The IEEE Instrumentation & Measurement Magazine
December 2009 issue

A Novel Network to Monitor Earthquakes

From the Editor's Bench

Shlomo Engelberg

Modular Design

For many years now, there has been a move toward modular design. Modular equipment is often cheaper to maintain. If you need to only test ten modules to determine why a piece of equipment is not working, you can save a lot of money on fault analysis. If repairing the piece of equipment means throwing out the bad module and slotting in its replacement, you can save a lot of money on repairs too. Though you may decry the waste of all the good parts still left in the broken module, you are likely to feel that overall modularity has served you well.

As with most successful ideas, modularity has gained adherents who would like to see it applied in contexts that are very different from those in which it was first used. It seems that many universities are trying to make programs of study and courses more modular. Often this is to cut costs but it can harm the students.

Let us consider taking a single course and "modularizing" it. Taking a course that has a lecture component and a recitation component and modularizing by separating the lecture and the recitation components seems reasonable. Why not treat the lecture as one module and the recitation as a second module? This allows us to cut costs by using a senior faculty member to lecture and a more junior faculty member or a graduate student to take care of the recitation. What could be more effective?

The problem with this arrangement is that unless the lecturer is phenomenally organized and unless he believes in always covering all the material he has set out to cover—whether or not the students' eyes have all glazed over—there will be times when he does not manage to cover the material he thought he would. The modular recitation, as a module, no longer fits the "slot" created by the lecture. In order to take care of this problem, the lecturer must communicate with the recitation instructor in a timely fashion, and the recitation instructor has to prepare a (somewhat) different recitation. When the lecturer gives the recitation, the material covered in the recitation is more easily changed, and the recitations are generally better matches for the lectures.

The design of an issue of this magazine is also modular. In order to make it possible to work on each article as it comes in, it is necessary that each article be a separate module. Each issue of this magazine has a theme. If we could organize things so that all of the authors spoke to one another, the themes would probably be clearer. As things are, modularity allows us to get out the magazine in an organized and timely fashion. Sometimes, modularity extracts a price by blurring the magazine's focus a bit.

This month we present many fine modules – articles and columns. We have articles about a novel method of earthquake monitoring, the last of the series of articles about the history of the National Institutes of Standards and Technology (NIST), a piece describing some of the instruments of days gone by, and an article that discusses spread spectrum techniques in wireless communications. As always, we have our columns too. Enjoy the issue!

Shlomo

President's Perspectives

Alessandro Ferrero

Farewell

This is my last column as President of the IEEE I&M Society. My term expires on December 31st. The time has come to look back at these last two years and bid you all goodbye. These years have not been easy but sailing the Society through the crisis – and hopefully out of it – has been a challenge and a great opportunity to reconsider and renovate our activities.

Very often, large professional associations oppose changes. Especially when business is running smoothly, they tend to follow the usual routine, taking the risk of slowly losing contact with the ever changing needs of their membership. Only external, dramatic events, such as a global financial crisis, break this routine and force us to reconsider the way we are conducting our business. Under this perspective, the recent crisis has represented a challenging opportunity for our Society to start renovating the services offered to its Membership.

During the last two years we have cleared the huge backlog of papers waiting to be published in the TRANSACTIONS ON INSTRUMENTATION & MEASUREMENT, we have increased the number of yearly issues from 6 to 12 and we have significantly increased the number of published papers. The scientific community has clearly appreciated these changes, since the journal impact factor has increased in two years from 0.572 to 0.978, showing the largest relative increment among our closest competitor journals.

We have expanded the services offered to our Membership, paying great attention to Student and GOLD Members. We have started the International Measurement University (IMU), a summer school devoted to Ph.D. students and young engineers who want to deepen their knowledge in the I&M field, and we have started our web tutorial program, offered for free to our Student Members. We have strengthened our award program for best student papers, and we have started and sponsored the I&M Hardware Design Competition. We have encouraged new I&M Chapters, and we have taken an active part in the IEEE Second Life project by developing our own villa in Second Life.

We have initiated a careful revision of the editorial plans of this Magazine to make it more attractive and informative to our Membership and more profitable to the Society. It is too early to say whether these initiatives are meeting the expectations of our Membership. For sure, they have required the hard work of many dedicated people. I was really lucky during these last two years because I could rely on a wonderful team of friends who helped me refine the strategic plans and turn them into real, ongoing initiatives.

I wish to thank many people, including all of the Vice Presidents and Committee Chairs, the Editors-in-Chief; Reza Zoughi of the TRANSACTIONS ON INSTRUMENTATION & MEASUREMENT

and Shlomo Engelberg of the *Instrumentation & Measurement Magazine* for their hard work and their invaluable contribution of new ideas and critical comments. I wish to thank the Members of the Society's Administrative Committee for their constant presence at the AdCom meetings and in the Society's management, and also the Student Representatives for their contributions in steering and supporting all student initiatives. Let me conclude with a special thank you to Judy Scharmann, the Society's Executive Assistant, for her invaluable help in keeping under control the nearly infinite issues that land on the President's desk almost every day. I would have been lost without her patience and dedication. A special thank you also to June Sudduth, the Magazine's Assistant to the Editor for having revised my columns and translated them into readable English. Thank you all for your patience in reading these columns. I hope I didn't bore you too much. Ciao!

Alessandro

Article Summaries

A Novel Strong-Motion Seismic Network for Community Participation in Earthquake Monitoring

(Summary)

Elizabeth Cochran, Jesse Lawrence, Carl Christensen, and Angela Chung

In this paper, the authors describe a new, inexpensive initiative to augment seismic networks quickly by using Micro-Electro-Mechanical Systems (MEMS) accelerometers and distributed computing techniques called the Quake-Catcher Network (QCN). Its use is expanding rapidly and increases the density of ground motion observations. The network of volunteers who participate, the location of sensors in the system, detection and analysis of triggers from megadata, tagging with accurate time, and the MEMS accelerometer sensors in use are described.

This summary includes text from the article.

Bridges I Have Crossed

(Summary)

Thomas B. Greenslade, Jr.

The construction of high-precision electrical measurements was raised to an art in the United States in the late 19th and early 20th centuries by companies such as Leeds & Northrup (L&N) of Philadelphia and General Radio of Cambridge, Massachusetts. Several pieces of apparatus based on bridge circuits from the author's own collection are presented and illustrated, highlighting specifically the development of early Wheatstone bridges.

This summary includes text from the article.

Spread Spectrum Techniques in Wireless Communication (Part 1)

(Summary)

Miguel Pereira, Octavian Postalache, and Pedro Girao

Spread spectrum communication techniques including in-time and frequency domains for direct sequence, frequency hopping, and time hopping are currently used in a large number of wireless applications. This article provides an overview of these techniques. Results of laboratory tests of a ZigBee network are presented, and experimental results are compared with theoretical expectations. In the next issue, Part 2 of this paper will present an application developed for a wireless distributed measurement sensing and actuating system for water quality assessment.

This summary includes text from the article.

Fourth in a Series: The National Bureau of Standards Comes of Age under Samuel Stratton

(Summary)

James F. Schooley, Sr.

