counter-timer module, a common feature of virtually all microcontroller designs. Variations in amplitude due to noise are ignored.

The HAL 2850 can be programmed to send pulses as slow as 30 per second, or as fast as 2000 per second. This wide range allows the system designer to tailor it to the system needs. A slower update rate may suffice for slowly-changing variables such as temperature, and reduces the overall load on the microcontroller. A faster rate may be required for fast-changing variables such as pressure.

Along with the HAL 2830 and HAL 2850, Micronas offers an easy-to-use application kit containing a programmer board, LabVIEW(TM) programming software and the necessary source code.

For more information on Micronas and its products, please visit www.micronas.com.

New Family of Signal Conditioners

PCB Piezotronics has introduced a new family of rack mounted signal conditioners, available with selectable filters or isolated grounds. These signal conditioners are best suited for applications where case ground piezoelectric sensors are used and could potentially cause ground-loop noise, such as during aerospace or satellite component vibration testing, automotive component testing, product testing, drop testing, and any general vibration testing.

Model 483C30 features eight channels with true galvanic isolation of each input to output, which is also selectable on/off per channel. Isolation is ideal for the removal of ground loop noise caused by sensors which are electrically on ground. Other features in this low-noise model

include choice of ICP[®], charge, or voltage inputs; multiple charge input sensitivities (0.1, 1, 10 mV/pC); incremental gain (x0.1 to x200); internal/external calibration; 4-order 10 kHz low pass filter; and Ethernet interface, for ease of setup with supplied software. Other frequency filters are available as options.

For better filtering options, Model 481A03 features 16 channels of ICP[®] inputs with programmable eight-order Elliptical low pass filters (>256 steps), incremental gain (x0.0025 to x200), internal/external calibration, programmable overload threshold, and RS-232 interface for setup with supplied software. This unit can be used with all models of ICP[®] sensors for vibration, pressure, force, and strain measurement.

For detailed specifications, drawings or additional information, visit www.pcb.com.

Expanded line of Wideband Switches Offer High Isolation and High Frequency

Spectrum Microwave introduces their newly expanded line of switches now offering SPDT to SP5T designs with a wide bandwidth from 100 MHz to 22 GHz. These high performance switches feature an integral TTL driver and are available with fast switching speeds of better than 100 ns, high isolation of up to +95 dB and insertion loss as low as 0.8 dB.

Spectrum Microwave's high isolation, high frequency switches are constructed with gold wire and gold plated leads, which provides lower loss than other types of construction. These switches are fully customizable with up to 5 throws with continuous RF input power to +30 dBm, DC nominal voltage of +5.0/-12 Volts, VSWR of 1.5:1 and an operating temperature of -55°C to +85°C. The switches also feature an SMA connector housing with field removable connectors.

Spectrum Microwave's high isolation, high frequency switches are ideal for a wide range of applications including test equipment, radar, and demanding military programs.

Find more information at www.spectrummicrowave.com.

Alignpro[™] System for Real-Time Concentricity and Angularity Adjustment

Instron offers its enhanced AlignPRO system for real-time concentricity and angularity adjustment under load. AlignPRO effectively measures unwanted specimen bending, due to loadstring misalignment. This improves the accuracy of test data by ensuring the load string is correctly aligned before testing. The software and electronics are fully compatible with the existing AlignPRO fixture and strain-gauged specimens.

The AlignPRO system consists of an alignment fixture, a strain-gauged specimen, software and electronics. For increased testing flexibility, the new compact and portable electronics can be carried around the laboratory from machine to machine. Additionally, the system supports both eight and twelve gauge alignment cells.

Instron's AlignPRO software uses 'wizard' technology to guide the user through the alignment process ensuring quick and accurate alignment. The software monitors the output from strain gauges mounted on either flat or round alignment cells. These outputs are used to calculate bending due to angular and concentric alignment errors. For each of these components, the direction and magnitude of the bending is displayed both numerically and graphically.

Additionally, custom alignment cell definitions can be created and stored in a local specimen database. The software also features a comprehensive reporting tool. With a simple USB connection, the AlignPRO electronics do not require additional hardware cards or further interface ports to function.

For more information, visit www.instron.com.

Membership Notes

Jorge Fernández Daher

In this issue, we are going to explain the funding program we have been running for Chapters. We also include the updated list of Chapter Chairs and finally we welcome our new Senior Members.

The Chapter Development Funding Program is designed to encourage your chapter to promote and improve its value to your members. The Membership Development Committee of the I&M Administrative Committee offers support for your efforts in this endeavor with this program.

We have developed the following process to provide some consistency and structure for both the submission procedure and the review procedure. We want to encourage you to be creative. The ideas and examples we have included are to stimulate your thinking, not to limit what you can do.

Rules:

- Money must be used for the purpose of "membership development," that is, for the purpose of attracting new members, or improving the value and quality of membership of our current members.
- Events must be reasonably well-publicized, such that at least any I&M member and ideally any IEEE member, in your local area should be able to know about the event. Funds are not to be spent for private parties.
- Within one (1) month of the completion of your event, submit a report of how your event went, with any proposed results or metrics.

Ideas:

- Make a handout pamphlet to show who you are and what you do.

- Provide travel expenses for a guest speaker. (Note: there is also an “IEEE Distinguished Lecturer Program,” which is separate from this process.)
- Organize a local game or contest.
- Run a workshop.
- Arrange a forum or event to help people establish professional networks.
- Use your imagination. Make a request.

Maximum Amount of Funds for an Event

“Small Events” should be limited to \$500.

“Significant Value-Added Events” should be limited to \$1000.

“Basic Expenses,” such as additional local advertising, should be limited to \$200.

“Travel Expenses” should be limited to \$500.

“Events with Seed Money” (as discussed below), should be limited to \$1000 for “Medium-sized Events” and \$2000 for Significant Value-Added Events.

Seed Money for Revenue-Generating Events

We would like to encourage the development of events that can partially or fully fund themselves or generate revenue. We can provide additional “seed” money beyond the limits given above guidelines for events that have the potential to generate revenue. Seed money is defined as money that is planned for expenditures to support an activity that will generate revenue, such that some of this revenue can be applied towards a future purpose. Such future purposes must also meet the guidelines of this membership-development program.

A proposal for this future purpose must be submitted within nine (9) months of the completion of the original event. This proposal must be accompanied by the application found at http://www.ieee-ims.org/site/membership/chapter/Chapter_Funding_form_July2007.doc.

For a request for seed funding, please propose a budget that includes three scenarios: optimistic, realistic, and conservative financial income and expenditures. The conservative scenario should indicate a financial loss that is no greater than the funding guidelines listed for “Maximum Amount of Funds for an Event.” (Obviously, less loss than the maximum is preferred.)

As an example, for a “Significant Value-Added Event” that requires \$1500 in expenditures, the conservative plan should show no more than \$1000 loss, and \$500 to be generated for the future activity. If that same event generated \$1500 in revenue (i.e., the event “broke even”), then, \$1500 would be available for a future activity.

Chapter Chairs, March 2008:

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Panel Discussion for Graduate Students at I²MTC: A Success!

By Kristen Muñoz

The IEEE I&M Society strives to support all of its constituents and members including the student members of the Society. One way that the Society has initiated to interact with its student members is through the Panel Discussion for Graduate Students. The first Panel Discussion was held this year at the International Instrumentation and Measurement Technology Conference (I²MTC) in Victoria, B.C., Canada.

The sixteen graduate students who attended were from England, Canada, Belgium, Germany, Italy, and the United States. The panel presenters were Ms. Kristen Muñoz, Mr. Mohamed Abou-Khousa, Mr. Marco Faifer, and Mr. George Lecakes; four graduate students representing a diverse background. Also in attendance were Dr. Reza Zoughi, the Editor-in-Chief of the *Transactions on Instrumentation and Measurement*, and Dr. Ruth Dyer, an elected member of the Administrative Committee (AdCom) of the I&M Society and the Society's past Vice President for Membership.

Ms. Kristen Muñoz, the graduate student representative to the I&M AdCom, chaired the panel. She is a Ph.D. candidate in the Electrical and Computer Engineering Department at Missouri University of Science and Technology. Kristen discussed the benefits of attending conferences, in particular I²MTC.

Mr. Mohamed Abou-Khousa is a Ph.D. candidate in Electrical and Computer Engineer at Missouri University of Science and Technology. He also serves as a reviewer for the *IEEE Transactions on Instrumentation and Measurement* and *Transactions on Antennas and Propagation*. Mohamed spoke about publishing in IEEE journals and what a prospective author can do to help ensure publication of his or her paper. Following Mohamed's presentation, there was a discussion with the Editor-in-Chief of *Transactions on Instrumentation and Measurement*, Dr. Zoughi. Dr. Zoughi outlined the differences between a conference proceedings version and a special issue version of a paper. He also mentioned some differences among IEEE societies in handling special issues of their respective IEEE Transactions.

Mr. Marco Faifer is a Ph.D. candidate who attends Politecnico di Milano in Milan, Italy. He discussed career paths in both academia and industry from an Italian perspective. An interesting discussion followed Marco's presentation, including a comparison of similar career paths in the United States. Dr. Dyer contributed to the discussion by mentioning some of her experiences in this area.

Then, Mr. George Lecakes, spoke about interdisciplinary study. George was especially well-suited for this topic. He completed his undergraduate degree in Civil Engineering and is now pursuing a graduate degree in Electrical and Computer Engineering at Rowan University in New Jersey. In discussing his experiences in pursuing a graduate degree in a new field of study, George made the point "relate it to something you know". This advice is useful to all engineers to remember as we progress in our careers and find ourselves interacting with new people in new situations.

The Graduate Student Panel Discussion will be held next year at I²MTC 2009 in Singapore. Be sure to check the Student Activities section of the I&M Website, <http://www.ieee-ims.org/site/membership.php>, for information and updates. I would like to thank all of the students who attended the session and contributed to the discussions. I hope to see all of you next year at I²MTC 2009.