This fourth and final part of an essay on the founding and early years of the National Bureau of Standards (NBS), now known as the National Institute of Standards and Technology (NIST), describes the progress of NBS to a surprisingly mature agency of the Federal government under the sure hand of Samuel W. Stratton. This survey specifically covers the years 1904-1922, ending with Stratton's retirement as NBS director. During this time, Stratton continued to add capable scientists to his staff and attack an ever-wider range of technical problems. In doing so, he secured a place for the Bureau as the principal source for science-based measurement standards in the U.S. In addition to its standardization activities, NBS contributed heavily to military research and development during World War I and to America's transition to postwar technical work.

This summary includes text from the article.

Erratum

Erratum: In the October 2009 issue of the *I&M Magazine*, we set the title for Tutorial 21 incorrectly on page 35. We apologize for this error. The correct title is included here. -- Allen Press, Inc.

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

Part 21 in a series of tutorials in instrumentation and measurement

Ruqiang Yan and Robert X. Gao

Column Summaries

Instrumentation Notes

(Summary)

Bruno Ando and Salvatore Graziani

Plasticland: Where a New World Comes True

Interest in electroactive polymers continues to grow with investigation of ionic polymer metal composites during the last two decades. The deformations produced in these materials as a reaction to a signal of just a few volts shows great promise for their use in instruments. New materials have been developed during the study of these polymers and researchers will continue to bring new devices to the industrial community. The prototypes explained in this article show the viability of this technology.

This summary includes text from the column.

Instrumentation Notes

(Summary)

Benjamin Cohen, Shlomo Engelberg, and Eliezer Yucht

Designing a Secure Data-Logger

In this article, the authors describe the process of developing a prototype voice-recording system that creates a cryptographic hash value for the audio data and then specifies the storage system used to encrypt the values associated with the set of measurements. The encryption system uses a private-key specific to the microcontroller circuitry, and the authors outline the challenges of real-time encoding and data storage.

This summary was written by Kristy Virostek.

By the Numbers

(Summary)

Stephen A. Dyer and Justin S. Dyer

Least-Squares Fitting of Data by Rational Functions: Levy's Method (Part 1)

In this installment, we provide a brief introduction to least-squares fitting of data by rational functions by presenting Levy's Method, a classical approach that is relatively straightforward in concept and easy to program, and which gives respectable results in a broad range of circumstances.

This summary includes text from the column.

Departments

New Products

Robert Goldberg

High-Voltage Differential Probes for Floating Signal Measurements

Agilent Technologies Inc. introduces new 25-MHz and 100-MHz, high-voltage differential probes. The N2790A and N2791A high-voltage differential probes allow conventional earth-grounded Agilent oscilloscopes to be used for floating signal measurements of up to 1,400V of differential voltage and 1,000 V of common-mode voltage. Thanks to its high bandwidth and excellent input-impedance characteristics, the probe can accurately measure up to 3.5ns of fast transient edges in modern switching power supplies.

The N2790A and N2791A differential probes offer user-selectable attenuation settings that make it highly versatile and allow it to be used for a broad range of applications. The probe comes with various probe tip accessories for use with small and large components in tight places. The N2790A also has an over-range indicator that alerts the user when the probe input exceeds the dynamic range of the probe.

Information about the Agilent N2790A and N2791A differential probes are available at www.agilent.com/find/N2790A.

New Message-Based DAQ (MBD) Protocol

Measurement Computing has released two new data acquisition products featuring a new O/S-independent protocol that allows DAQ devices to be programmed with simple text-based messages.

A new 7000 series product line, which includes the USB-7202 and USB-7204 boards, combines small form-factor, bus-powered USB hardware, and a light and agile software framework that can be ported to multiple operating systems. The software framework, a core technology to the series, is called Message-Based DAQ (MBD).

MBD is a well-defined protocol that permits the programming of DAQ devices using simple text-based messages. The MBD protocol greatly simplifies driver and application development: all DAQ operations are programmed through a common command interface, which is composed of a consistent, extensible firmware interface and an open-source, cross-platform API.
The firmware parses text-based messages transmitted through a device driver and converts these messages into DAQ-specific commands that control the device. This concise and well-documented interface allows driver development for multiple operating systems and also supports O/S-independent embedded systems that need to communicate only over a USB root port.

The USB-7202 features:
Eight analog input channels
16-bit resolution
100 kS/s max total throughput
Simultaneous sampling (1 A/D converter per input)
One 32-bit event counter
External digital trigger input
Eight digital I/O lines

The USB-7204 features:
Eight single-ended, or four differential, analog inputs
Two 12-bit analog outputs
12-bit (differential), 11-bit (single-ended)
Up to 50 kS/s sample rate
16 digital I/O lines

Find more information at www.mccdaq.com.

Ethernet Analog Output Units Provide 16 Channels of 16-Bit D/A

Acromag has released two new high-performance analog output units for their EtherStax® line of rugged Ethernet I/O. The high-density ES2171 and ES2172 models each provide 16 channels of process current or voltage output control signals with 16-bit D/A resolution. Each module accepts Modbus TCP/IP, UDP/IP, or i2o® peer-to-peer network inputs and provides high-resolution analog outputs to drive displays, indicators, chart recorders, positioners, or actuators.

Two base models support a variety of I/O ranges and options. The ES2171 outputs DC current signals in a 0-20mA or 4-20mA range. ES2172 units produce ±5V or ±10V DC signals. Output ranges are independently configurable on each channel. An internal loop-back circuit verifies the output levels. Using Acromag's i2o® peer-to-peer technology, ES217x units can function as an output target device for data sent directly from EtherStax analog input units. Both models have an option for 10/100Base-TX copper or 100Base-FX fiber-optic network media.

Numerous features help increase reliability, improve performance, and protect from harsh industrial environments. Dual network ports provide a redundant communication path for critical applications. Dual DC power terminals enable use of redundant power sources. A failsafe relay enables implementation of auto-failover designs or an alarm output on a power or link-loss failure. The compact, stackable aluminum enclosure resists 50g shock and 5g vibration making it ideal for mounting directly on machinery.

The stackable, high-density packaging enables installation of 48 analog outputs in an 8" x 7" footprint or 96 outputs across a 19" rack. This rugged box is ideal for mounting on DIN rails, walls, or on machinery. Plug-in terminal blocks offer easy installation and servicing.

EtherStax I/O is designed for high-reliability operation. Units feature 1500Vrms isolation with surge protection on all ports to increase performance and minimize downtime. Industrial-grade specs include extended -40 to 75°C operating temperatures for low power, high efficiency, fan-less designs.

For more information please visit www.acromag.com.

DME Test and Measurement Options for Aeronautical Radio Navigation Services

New options from Rohde & Schwarz enable manufacturers and operators of aeronautical radio navigation systems to test distance measurement equipment (DME) with far greater flexibility and precision. The high-end R&S SMA100A analog signal generator makes it possible for the first time to generate and analyze DME signals in both the lab and in mobile applications. It also allows users to check the receive and transmit unit of a DME ground station as well as the DME unit aboard an aircraft. The compact R&S EVS300 ILS/VOR analyzer has been enhanced to include the ability to analyze DME signals, which makes it ideal for mobile maintenance of

DME ground stations. Options for measurements on ILS and VOR services are already available for both instruments. As a result, users always have the right solution at their fingertips for checking the key functions of their systems in accordance with the specifications of the International Civil Aviation Organization (ICAO).