Instrumentation and Measurement Society 2007 Awards

Outstanding Young Engineer Award

The I&M Outstanding Young Engineer Award recognizes an outstanding young I&M member who has distinguished him or herself through achievements, which are technical, of exemplary service to the I&M Society, or a combination of both, early in their career. The nominee must not have reached their 39th birthday and must be an I&M member at the time of nomination. The 2007 Outstanding Young Engineer Award recipient is:

Sergio Rapuano

University of Sannio, Benevento, Italy

“For the development of a distributed measurement laboratory that can be remotely accessed by students over the Internet”

Sergio Rapuano (M’00) received the master’s degree (*cum laude*) in electronic engineering and a Ph.D. degree in computer science, telecommunications and applied electromagnetism from the University of Salerno, Italy. Since 2002 he has been with the Faculty of Engineering of the University of Sannio as Assistant Professor of Electric and Electronic Measurement. He is a member of the IEEE Instrumentation and Measurement Society TC-10, secretary of the TC-23 Education in Instrumentation and Measurement Working Group on e-tools and Co-Chairman/official reporter of TC-25 Medical and Biological Measurements Subcommittee on Objective Blood Pressure Measurement. His research interests include digital signal processing for measurement in telecommunications, data converter characterization, distributed measurement systems, virtual laboratories, and medical measurement.

Technical Award

The I&M Technical Award is given to an individual or group of individuals for outstanding contribution or leadership in advancing instrumentation design or measurement technique. The 2007 Technical Award recipient is:

John C. Eidson

Department Scientist, Agilent Technologies, Agilent Laboratories, Palo Alto, California, USA

“For outstanding leadership in developing the IEEE 1588 Standard for Precision Clock Synchronization Protocol for Networked Measurement and Control Systems”

John Eidson did his undergraduate and masters work at Michigan State University and earned his Ph. D. in Electrical Engineering at Stanford University. He is currently a Department Scientist with Agilent Technologies, Agilent Laboratories. He is a key contributor on architecture for distributed measurement systems and is responsible for promoting IEEE 1588 both within and external to Agilent. Dr. Eidson is Chair of IEEE 1588 Precise Networked Clock Synchronization Working Group of the IM/ST Committee for both the 2002 and 2008 edition of IEEE 1588. He

is a member of the Technical Committee for the LXI Consortium, was the co-chair for the 2003-2006 Conferences on IEEE 1588, the co-chair of ISPCS 2007 and is on the steering committee for ISPCS 2008. Dr. Eidson is a prolific author, with dozens of publications in journals, technical magazines, conference publications, technical reports, and a book entitled *Measurement, Control, and Communication Using IEEE 1588*. He is an IEEE Fellow and co-recipient of the 2007 Agilent Laboratories Barney Oliver Award for Innovation.

Distinguished Service Award

The I&M Society Distinguished Service Award is presented each year to an individual who has given outstanding service to the Society and to the profession.

The 2007 Distinguished Service Award recipient is:

Reza Zoughi

Missouri University of Science and Technology, Rolla, Missouri, USA

"For service to the Society as Transactions Editor-in-Chief, where he rapidly deployed our online Transactions editorial process and dedicated an incredible amount of time and energy to maintain our Transactions to the highest quality level"

Reza Zoughi joined the Department of Electrical and Computer Engineering at the Missouri University of Science and Technology, formerly the University of Missouri-Rolla, as the *Schlumberger Distinguished Professor* in 2001. He received his B.S.E.E, M.S.E.E, and Ph.D. degrees in electrical engineering from the University of Kansas. His current areas of research include developing new nondestructive techniques (NDT) for microwave and millimeter wave inspection and testing of materials, developing new electromagnetic probes and sensors to measure characteristic properties of material at microwave frequencies and developing embedded modulated scattering techniques for NDT for complex composite structures. He has published 95 journal papers, over 217 conference presentations and proceedings, and 80 technical reports in the fields of radar remote sensing and microwave nondestructive evaluation. He is also the author of a graduate textbook entitled "*Microwave Nondestructive Testing and Evaluation Principles*", and the co-author with A. Bahr, and N. Qaddoumi of a chapter on Microwave Techniques in an undergraduate introductory textbook entitled "*Nondestructive Evaluation: Theory, Techniques, and Applications*".

He is a Fellow of the IEEE and a Fellow of the American Society for Nondestructive Testing (ASNT). He is the Editor-in-Chief of the *IEEE Transactions on Instrumentation and Measurement*.

Career Excellence Award

The I&M Society Career Excellence Award is awarded to recognize a lifetime career of meritorious achievement and outstanding technical contribution by an individual in the field of instrumentation and measurement.

The 2007 Career Excellence Award recipient is:

Milton G. Slade

Retired, Concord, Massachusetts, USA

"For a lifelong career in automated test and measurement and over 15 years of volunteer service to the Instrumentation and Measurement Society"

Milton Slade retired from GTE Government Systems after 15 years of program management responsibility for automatic test programs, group support equipment, and a military telephone message switch. Earlier he was active in the development of automatic support equipment at Sanders Associates and systems engineering and management of communications, radar systems, and automatic test equipment at RCA. He conducted research in guided missile telemetry at MIT Research Laboratory of Electronics and flight planning and analysis of variable incidence hydrofoil control systems at the MIT Flight Control Laboratory. He is a 1948 graduate of MIT with an SB in EE.

His contributions to the I&M Society are manifold and include service as Vice President and President of the Society, 15 years as a member of the Technical Committee on Automated Instrumentation, 10 years on the AUTOTESTCON Board of Directors, member and Chairman of the IMTC Board of Directors, member of the Editorial Board of the I&M Magazine, Editor-in-Chief of the I&M Transactions, and Editor of the I&M Newsletter. Mr. Slade is a Life Fellow and a recipient of the IEEE AUTOTESTCON Frank McGinnis Professional Achievement Award.

TC News

Rich Hochberg and Steve Adam

Technical Committee Reports for Spring 2008 And Standards Activities

I have really enjoyed working with the members of the Technical Committees these past few years, but sad to say my tenure in this position is coming to an end. A new Vice President for Technical Activities will be elected for 2009 and this is my last submission in this fine magazine. Dr. Steve Adam assisted in getting a new PARs going in the Standards arena, with their potential to become IEEE Standards in many important areas. Steve's contributions were greatly appreciated by all of us who had contact with him.

These and other TC activities were reported at our last IMS AdCom meeting in Victoria, BC, after the I²MTC meeting. Highlights of the reports follow: (some had to be edited to meet space limitations in the magazine).

Rich

TC-1 Measurement Precision, Sensitivity and Noise: by Norman Belecki

- The following activities were undertaken this past quarter:
 - Began an outline for a resource bibliography on noise analysis at the limits of measurement precision in the various areas of electromagnetic metrology.
 - Reviewed about 330 papers submitted to CPEM 2008 for content relating to the purview of TC-1. Thirteen summaries were directly related and another 50 or so have relevant content. In addition reviewing the resulting I&M Transactions papers and to adding them (as appropriate) to the resource document, I plan to solicit their authors to join TC-1, either at the conference or later.

TC-2 DC-LF Measurement: by Yicheng Wang

- TC-2 has successfully helped organizing tutorials on quantum-based electrical standards for I2TMC 2008. This is part of TC-2 effort to collect feedback and ideas to guide future TC-2 activities.

TC-3 Frequency and Time: by Eva Ferre-Pikal

- During the past year the TC-3 has been updating IEEE Std 1139 ‘Standard Definitions of Physical Quantities for Fundamental Frequency and Time Metrology - Random Instabilities’. We have finished the review process and plan to submit the draft standard to the IEEE for balloting by the end of April 2008.

TC-4 High Frequency Measurement: by Yeou-Song (Brian) Lee

- Continue close reports with the MTT-11, NCSLI, MSC, and ARFTG
- Working group on the scattering parameter measurement standards to the IEEE standards association formed. PAR378 was re-submitted for June Standards Association meeting after the issues from the March meeting were resolved.
- PAR 470 working group for microwave and RF power measurement was initiated and members are contacted.
- Future Plans:
 - Continue recruiting members to join this committee.
 - Liaison with other professional societies in the high frequency measurement
 - Upon approval of PAR378, the working group is expecting to submit the draft in late 2008.
 - Submit PAR 470 and form a working group.

TC-9 Sensor Technology: by Kang Lee

- The Technical Committee on Sensor Technology TC-9 sponsored the following working group (WG) activities in standards development:
- IEEE 1451.0 - Common Functionality and TEDS Working Group
 - The IEEE 1451.0-2007 standard is published.
- IEEE 1451.5 - Wireless Sensor Working Group
 - The IEEE 1451.5-2007 standard is published.
- IEEE 1451.7 – Sensor and RFID Integration Working Group
 - The working group conducted biweekly teleconference calls developing draft specifications of IEEE 1451.7 Standard for Transducers to Radio Frequency Identification (RFID) Systems Communication Protocols and Transducer Electronic Data Sheet Formats
- IEEE 1588 - Precise Networked Clock Synchronization Working Group