An aircraft uses DME to measure its slant distance to a ground station. To make this measurement, the aircraft's onboard radio unit (interrogator) transmits shaped RF double pulses to the ground station, which returns them after a defined delay (reply delay). Up to now, most of the parameters could be checked only with integrated test equipment. However, any fault in the equipment could lead to incorrect measurement results or even malfunctioning of the system. The use of external measuring equipment therefore increases air traffic safety.

For ATC authorities and for manufacturers of DME systems, Rohde & Schwarz provides a solution that can perform even more detailed measurements: When equipped with the R&S SMA-K26 option, the R&S SMA100A generates DME aircraft interrogator signals. It can also simulate a DME ground station including the squitter and identification pulses.

The DME options (R&S EVS-K6 for the R&S EVS300 and R&S SMA-K26 for the R&S SMA100A) are now available from Rohde & Schwarz.

The Rohde & Schwarz application note "Test of DME/TACAN Transponders" describes the operating principle of DME and its military version (TACAN), as well as various test scenarios for ground station maintenance. It can be downloaded from the Rohde & Schwarz website at http://www.rohde-schwarz.com/ad/dme/pr.

Digital Radio Test Set Supports Wide Range of Available Analog and Digital Radio Technologies Worldwide

Aeroflex announces new software version 1.7.6.2 for the Aeroflex 3900 Series Digital Radio Test Set. Included in this release are a number of enhancements and support for the rapidly expanding digital land mobile radio test market across the globe.

According to Aeroflex, release 1.7.6.2, the 3900 Series supports the widest available range of tests for digital radio technologies including options for P25, TETRA, HPD®, NXDN™, MOTOTRBO™ (DMR), dPMR (ETSI 102-490) and Japan’s ARIB T98 standard as well as analog technologies. The software includes advanced test capabilities for a wide range of new features including off air monitor software for P25 message logging, enhanced SmartNet™/SmartZone™ trunking with analog voice channel handoff and a new audio tracking generator function for the audio analyzer to allow swept measurements and audio circuit response curves.

An improved DMR (MOTOTRBO™) system includes the addition of new transmitter patterns and advanced analysis functionality. The software updates also enable parametric measurements for the digital dPMR radio systems and digital test modes for NXDN™ radios and the Japanese ARIB T98 standard.

The Chinese User Interface was a joint development of Aeroflex’s operations in Beijing, Hong Kong and Shanghai and the development team in Wichita, KS.

Find more information at www.aeroflex.com.

Innovative Connector for the Test & Measurement Industry

Virginia Panel Corporation (VPC)'s newest connector solution, i1™, is ideal for small connector needs. Following the success of VPC's popular rack and panel connector, iCon™, i1 was developed to satisfy the need for an even smaller connector. The i1 holds a single iCon module in each connector, making it the perfect solution for low I/O applications. i1 has a 30 degree U-shaped cable clamp to provide strain relief and reduce height requirements. It offers a polarization feature to ensure correct alignment and captive hardware to prevent lost screws. Its half-turn quick cam ensures easy engagement of the ITA and receiver, guaranteeing 10,000 cycles. Optional keying and guide pin configurations protect contacts from damage when using multiple connectors, and contacts have been recessed for added pin protection. Rugged durability allows the i1 to withstand drop and vibration testing conditions. The removable backshell and engaging mechanism allow for easy access to wiring and pins. The i1will operate in temperatures from -55° C to 105° C.

For more information about i1, visit www.vpc.com/i1.

New Pressure Strain and Force Handbook™ Now Available

OMEGA's New Pressure, Strain, and Force Handbook™ contains over 1200 pages of products for the measurement, display and control of pressure, differential pressure, barometric pressure, absolute pressure and vacuum and new technical articles including Wireless Measurement of Pressure, Strain, and force parameters. Also included is a broad selection of products including pressure and vacuum switches, dial pressure gauges, load cells, force translators, rotary and static torque sensors, weighing hardware, strain gages, strain instrumentation, displacement sensors, and proximity sensors. Special sections cover accelerometers, dynamic pressure and force transducers, pneumatic valves, regulators, sanitary fittings, automation and temperature products.

For more information, go to www.omega.com/literature/pressure9/.

Hosted Software Provides Detailed Data for Safer Gas Detection

Industrial Scientific has introduced iNet Control as the first hosted software application for managing gas detector fleets. This service is included with every iNet subscription, providing visibility into alarms, maintenance and usage.

When alarm events happen, iNet Control shows which gas detectors had an alarm, when the alarms happened, and where they happened. It also tells what the gas hazards were and how much gas was present. This data can show users if employees are at risk from exposure to harmful gases. Equally important, it helps in identifying and monitoring high-risk areas.

Providing visibility into gas detector maintenance can help keep a program in top working order. iNet uses Industrial Scientific DS2 Docking Stations to automatically perform gas detector testing, calibration and bump testing. iNet Control provides assurance that these functions are performed as scheduled. Users also know when gas detectors were last calibrated; if a sensor is about to fail or expire; and when calibration gas is low, empty or expired.

Visibility into equipment usage helps eliminate operator mistakes that may compromise safety. iNet Control shows team leaders if any gas detectors were used without a bump test or calibration. It shows if any team member turned off their gas detector in alarm conditions. It also shows if any alarm settings or datalog intervals are not set correctly.

Users may view trend graphs for a quick overview of the health of their program or sensor-level detail for each gas detector. These tools help safety professionals identify the source of potential problems and take steps to save lives. iNet Control also allows users to compare their program to industry averages. Or, users can customize their data to measure performance to internal standards.

Because iNet Control is hosted over the Web, it does not require organizations to install any hardware or software. All ongoing upgrades are included; when a new feature is added, iNet subscribers will have instant access to it the next time they log in.

Find more information at www.indsci.com.

New Multi-Channel Waveform Generators Deliver High Channel Density

ZTEC Instruments announces their new series of waveform generators, the ZT5210. Available in PCI, PXI, VXI, & LXI, these multi-channel waveform generators feature a sampling rate of 200 MS/s, a bandwidth of 50 MHz, and 14-bit resolution.

The ZT5210 series provides high channel density for all platforms with 2 independent outputs on PCI & PXI, and 2 or 4 outputs on VXI & LXI. Each output channel is completely independent of the other channels, making these instruments ideal for applications requiring independent control of each output. Additionally, the dual memory on each channel allows waveforms to be played from one memory bank while a second waveform is loaded into the other memory bank on the same channel. In binary modulation mode, the output toggles between the waveforms in each memory bank based on an external input or trigger.

In addition to its arbitrary waveform generator features, the ZT5210 series offers a robust function generator library. Built-in functions include sine, square, triangle, ramp, pulse, sync pulse, Gaussian pulse, Lorentz pulse, AM, FM, DC, haversine, havercosine, half cycle sine, noise, multi-tone, & serial data.

The arbitrary waveform functionality of these instruments is extremely flexible. Up to 32M samples per channel can be output using an 8M sample waveform library. Users can mix and match up to 8 sequences from the waveform library, each with 4096 segments/sequence.
For high voltage applications, the 5210 series generates signals up to 14 Vpp into 50 Ohm loads or 28 Vpp into high impedance loads.