- The IEEE 1588-2008 standard was approved by the IEEE Standards Board. Kang has worked with IEEE to put the draft up for sale at the IEEE website because of industry demand
- Participated in the ISO/IEC/JTC1/SC31/WG4 meetings on air interface standards for RFID. The air interfaces involved were ISO 18000-6 standard for Passive and Battery-assisted RFID and ISO 18000-7 standard for Active RFID. These standards will in some way link with the IEEE 1451.7 standard for sensor interface.
- Kang made a presentation “IEEE 1451 Smart Sensor and Network Standards” at the SC31/WG6 Subcommittee on mobile item identification management. Kang is working with IEEE to fast track the IEEE 1451 standards to the JCT1/SC31 committee.
- 2007 ISPCS Symposium
 - The 2007 International IEEE Symposium on Precision Clock Synchronization (ISPCS) for Measurement, Control, and Communication was held on Oct 1-3 in Vienna, Austria. Kang was the technical program co-chair. About 150 people attended the symposium and 50 people participated in the Plugfest to test IEEE 1588 standards-based prototype hardware and software for interoperability. See web site: <http://www.ispcs.org>.
- 2008 ISPCS Symposium
 - The 2008 International IEEE Symposium on Precision Clock Synchronization (ISPCS) for Measurement, Control, and Communication is being planned to be held on September 22-26, 2008 at the University of Michigan in Ann Arbor, Michigan. Kang is the General Program Co-Chair. Teleconference calls have been held monthly for the organizing committee to plan for the Symposium.. See web site: <http://www.ispcs.org>.
- Planned activities for the next six months:
 - The IEEE 1451.7 Working Group will continue the development of the draft specification for the sensor to RFID tag interface standard.
 - The IEEE 1588 Working Group is working with the IEEE Editor in preparing the approved IEEE 1588-2008 draft standard for publication.
 - Continue to work with the University of Michigan to hold the 2008 International IEEE Symposium on Precision Clock Synchronization for Measurement, Control, and Communication in Ann Arbor, Michigan.

TC-10 Waveform Generation, Measurement, and Analysis: by Thomas Linnenbrink

- TC-10 is actively developing five major standards: The revision of IEEE Std 181-2003 (Standard on Transitions, Pulses, and Related Waveforms); the revision of IEEE Std 1057-1994 (Standard for Digitizing Waveform Recorders); the revision of IEEE Std 1241-2000 (Standard for Terminology and Test Methods for Analog-to-Digital Converters); the development of IEEE Std P1658 (Standard for Terminology and Test Methods for Digital-to-Analog Converter Devices; and, the development of IEEE Std P1696 (Standard for Terminology and Test Methods for Electronic Probes). The committee members reviewed work in progress on 1057, 1241, 1658, and 1696 at our February 2008 meeting in Colorado Springs sponsored by Hittite Microwave. Plans were made to start revising 181 and to coordinate it with the IEC. A new standard addressing jitter was discussed. The committee also agreed to submit a TC-10 overview paper to the 16th IMEKO TC4 Symposium/13th Workshop on ADC Modeling and Testing in Florence, IT, September 22 - 24, 2008. The next TC-10 meeting will be held on May 19

- 22 in Beaverton, OR, hosted by Tektronix. The Fall 2008 meeting will be held in Florence, IT in conjunction with the symposium and workshop noted above. At this time, nearly one third of the TC-10 membership lives in Europe.

- Specific activities of the five subcommittees are described below.
- Subcommittee on Pulse Techniques (SCOPT) (181) (Nick Paulter, Chair):
 - The SCOPT chairman submitted a Project Authorization Request to the IEEE on 7 March 2008 for revising the Std 181-2003. Revisions will include correcting errors, adding information on impulse-like waveforms and, developing reference waveforms for comparison and evaluation of algorithm performance. The chairman is hoping to coordinate this revision process with that of similar IEC documents, namely, the IEC 60469-1 and -2. Nick Paulter, the SCOPT chairman, is also the convener of IEC MT 18 of its TC-85 which is responsible for these two IEC standards.
- Waveform Measurement Subcommittee (1057) (Bill Boyer, Chair):
 - The Waveform Recorder Subcommittee of TC-10 has completed work on an updated version of IEEE Standard 1057 on testing waveform recorders. The third and final recirculation ballot was completed last fall with 100 per cent approval. The draft was approved by RevCom at their December 2007 meeting. We also had to request that the PAR be amended so that the Scope and Purpose statements in the PAR were identical to the one in the draft. The PAR change request was approved by NESCom in November 2007. We have completed working with the IEEE editors to produce the final version to be published. A working group meeting was held in February in Colorado Springs to review the editing changes. The official publication is scheduled for April 18, 2008.
- ADC Subcommittee (1241) (Steve Tilden, Chair):
 - The committee continued aggressive editing and re-writing the maintenance draft update at its February 2008 meeting in Colorado Springs, Colorado and. It will meet again in May in Beaverton, Oregon where further progress will be made on the draft. The committee also participates in IMTC quite widely and ADC Forum conferences. Further publication is planned for future conferences and publications as well as the next ADC Forum to spread the word about the standard and solicit input from non-members. This committee is also trying to increase its working membership to speed the process. The deadline for ballot completion and approval for this maintenance cycle is Dec 31 2009.
- DAC Subcommittee (P1658) (Steve Tilden, Chair):
 - The committee made significant progress towards creating the initial draft at its February meeting in Colorado Springs. It will meet again in May in Beaverton, Oregon to continue that work toward creating an initial draft for ballot before the PAR deadline. This committee is also aggressively recruiting new working members to gain momentum toward draft completion. On 27 March the IEEE NESCom approved our request for a PAR extension (Attached) from 31 Dec 2008 to 31 Dec 2010 which will allow us to complete the draft and ballot without compromising on depth of coverage or details.
- Subcommittee on Probe Standards (SCOPS) (P1696) (Robert Graham, Chair):
 - The draft standard is beginning to take shape. An draft outline has been generated, and is being updated as the standard progresses. SCOPS has been meeting

regularly, both in-person at the regular TC-10 meetings and by teleconference. Assignments have been made to committee members to write specific sections. The entire subcommittee then reviews the material. Our next teleconference is scheduled for Wednesday, April 23rd. Our next in-person meeting will be on Thursday, May 22nd, in Beaverton, OR.