Every instrument in the ZT5210 series includes ZWave Waveform Generator Software. ZWave looks & works exactly like a benchtop waveform or function generator. It provides quick access to all settings, a waveform viewer, as well as configuration save & recall. Drivers for C/C++, IVI, LabVIEW, & COM are also complimentary with the instrument. IDE project examples and support for LabWindows/CVI, Visual Studio, and LabVIEW are also available. All of ZTEC's drivers & software work with Windows and Linux.

For more information please visit www.ztechinstruments.com.

New "S" Series Solid-State Amplifiers Pack More Power into Smaller Packages

AR RF/Microwave Instrumentation has introduced a family of new “S” solid-state Series amplifiers that are more compact, more efficient, and more powerful than previous models. The new “S” Series includes the following models (all cover the 0.8 – 4.2 GHZ frequency range):

Model 15S1G4 (15 Watts CW)
Model 30S1G4 (30 Watts CW)
Model 60S1G4 (60 Watts CW)
Model 120S1G4 (120 Watts CW)

These new amplifier models employ a new design that delivers more than twice the power of older models. The new, more efficient design consumes less power, and incorporates both USB and Ethernet interfaces in addition to the standard IEEE and RS-232 interfaces. With these improvements, AR has maintained the superior rugged design for load tolerance and excellent linearity.

The Model 15S1G4 can be expanded from 15 to 30 watts in the same cabinet when higher power is needed. Find more information at www.ar-worldwide.com.

Portability and Versatility Come Together in Digital High-Speed Cameras

In 2007, Vision Research, a leading manufacturer of high-speed digital imaging systems, revolutionized the way professionals across a variety of industries utilized high-speed video with the introduction of the Phantom® Miro, a true point-and-shoot digital high-speed camera. The Phantom Miro’s unprecedented DSLR-like form factor opened the door to high-speed video for countless applications, offering a fully-portable, hand-held solution for the effortless recording of high quality, digital video completely untethered from a power source.

Taking the original Phantom Miro to the next level, the new Phantom Miro eX puts even more power and versatility in the palm of users’ hands thanks to an exciting new range of advanced features and functionalities. Available in three models, the Miro eX1, Miro eX2 and Miro eX4, these new compact digital high-speed cameras leverage over 50 years of Vision Research’s legendary high-speed video capture expertise to set a new standard for versatility in the industry. The new Phantom Miro eX offers users a custom-designed CMOS sensor and is available in resolutions of 640x480 (Miro eX1, Miro eX2) and 800x600 (Miro eX4). With the Phantom Miro eX, users can take advantage of maximum, full-resolution frame rates of 500 frames-per-second (fps) to over 1,200 fps. By reducing resolution, the Miro eX can record even faster, reaching speeds of over 100,000 fps. The Phantom Miro eX also offers super-fast exposure times as low as two microseconds (1/500,000 second), allowing users to freeze fast-moving objects and eliminate blur from their video.

The new Phantom Miro eX has also been reengineered to be lighter and more ergonomic than its predecessor. The Miro eX features a conductive fiber filled polycarbonate body, which reduces the camera’s overall weight to 1.5 pounds (without the lens).

The Phantom Miro eX is the first digital high-speed camera in Vision Research’s history to feature a built-in, Image-Based Auto-Trigger. This built-in triggering system allows users to program the Phantom Miro eX to automatically begin recording as soon as motion is detected within a specific point in the frame (available on Miro eX2 and Miro eX4).

Additional information and detailed specifications for the Vision Research Phantom Miro eX Family of digital high-speed cameras can be found at www.visionresearch.com.

Ultracapacitor Model Component Library for Use in Simulation System

ANSYS, Inc. has announced that an ultracapacitor components library from Maxwell Technologies, Inc. an ANSYS customer has been made available for use in Simplorer® technology. As a result, automotive, aerospace and industrial power engineers developing hybrid vehicles and other electric-powered products and systems now can easily utilize the energy-storage device models in their simulations.

Ultracapacitors are energy-storage devices that efficiently deliver bursts of high power and recharge rapidly from any energy source over hundreds of thousands to millions of cycles. Maxwell's BOOSTCAP ultracapacitor products currently are being used for backup power in wind turbines and other industrial applications and for braking energy recuperation and torque assist in low-emission, fuel-efficient hybrid-electric/internal-combustion transit buses and electric rail vehicles. They also have been designed into hybrid trucks and automobiles that will move into production over the next few years. Compared to batteries, BOOSTCAP cells deliver up to 100 times the power, last more than 100 times as long, operate more reliably in high- and low-temperature conditions, require little or no maintenance, and reduce environmental issues associated with battery disposal.

The ultracapacitor model library is already being utilized within Simplorer software at Argonne National Laboratory, which supports the U.S. Department of Energy's mission of providing the nation with a safe, reliable and environmentally friendly energy supply.

The ultracapacitor components library is available for download at http://www.ansoft.com/modeldb/.

Technical Committee Reports on Technical and Standards Activities, Spring 2009

Kang Lee

The technical and standards activities of the respective technical committees in the last six months and their plans for the next six months are presented:

TC-1 Measurement Precision, Sensitivity, and Noise

- Seeking a new chair to lead the committee.

TC-3 Frequency and Time by Eva Ferre-Pikal

Activities:

- As part of SCC 27, we worked jointly with the UFFC to revise IEEE 1139, Standard Definitions of Physical Quantities for Fundamental Frequency and Time Metrology – Random Instabilities. The IEEE 1139 was approved by the IEEE-SA Standards Board on September 2008 and went through editorial review earlier this year.

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

- Keeping close reports with the MTT-11, NCSLI, MSC, and ARFTG
- IEEE 378 was approved in June 2008 and a working group was formed and members solicited. The working group meetings are to be held in conjunction with the MTT and ARFTG Symposiums in June 2009.

Planned activities:

- Continue recruiting members to join this committee.
- Liaison with other professional societies in high-frequency measurement.
- Form working groups for the IEEE microwave and RF power measurement standards by end of 2009.

TC-5 Connectors in Measurements by Yeou-Song (Brian) Lee

Activities:

- Keeping close reports with the MTT-11 and ARFTG
- Will participate in the P1785 Working Group. The working group meetings are to be held in conjunction with the MTT and ARFTG Symposiums in June 2009.

Planned activities:

- Form working group to revise the IEEE 287 connector standards. Nick Ridler of National Physical Lab/UK volunteers to be the lead.

TC- 6 Emerging Technologies by Vincenzo Piuri

The committee searches for promising technological areas in which measurement technologies and applications are relevant and beneficial. In particular, attention has been focused on biometrics, bioinformatics, molecular structures, organic structures, and quantum technologies. The activities concerned the analysis of the field and the identification of potentials for our technologies and knowledge.

Activities:

- The committee organized a special issue on "Biometrics Instrumentation and Measurement" in the IEEE Transactions on Instrumentation and Measurement.

Planned activities:

- The committee is planning to organize a special session on biometrics at I2MTC 2010.