TC-11 SCC-20 Coordinators: by Joe Stanco

- This report is an update of the progress being made in the incorporation of ATML which define a collection of XML-based schemas that allows ATE and test information to be exchanged in a common format adhering to the XML standards in a number of IEEE SCC20 standards. The SCC20 is the standards organization through which the ATML components will be published.
- In addition, the Hardware Interfaces (HI), Diagnostic and Maintenance Control (DMC), Test Description (TAD) and Test Information Integration (TII) subcommittees will meet in St. Louis, MO on April 22nd through the 24th 2008. The following gives a status of the various standards with ATML components.
 - ATML Overview and Architecture IEEE Std 1671-2006 Published December 2006
 - IEEE P1636.1 (Test Results) Trial-Use Standard, published
 - IEEE P1671.3 (UUT Description) Trial-Use, published
 - IEEE P1671.4 (Test Configuration) Trial-Use, being published
 - IEEE P1671.5 (Test Adapter) Trial-Use Standard, formal ballot process
 - IEEE P1671.6 (Test Station) Trial-Use Standard, formal ballot process
 - IEEE P1671.2 (Instrument Description) Trial-Use, formal ballot process
 - IEEE P1671.1 (Test Description) Trial-Use Standard, invitation for ballot.
 - Diagnostics (AI-ESTATE - 1232), Signal Description (STD - 1641), Signal Description (STD - 1641), Maintenance Action Information (MAI - P1636.2) have component candidate schemas.
- The Diagnostic and Maintenance Control (DMC) subcommittee's Standard for Software Interface for Maintenance Information Collection and Analysis IEEE P 1636 (SIMICA), invitation for ballot.

TC-17 Materials in Measurements: by Jacob Scharcanski

- The discussions following the creation of a new group of international members within TC-17, last September, led to the proposition of a 'Workshop on Modeling in Measurements'. Since this is the first meeting of the kind, we expect to have invited speakers, and other contributors interested in this research area. This Workshop has been proposed as a two-days meeting in Rio de Janeiro (Brazil), in October 2009. At that time, there will be other IEEE sponsored meetings in Rio (IEEE MMSP 09 and SIBGRAPI 09). After the meeting, we plan to report on the Workshop achievements in a Special Section in the IEEE Transactions on I & M.
- All members of the IEEE IMS are most welcome to join the group, and also are invited to provide their input(s)/suggestion(s) by e-mailing: Gladimir Baranoski, gvgbaran@curumin.math.uwaterloo.ca or Jacob Scharcanski, [<jacobs@inf.ufrgs.br>](mailto:jacobs@inf.ufrgs.br).

TC-19 Imaging Measurements: by George Giakos

- The TC 19 Technical Committee on "Imaging Systems" has been involved into the following activities:
 - Assisted in the reviewing of journal papers for the Transactions

- Assisted in the reviewing of Proceeding papers for the IMTC 2008
- Organized two Special Sessions for the IMTC 2008, entitled “Imaging Systems and Techniques”.
 - Involved with the organizing of the IEEE International Workshop on Imaging Systems and Techniques 2008 (IST 2008) that will take place in Chania, Island of Crete, Greece. The IEEE IST 2008 International Workshop deals with the design, development, evaluation and applications of imaging systems, instrumentation, and measuring techniques

TC-20 Transportation Systems: by Frans C.A. Groen and Georg Brasseur

- The Committee is promoting:
 - basic research on I & M in transportation systems
 - sensor data processing, interpretation and fusion in intelligent transportation systems
 - I & M in alternative energies vehicles and driver assist systems.
 - Incorporating instrumentation, measurement and sensor data interpretation in curricula for automotive and transportation systems
- The work on establishing a new Master of Engineering study at TU-Graz called “Automotive Software and Electronics” with a new chair plus department called "Embedded Automotive Systems" is finished. The Master study will started in the fall term 2007. Our attempt is totally in compliance with the view of “Transportation Systems”.
- Contributed to the organization, in collaboration with TC-15 Virtual Systems, TC-27 Human-Computer Interfaces and Interaction, TC-28 I & M for Robotics and Automation and TC-30 Security and Contraband Detection, of the *ROSE 2007 - IEEE International Workshop on Robotic and Sensors Environments*, Ottawa, ON, Canada, 12-13 October 2008.
- Ongoing activities include:
 - Organization of a tutorial on “Different measurement issues and how they are solved in transportation systems” at IMTC2008
 - Supporting Okyay Kaynak, and Emil Petriu as a member of the Technical Program Committee of VECIMS 2008-International Conference on Virtual Environments, Human-Computer Interfaces, and Measurement Systems, to be held in Istanbul, Turkey, 14-16 July, 2008

TC-21 Built in Test (BIT): by Robert Gao and Dennis Hecht

- Starting a new project with the National Institute of Standards and Technology on bearing wear monitoring for designing a smart spindle with self-diagnosis and prognosis capability.
- Starting a new collaborative project sponsored by the National Science Foundation on cyber-enabled reconfigurable manufacturing enterprise.
- Continued activities of the NDIA Integrated Diagnostic Committee, including follow-on work in the area of Electronic Prognostic, for which workshops were held in previous years. Report and Information Briefings have been completed on maintenance database analysis. Specific outcomes include:
 - Results briefing has been provided, with quantified diagnostic benefits and a selected candidate system.
 - Data analysis has been started.

- Expected benefits include reduced false alarm removals of 40% and improved availability of 25% .
- The NDIA Integrated Diagnostic Committee has recently been tasked to help stream-line the process by which new technologies, especially in the diagnostic realm, find their way into the design of new/modified weapon systems in a more expeditious manner.
- For the next reporting period, the Committee plans to engage in the following activities:
 - Play a more active role in promoting the Vehicle Health Management Initiative
 - Hold joint meeting with Automatic Test Committee to develop standardize sharing of diagnostic data with ATE
 - Expand research to include human physical activity measurement through the integration of sensor suites, embedded firmware, and wireless communication.

TC-22 Intelligent Measurement Systems: by Cesare Alippi and Mel Siegel

- The Committee is promoting:
 - basic research on computational intelligence (soft computing and composite technologies) in I & M systems and their applications;
 - research on intelligent distributed sensing networks based on soft-computing components;
 - research on computational intelligence methodologies and techniques for adapting processing systems;
 - the use of computational intelligence technologies in I & M for intelligent manufacturing applications, homeland protection and personal safety.
- The Committee is organising and coordinating
 - 2008 IEEE International Conference on Computational Intelligence for Measurement Systems and Applications (CIMSA), July 14-16, 2008, Istanbul, Turkey sponsored by the IEEE IMS and the IEEE Neural Networks Society. The committee is also collaborating in the organization of the co-located IEEE International Conference on Virtual Environments, Human-Computer Interfaces and Measurement Systems (VECIMS) 14-16 July, 2008.
 - TC-22 has provided the technical cooperation to the special session: Energy Harvesting and Management: towards credible deployments in wireless sensor networks and systems, IMTC 2008, to promote the use of intelligent techniques in the field of energy harvesting and WSNs.

TC-23 Education for Instrumentation and Measurements: by Theodore Laopoulos

- This report is an update of the progress being made in the incorporation of ATML which define a collection of XML-based schemas that allows ATE and test information to be exchanged in a common format adhering to the XML standards in a number of IEEE SCC20 standards. The SCC20 is the standards organization through which the ATML components will be published.
- In addition, the Hardware Interfaces (HI), Diagnostic and Maintenance Control (DMC), Test Description (TAD) and Test Information Integration (TII) subcommittees will meet in St. Louis, MO on April 22nd through the 24th 2008. The following gives a status of the various standards with ATML components.
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- The Diagnostic and Maintenance Control (DMC) subcommittee's Standard for Software Interface for Maintenance Information Collection and Analysis IEEE P 1636 (SIMICA), invitation for ballot.

TC-25 Medical and Biological Measurements: by Marco Parvis

- The TC is organizing the third edition of MEMEA (MEMEA-2008 in Ottawa) with a good success, 39 submissions, and 29 accepted papers. The previous MeMeA workshop closed with a remarkable surplus of more than 100%.
- In the meantime, the TC subcommittee on Blood Pressure Measurement (Dr. Voicu Groza) is working on a PAR, which has been approved on 27 Mar 2008 by IEEE-SA Standards Board. The project name is "Standard for Objective Measurement of Systemic Arterial Blood Pressure in Humans". The project has been approved till 31 Dec 2012.

TC-26 Radar Cross-Section Measurements: by Mark Yeary

- Committee Focus Areas of Research:
 - Digital Radar Receiver Design and Deployment
 - Innovative Algorithm Development for Severe Weather Detection and Warning
 - Hardware Development and Upgrades for Radar Systems
- Specific Committee Activities:
 - Service on the Technical Program Committee (TPC) for I²MTC 2008
 - Service as a Session Chair at for I²MTC 2008
 - Reviewing papers for the I&M Transactions
 - Continued interactions with the National Severe Storms Laboratory
 - On a teamwork basis, preparing for a workshop
 - Working with NASA to measure and characterize airborne hazards
 - Working to promote the national Multi-Function Phased Array Radar (MPAR) and Automation, of the ROSE 2008 - IEEE International Workshop on Robotic and initiative. This is in collaboration with NOAA, ONR, Lockheed-Martin, and the FAA.