TC-7 Signals and Systems in Measurement by Laszo Sujbert

Activities:

- Continued working on a testbed for testing signal processing algorithms in sensor networks.
- Prepared papers for I2MTC in Singapore.

TC-8 Automated Test Systems and Instrumentation by Michael J. Stora

The objectives of the Committee are to:

- Reestablish a staff to support TC-8, under a formal organization, membership, purpose, goals and policies (IEEE policies and unique issues guiding TC-8).
- Complete IEEE-P1155 Revision for VXI based upon the current VXI Specification Revision efforts, which will include Serial Bus Upgrade under VITA-41.X backplane implementation, and adoption of the IEEE-1149.1/4 within specification. This will be supported by the VXI Consortium Technology Working Group.
- Complete IEEE-P1693 Standard for Modular Interconnect Packaging for Scaleable System (MIPSS) Working Group involving seven companies and 15 personnel and is enlisting more.

- Enhance and develop working group committees that will conduct the development work

necessary to complete projects timely.

- Establish collaboration meetings of the groups two times a year, working with IEEE chapters and IEEE/I&M events such as AUTOTESTCON to provide space for meetings.

Activities:

- Reaffirmed the IEEE 1174-2000 (2009), IEEE Standard Serial Interface for Programmable Instrumentation Standard.
- Reaffirmed the IEEE 488.1-2003 (2009), IEEE Standard for Higher Performance Protocol for the Standard Digital Interface for Programmable Instrumentation.
- Initiated reaffirmation process for the IEEE 488.2-1992 (R2004), IEEE Standard Codes, Formats, Protocols, and Common Commands for use with IEEE Std 488.1-2009, IEEE Standard Digital Interface for Programmable Instrumentation.
- Working group meetings were conducted in July and November (at the AUTOTESTCON 2009).

Planned activities:

- Reestablish a staff to support TC-8, under a formal organization, membership, purpose, goals and policies (IEEE policies and unique issues guiding TC-8).
- Complete IEEE P1155, Revision for VXI based upon the current VXI Specification Revision efforts, which will include Serial Bus Upgrade under VITA-41.X backplane implementation, and adoption of the IEEE-1149.1/4 within specification. This will be supported by the VXI Consortium Technology Working Group.
- Complete IEEE-P1693 Standard for Modular Interconnect Packaging for Scalable System (MIPSS) Working Group involving 7 companies and 15 personnel, and is enlisting more.

- Enhance and develop working groups to complete various projects on a timely manner.

- Establish collaboration meetings of the groups two times a year, working with IEEE chapters and IEEE/I&M events, such as AUTOTESTCON to provide space for the meetings.

TC-9 Sensor Technology by Kang Lee

Activities:

- IEEE 1451.7 – Sensor and RFID Integration Working Group
  IEEE 1451.7 draft was balloted. The result of the ballot is 98% affirmative vote with comments. The working group reconvened to resolve the comments.

- IEEE 1588 - Precise Networked Clock Synchronization Working Group
  A subcommittee was formed and meetings were held to address questions from industry on the interpretation of the IEEE 1588-2008 standard.

- Introduced the IEEE 1451.5 Wireless Sensor Interface Standard in a NASA meeting on Wireless Connections in Space held at the NASA Langley facility in Hampton Virginia. The NASA group was interested in exploring wireless technology for applications in space.

- Collaborated with other organizations to demonstrate ocean sensor interoperability based on IEEE 1451, OGC, and other standards. The demonstration showed the integration of IEEE 1451 with ocean sensors and instruments for ocean condition monitoring. The demonstration was presented at the Ocean Innovation Workshop held on October 22, 2008 in St. Johns, Canada. The partners involved were the Monterrey Bay Aquarium

Research Institute (MBARI), the European Seafloor Observatory Network (ESONET) community including the Christian-Albrechts-Universität zu Kiel in Germany, University of Bremen in Germany, and Universitat Politècnica de Catalunya in Barcelona, Spain. Sensors and instruments located in America and Europe were accessed via the Web using Smart Transducer Web Services (STWS). Others are invited participate in future integration of standards-based global ocean condition monitoring demonstration.

Planned activities:

- The IEEE 1451.7 Working Group will conduct resolution ballot and submit the balloted draft to the IEEE-SA Standards Board for approval as a standard.
- Works with ISO/IEC JTC 1 /SC 31/WG 6 to form a joint committee to work on the IEEE 1451.7 for ISO adoption.
- Works with IEEE to fast track IEEE 1451 standards to JTC 1/SC 31 via the PSDO agreement between IEEE and ISO.
- Continue planning of 2009 ISPCS to be held in Italy. See activities above for more detail.
- Works with the Interoperability Laboratory of the University of New Hampshire to organize ISPCS 2010 in Portsmouth, New Hampshire.

Subcommittee on Capacitive Sensors by Georg Brasseur

The aims of the Subcommittee are to:

- develop, promote and support capacitive sensor-related technologies, user applications;
- develop new methods to meet industry's need for cost efficient, robust, reliable and accurate sensors;
- review capacitive sensors and their applications in the user community, government and industry;
- provide forums such as workshops and symposia where such technologies can be discussed;
- maintain liaison with other societies and organizations working in the same or related areas.

Activities:

- In co-operation with TC-20, established a "technical co-sponsorship" for the 6th International Conference for Conveying and Handling of Particulate Solids (CHoPS) between IEEE I&M and the Conference organizer. The Conference will be held in Brisbane, Australia on the 3rd - 7th August 2009 (http://www.chops2009.org.au/index.html).
- Supported the work of the Special Session Chairs Anton Fuchs (Graz University of Technology) and Gourab Sen Gupta (Massey University) of the IEEE Sensors 2009 Conference (http://www.ieee-sensors2009.org/special.html).
- Supported the set-up process of the IEEE Austria Subsection on Instrumentation and Measurement.

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

Activities:

Actively developing and/or promoting five major standards: The revision of IEEE Std 181-2003 (Standard on Transitions, Pulses, and Related Waveforms); the promotion of IEEE Std 1057-2007 (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 IEEE 1241, 1658, and 1696 at our February 2009 meeting in Tucson, AZ sponsored by Texas Instruments. Plans were made to start revising 181 and to coordinate it with the IEC. Ways to promote the new IEEE 1057 were considered. A potential new standard addressing jitter was also considered. The spring meeting will be held on at LTX in the Boston area during the first week of June 2009.

Subcommittee on Pulse Techniques (SCOPT) (P181) by Nick Paulter

The IEEE-SA Standards Board approved a PAR to revise IEEE 181-2003 on May 19, 2008. Work is to be completed by December 31, 2012. 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 (P1057) by Bill Boyer

IEEE Std 1057-2007 was published April 18, 2008. The subcommittee will focus its attention on promoting awareness of the new standard. Since this standard contains the latest TC-10 definitions and test techniques, it will influence ongoing work on related standards.

ADC Subcommittee (P1241) by Steve Tilden

The committee continued aggressive editing and re-writing the maintenance draft update at its February 2009 meeting in Tucson, Arizona. In Florence last September, several of our European colleagues were recently recruited and joined the subcommittee. The subcommittee also participates in I^2MTC quite widely and ADC Forum conferences. Further promotion is planned by preparing papers and presentations for future conferences and publications as well as for the next ADC Forum to spread the word about the standard and solicit inputs. The deadline for ballot completion and approval for this maintenance cycle is December 31, 2009. One major accomplishment, which was a major reason for this maintenance cycle, was to add an annex on ADC architectures, which has now been drafted & reviewed. To meet the PAR deadline, further additions can no longer be accepted. With restrictive travel policies, we intend to take more advantage of WebEx meetings.

DAC Subcommittee (P1658) by Steve Tilden

The subcommittee made significant progress on the initial draft at its February 2009 meeting in Tucson, Arizona. It will continue that work toward creating an initial draft for ballot before the PAR deadline. This subcommittee has now stopped recruiting new working members due to the impact new members usually have on committee work. In Florence last September, several of our European colleagues were recruited and joined the subcommittee. On 27 March 2008 the IEEE NESCom approved our request for a PAR extension from December 31, 2008 to December 31, 2010 which will allow us to complete the draft and ballot the standard without compromising its depth of coverage or details. With restrictive travel policies, we intend to take more advantage of WebEx meetings.

Subcommittee on Probe Standards (SCOPS) (P1696) by Tom Linnenbrink

The subcommittee met mostly by teleconference in Tucson, AZ, on February 17, 2009. Tom Linnenbrink assumed the position of acting chairman until a new subcommittee chairman can be recruited. Efforts to date to recruit a new subcommittee chairman were discussed as were potential candidates. All members were encouraged to recommend membership in SCOPS to any interested parties.

TC-11 Liaison Report by Joe Stanco SCC20 (ATLAS) Coordinator

- This liaison report will cover the Test and Diagnosis for Electronic Systems SCC20 organization / committee's balloting / standards status from the last report up to the 2009-1 meeting held in Bournemouth, UK. on April 20th to the 23rd. The status will be presented by subcommittees.
- The Diagnostic and Maintenance Control (DMC) subcommittee's Standard for Software Interface for Maintenance Information Collection and Analysis IEEE 1636 (SIMICA) as well as its companion dot standard IEEE 1636.1 Test Results and Session Information are now trial use standards. The other dot standard IEEE P1636.2 Maintenance Action Information completed initial ballot and is currently in ballot review. IEEE-1232 AI-ESTATE standard is being updated and is in ballot.
- The Test Information and Integration (TII) subcommittee currently has IEEE standard 1671 ATML overview and Architecture as well as four companion trial use dot standards. These standards are as follows: IEEE 1671.3 UUT Description and IEEE 1671.4 Test Configuration. IEEE 1671.5 Test Adapter standard and IEEE 1671.6 Test Station standard completed recirculation ballot and were published in December 2008.
- The Test and ATS Description (TAD) have the following active standards. IEEE 1641 which is undergoing an update. The IEEE 1671 dot standards; IEEE P 1671.1 Test Description completed initial ballot and is in ballot resolution and IEEE 1671.2 Instrument Description completed recirculation ballot and was published in December 2008.
- The Hardware Interface (HI) subcommittee standard IEEE 1505.1 completed recirculation ballot and the standard was published in November 2008.

Planned activities:

- Continue liaison and report salient SCC 20 activities and meetings.
- SCC 20 plans to meet prior to AUTOTESTCON 2009
- A number of these TII, TAD and DMC standards are planned to be demonstrated at AUTOTESTCON 2009.

TC-15 Virtual Systems in Measurements by Emil Petriu

Activities:

- Organization, in collaboration with TC-27 Human-Computer Interfaces and Interaction, TC-28 Instrumentation and Measurement for Robotics and Automation, and TC-37 Measurements and Networking of the *HAVE'2008 - IEEE International Workshop on Haptic Audio Visual Environments and Games*, Ottawa, ON, Canada, 18-19 October 2008.
- Organization, in collaboration with TC-22 Intelligent Measurement Systems, TC-27 Human-Computer Interfaces and Interaction, TC-28 Instrumentation and Measurement for Robotics and Automation, and TC-30 Security and Contraband Detection of the *ROSE 2008 - IEEE International Workshop on Robotic and Sensors Environments*, Ottawa, ON, Canada, 17-18 October 2008.

Planned activities:

- Organization, in collaboration with TC-27 Human-Computer Interfaces and Interaction and TC-28 Instrumentation and Measurement for Robotics and Automation of the VECIMS 2009, IEEE Int. Conf. on Virtual Environments, Human-Computer Interfaces and Measurement Systems, 11-13 May 2009, Hong Kong.
- Organization, in collaboration with TC-27 Human-Computer Interfaces and Interaction, TC-28 Instrumentation and Measurement for Robotics and Automation, and TC-37 Measurements and Networking of the *HAVE'2009 – 8th IEEE International Workshop on Haptic Audio Visual Environments and Games*, 7- 8 Nov. 2009, Politecnico di Milano, – Lecco Campus, Italy

- Organization, in collaboration with TC-22 Intelligent Measurement Systems, TC-27 Human-Computer Interfaces and Interaction, TC-28 Instrumentation and Measurement for Robotics and Automation, and TC-30 Security and Contraband Detection of the *ROSE 2009 - IEEE International Workshop on Robotic and Sensors Environments*, 6-7 Nov. 2009, Politecnico di Milano, – Lecco Campus, Italy

TC-16 Laser and Optical Systems in Measurements by Thierry Bosch
Planned activities:

- Organization of a conference (CMOI) on optical measurements for industrial applications each year in November in France (Reims in 2009, Toulouse in 2010).

TC-17 Materials in Measurements by Jacob Scharcanski
Planned activities:

- No relevant activity to report. We have been planning to organize an international event in Rio de Janeiro, next October, but we have experienced very low member engagement so far.

TC-19 Technical Committee on Imaging Systems by George Giakos
Activities:

- In collaboration with *TC-15 on Virtual Systems In Measurements, TC-28 Instrumentation and Measurement for Robotics and Automation, TC-30 Security and Contraband Detection,* drafted a proposal on the creation of an IEEE International School on Imaging. The objectives of this proposal are to promote the creation of an International School of Imaging, within the IEEE Instrumentation and Measurement Technical society, towards the exploration of novel physical and engineering imaging principles, advancement and generation of new knowledge related to the design, development, and applications of imaging technologies, systems and techniques. The International School on Imaging would target participants from Industry, Government and Academia.
- Actively involved in collaboration with the dedicated efforts of the Tsinghua University with the organization of the IST 2009 International Workshop in Shenzhen, China, May 11-12, 2009.
- Involved with the review of a number of Transactions and I2MTC Proceeding papers.

Planned activities:

- Plans to continue its efforts towards the organizational aspects of the IEEE International School on Imaging in coordination with the collaborating TC Committees.
- Continues its efforts together with the local organizing committee of the Tsinghua University towards the organization of the IST 2009 event in Shenzhen, China.