TC-31 I&M for Homeland Security: by Kang Lee and Brian Wadell.

- Activities in the last six months:
 - Sensor Standards Harmonization meetings: Kang Lee organized and conducted two Sensor Standards Harmonization working group meetings on Oct 16, 2007 and April 30, 2008 respectively, at NIST. The meetings aimed to coordinate sensor-related standards activities in industry and government in support of DHS Standard Office for their interest in sensor standards and interoperability.
 - Participated in the 9th Annual Technologies for Critical Incident Preparedness Conference and Expo 2007: Kang Lee participated in the Technologies for Critical

Incident Preparedness Conference and interacted with the people implementing technologies to protect the nation from terrorist attacks. He helped to promote the IEEE smart and wireless sensor standards to these technology implementers and users.

- The next Sensor Standards Harmonization meeting is planned to be held on August 12, 2008 at NIST. Interested party can contact Kang at kang.lee@nist.gov.

TC-32 Fault Tolerant Measurement Systems: by Nohpill Park and Serge Demidenko

1. The special session on "Design, Manufacturing and Test of Reliable System-on-Chip (SoC) and System-in-Package (SiP) for the forthcoming I2MTC 2008 has been proposed and developed. The session description is available on the web - http://imtc.ieee-ims.org/imtc_2008.php
2. Session on Dependable Sensors was organized at the 2nd International Conference on Sensing Technology, November 26-28, 2007, Palmerston North, New Zealand.
3. The extended versions of the papers presented at the session on Dependable Sensors as well as some of the selected papers from the International Conference Sensing Technology in the special issue of the International Journal of Intelligent Systems Technologies and Applications (IJISTA) - the call for papers has been released in March 2008.
4. Discussions were held with the organizers of the 2009 IEEE Sensors Conference on organizing a Special Session on Fault Tolerant and Dependable Sensing Technology within the program of the Conference (October 2009). The preliminary results of the discussion are positive.

TC-33 Characterization of Electrical HF and Optical Nonlinear Components: by Marc Vanden Bossche and Yves Rolain

- Co-organization of a series of special sessions at IMTC07 entitled: 'advances in microwave measurements. We had 3 sessions in Warsaw, and the attendance level was normal when compared to the other sessions. The attendance was even good for even for the last session that was held in the afternoon of the last day of the conference. We are repeating it in 08 in Canada, for the third year on a row. I think that if we can continue at this pace, we can contribute to more RF and microwave measurement activity in I & M.
- Joint organization of a TC-33 Target Network of Excellence workshop at the EUMC2007 conference held in Munich. This is really the core business of TC-33. We are trying to get people together to obtain a traceable phase standard that can be shared by more than one National Metrology Institution. We were happy to bring NIST, NPL and PTB around the table, and there was an interest to try to set the first steps in the direction of an international comparison for phase measurements. As also major industry players as Agilent and R&S have shown interest and are willing to participate, we will continue this effort.
- Liaison function to the MTT-11 TC on microwave measurements. We also try to keep a strong link with MTT-11 the measurement TC of MTT. I think that this goes quite well, and it allows us to match the activities, so that there is no overlap and that we are promoting microwave measurements in a similar way.

TC-36 Industrial Inspection by Zheng Liu and David Forsyth

- Dr. Pradeep Ramuhalli (<http://www.egr.msu.edu/ndel/members/current/ramuhalli>) from Michigan State University will join our TC.

- The other thing is a survey on standards of nondestructive inspection data is being planned. We want to get the responses from industries on a plan for data format standards for nondestructive inspection.

TC-37 Measurements for Networking by Claudio Narduzzi and Abdulmotaleb El Saddik

- The TC encouraged participation in I2MTC 2008 by disseminating information on the conference and promoting the organization of a special session on measurement and networking at I2MTC2008. From conference submissions over ten papers were short listed for the special session; the composition has now been finalized with four papers.
- TC-37 was also a co-sponsor of the IEEE Workshop on Haptic Audio Visual Environments (HAVE 2007) held in Ottawa, Ontario, Canada, 12-14 October 2007 and is now planning to sponsor HAVE 2008 too.

TC-38 Space Measurements by John. Schmalzel

- Sponsored a "IEEE 1451.1 Plug Fest" at the 2008 IEEE Sensors Applications Symposium in Atlanta, GA. Event was run by Dr. Deniz Gurkan, Univ. of Houston. Participants included Mobitrum, NASA Stennis Space Center (SSC), Rowan University, and included a sensor from NASA Kennedy Space Center. This was an opportunity to demonstrate plug and play capabilities of .1 sensors that adhered to an on-the-wire format updated by SSC.
 - Co-sponsoring with TC-9, updates to IEEE 1451.1 to included on-the-wire descriptions and definitions of health electronic data sheets (HEDS).
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