TC-20 Transportation Systems by Georg Brasseur and Frans Groen
Activities:

- The establishment of a "technical co-sponsorship" for the 6th International Conference for Conveying and Handling of Particulate Solids (CHoPS) between IEEE I&M and the Conference organizer. The Conference will be held in Brisbane, Australia on the 3rd - 7th August 2009 (http://www.chops2009.org.au/index.html).
- Established technical co-sponsorship between IEEE I&MS and the K2 Competence Center "Virtual Vehicle" relating to the Graz Symposium Virtual Vehicle (GSVF) to be held in Graz, Austria on the 27th –28th April 2009 (http://www.gsvf.at/cms/).
- Supporting the program Co-Chairs SH Choi, Abdulmotaleb El Saddik, and Stefano Ferrari as a member of the Technical Program Committee of VECIMS 2009 -International Conference on Virtual Environments, Human-Computer Interfaces, and Measurement Systems). VECIMS will be held in Hong Kong on May 11-13.

Planned activities:

- Plans to organize a special track at CHoPS for sensors usable for the materials the conference is focused at.
- Sets up a large database of automotive stereo video sequences in urban environments (1-5 km) with ground truth. This is done in collaboration with TNO (Dutch National Research institute for Applied Research) in Hague.

TC-21 Self Test and Built-in Test by Robert Gao
Activities:
- Served on the Technical Program Committee and reviewed papers submitted to the 2009 I2MTC Conference.
- Served on the Scientific Committee of the North American Manufacturing Research Institution of the Society of Manufacturing Engineers and reviewed papers submitted to the 2009 NAMRC conference.
- Collaborating with a manufacturing company in initiating research on digital telemetry and structural health monitoring through vibration signal analysis.
- Gave a seminar at NASA Stennis on embedded sensing and signal processing for structural health monitoring and visited a drilling equipment manufacturer to discuss research issues on real-time, in-process drilling rig condition monitoring, failure diagnosis, and remaining service life prognosis.
- Participated in conferences of the IEEE and ASME and presented papers on self-powered sensing and signal coding for energy efficient data transmission in wireless sensor networks.

Plan for the next six months:
- Actively seeks collaboration with the aerospace industry to expand research in built-in sensing to engine operation efficiency and vibration monitoring.
- Promotes the concept and techniques of energy-efficient and wearable sensing for human physical activity monitoring.

TC-22 Intelligent Measurement Systems by Cesare Alippi

The Committee promotes:
- basic research on computational intelligence (soft computing and composite technologies) in instrumentation and measurement 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;
- use of computational intelligence technologies in instrumentation and measurement for intelligent manufacturing applications, homeland protection and personal safety.

Activities:
- Coordinated IEEE Instrumentation and Measurement Society and the IEEE Neural Networks Society to cosponsor 2009 IEEE International Conference on Computational Intelligence For Measurement Systems And Applications on May 11-13, 2009, Hong Kong, China.
- Collaborated to the organization of the co-located IEEE International Conference on Virtual Environments, Human-Computer Interfaces, and Measurement Systems (VECIMS) on May 11-13, 2009.
- Organized the 2009 IEEE International Workshop on Robotic and Sensors Environments (ROSE) on November 6-7, 2009 in Lecco, Italy. It is sponsored by the IEEE Instrumentation and Measurement Society.

TC-23 Education for Instrumentation and Measurement by Theodore Laopoulos
Activities:

- Actively engaged in the organization of the 5th International Workshop on "Intelligent Data Acquisition and Advanced Computing Systems" – IDAACS'09, to be held in Italy in September 2009. Members Prof. A. Sachenko and Prof. D. Grimaldi are co-chairing this event (www.idaacs.net), and Prof. Th. Laopoulos is chairing the International Advisory Board. A special session is planned devoted to the educational use of software tools for practicing on electronic instruments (remote laboratories).
- A working group on "Web-Laboratories and E-learning Tools" is currently active and open to interested persons. The group examines the experience of the e-learning in the education on Instrumentation and Measurement (I&M) at different levels. Those interested please contact Prof. D. Grimaldi, email: grimaldi@deis.unical.it

TC-24 Measurement Microsystems by Andrzej Barwicz
- No report submitted.

TC-25 Medical Measurement by Marco Parvis
Planned activities:
- Continues to support the Medical Measurement and Application workshop which is gaining audience and popularity. The fourth edition of MEMEA (MEMEA-2009 May 29-30, 2009 Grand Hotel San Michele, Cetraro, Cosenza, Italy) is showing an increasing attendance with more than 50% increase of the number of submitted papers. More than 50% of the papers are from people not belonging to the IEEE, thus confirming the workshop is gaining popularity outside the society.
- The Subcommittee on Blood Pressure Measurement (Dr. Voicu Groza) is working hard organizing events (e.g. WARM 2008 - Workshop on Adverse Response to Medication - http://ottawa.ieee.ca/ims/warm2008/) and cooperates with the IEEE Standards Association that in these days has introduced new policies and procedures on the blood pressure measurement.

TC-27 Human Computer Interface and Interaction by Mel Siegel
- See TC-15 report

TC-28 I & M for Robotics and Automation by Mel Siegel and Emil Petriu

Activities:
- Organization, in collaboration with TC-15 Virtual Systems, TC-27 Human-Computer Interfaces and Interaction, and TC-37 Measurements and Networking of the *HAVE'2008 - IEEE International Workshop on Haptic Audio Visual Environments and Games*, Ottawa, ON, Canada on October 18-19, 2008.
- Organization, in collaboration with TC-15 Virtual Systems, TC-22 Intelligent Measurement Systems, TC-27 Human-Computer Interfaces and Interaction, and TC-30 Security and Contraband Detection of the *ROSE 2008 - IEEE International Workshop on Robotic and Sensors Environments*, Ottawa, ON, Canada on October 17-18, 2008.

Planned activities:
- Organization, in collaboration with TC-15 "Virtual Systems in Measurements" Technical Committee and TC-27 Human-Computer Interfaces and Interaction of the VECIMS 2009, IEEE Int. Conf. on Virtual Environments, Human-Computer Interfaces and Measurement Systems, May 11-13, 2009, Hong Kong.
- Organization, in collaboration with TC6 - Emerging Technologies, TC22 -Intelligent Measurement Systems, and the TC on Industrial Systems Applications - Task Force on Intelligent Measurement Systems of the IEEE Computational Intelligence Society, of the CIMSA 2009, IEEE Int. Conf. on Computational Intelligence for Measurement Systems and Applications, May 11-13, 2009, Hong Kong.

- Organization, in collaboration with TC-15 Virtual Systems, TC-27 Human-Computer Interfaces and Interaction, and TC-37 Measurements and Networking of the *HAVE'2009 – 8th IEEE International Workshop on Haptic Audio Visual Environments and Games*, Nov 7-8, 2009, Politecnico di Milano, – Lecco Campus, Italy
- Organization, in collaboration with TC-15 Virtual Systems, TC-22 Intelligent Measurement Systems, TC-27 Human-Computer Interfaces and Interaction, and TC-30 Security and Contraband Detection of the *ROSE 2009 - IEEE International Workshop on Robotic and Sensors Environments*, Nov 6-7, 2009, Politecnico di Milano, – Lecco Campus, Italy

TC-30 Security and Contraband Detection by Vincenzo Piuri, Mel Siegel and Emil Petriu
Activities:

- Organization, in collaboration with TC-15 Virtual Systems, TC-22 Intelligent Measurement Systems, TC-27 Human-Computer Interfaces and Interaction, and TC-28 Instrumentation and Measurement for Robotics and Automation of the *ROSE 2008 - IEEE International Workshop on Robotic and Sensors Environments*, Ottawa, ON, Canada, October 17-18, 2008.

Planned activities:

- Organization, in collaboration with TC-15 Virtual Systems, TC-22 Intelligent Measurement Systems, TC-27 Human-Computer Interfaces and Interaction, and TC-28 Instrumentation and Measurement for Robotics and Automation of the *ROSE 2009 - IEEE International Workshop on Robotic and Sensors Environments*, Nov 6-7, 2009, Politecnico di Milano, – Lecco Campus, Italy.

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

- Organized two Sensor Standards Harmonization Working Group meetings on Dec 16, 2008 and April 7, 2009, respectively. More than thirty participants representing DHS, DoD, industry, and academia attended the meetings to discuss ways of harmonizing sensor-related standards and sensor network and application integration and participating in collaborative demonstration.

Planned activities:

- The next Sensor Standards Harmonization meetings are planned to be held in July and November, 2009, respectively. Party interested to participate in the meeting should contact Kang Lee at kang.lee@nist.gov.

TC-32 Fault Tolerant Measurement Systems by Serge Demidenko
Activities:

- Organized a special session - SS-4 Fault-tolerant measurements and related fields in I2MTC 2009.

Planned activities:

- Organize a special session on fault-tolerant sensing technologies at the forthcoming IEEE Sensors Conference in October 2009 in Christchurch, New Zealand.
- Organize a special track on fault-tolerant electronics design at the 5th IEEE Symposium on Electronics Design, Test and Applications - DELTA'2010, Vietnam.

TC-33 Characterization of Electrical HF and Optical Non-Linear Components by Marc Vanden Boshe
Activities:

- Tried to set up a session track at the I2MTC 2009 without success because the organizers have chosen not to organize special thematic sessions this year.

- Tried to start a cross-verification of the phase calibration, but the large standards labs are not very keen to invest in the subject right now.
- Liaison with MTT-11 is continuing, MTT-11 is trying to set up rules for the organization of joint events and we are participating in that.

TC-34 Nanotechnology in Instrumentation and Measurement by Cindy Harnett
The goals of this Committee are to establish, develop, promote and support cooperation among researchers, industry & academia involved in different fields of nanotechnology instrumentation and measurement. Topics include:

- Sensors for the measurement of nanomaterial properties. New nanomaterials are continuously developed and require characterization.

- Instrument and procedure characterisation. Sensors and other instruments, for example resistive carbon nanotube vapor sensors and atomic force microscopes (AFMs), increasingly use nanomaterials as active elements. These instruments require careful calibration for use in applications.

Ongoing activities toward these goals:

- In 2009, the committee added the goal of compiling a list of research laboratory capabilities and researcher contact information for nanomaterial and nanosensor characterization.

- New members are sought to organize a conference session on nanomaterials in instrumentation and measurement, with special emphasis on nanowire and nanoneedle atomic force microscope (AFM) probes.

TC-35 Net-centric Operations Interoperability

- New chair is needed

TC-36 Industrial Inspection by Zheng Liu, David Forsyth, and Pradeep Ramuhalli
Activities:

- Dr. Zheng Liu gave a presentation at 17th World Conference on Nondestructive Testing about the potential IEEE standards for inspection data.
- The review process of a special issue on the Journal of Machine Vision and Applications (Springer) is complete. The publication of this issue by the end of 2009 is expected.

Planned activities:

- Continues the work on IEEE standards for inspection data.
- Organizes an IEEE lecture/seminar on machine vision.

TC-37 Measurements and Networking by Abdulmotaleb El Saddik and Claudio Narduzzi
The TC encouraged participation in I2MTC 2009 by disseminating information on the conference and promoting the organization of a special session on measurement and networking at I2MTC 2008.
The Committee promotes:

- Awareness and interest in networking and to encourage I&M Society members to apply their skills and extend their knowledge of networking-related problems in I&M application field.
- Basic research on instrumentation and measurement in networking
- Mutli-sensor data processing, interpretation and fusion in haptic systems

Activities:

- The establishment of a "technical co-sponsorship" for the 7th IEEE International Workshop on Haptic Audio Visual Environments and their Applications (HAVE 2008), Ottawa (http://www.discover.uottawa.ca/HAVE2008/)

- Supporting the program Co-Chairs SH Choi, Abdulmotaleb El Saddik, and Stefano Ferrari as a member of the Technical Program Committee of VECIMS 2009 - International Conference on Virtual Environments, Human-Computer Interfaces, and Measurement Systems). VECIMS will be held in Hong Kong May 11-13

Planned activities:

- Sponsoring the 8th IEEE International Workshop on Haptic Audio Visual Environments and their Applications (HAVE 2009), Lecco, Italy, (http://have.ieee-ims.org/)

TC-38 Space Measurements by John Schmalzel

- Hosted the IEEE 1451 Plug-Fest at SAS-2009 in New Orleans on Feb 18.

  The event was attended by a dozen interested people. Dr. Deniz Gurkan (U. of Houston) gave a demonstration of an IEEE 1451.1 analyzer that she and her students have developed. The Plug-Fest concluded with a panel discussion to develop ideas for future Plug-Fests. This planning work is continuing. TC-38 is also interested in supporting TC-9's plans for updating IEEE 1451.1 insofar as there is interest from the space community in defining additional

TC-39 Measurements in Power Systems by Lorenzo Peretto

TEDS-like data structures for other purposes.

The objectives of the Committee are to gather those people in the scientific community involved in the field of measurements in power systems in order to lead research on specific topics, promote and facilitate the exchange of knowledge between scientists, encourage the research on challenging topics, organize events related to the measurements in power systems, become an official consultative body for industries and operators in the field of power systems, as far as the design and development of specific instrumentation is concerned, and, last but not least, promote the development of new Standards and Guidelines.

This Technical Committee was established at the beginning of November 2008 with 8 members.

Ongoing activities:

- organizes its first workshop on ‘definitions and measurements of electrical quantities under periodic and non-periodic operating conditions’; it will be characterized by the presence of a consistent part of people coming from Utilities and Industry world in order to collect all those instances considered relevant and of practical interest needed to be studied and investigated;
- Represents the reference committee for the I&M Society for providing a scientific contribution to the two new Journals of the IEEE PES: “Sustainable Energy Journal” and the “Smart Grid Journal”

Society News

Vincenzo Piuri

Conference Report: 2009 IEEE International Instrumentation and Measurement Technology Conference (I2MTC 2009)

The 2009 IEEE International Instrumentation and Measurement Technology Conference (I2MTC 2009), sponsored by the IEEE Instrumentation and Measurement Society, the IEEE Singapore Section and the Singapore Polytechnic, was held on May 5-7, 2009, in Singapore. This was the 26th edition of our truly successful conference series, which came back to Asia after

15 years from the edition held in Hamamatsu, Japan. The IEEE Instrumentation and Measurement Society would like, in fact, to formally acknowledge with this conference, the vitality and fast growth of this field, its membership, and activities in Asia.

Located at one of the crossroads of the world, Singapore's strategic location and excellent facilities in South-East Asia has contributed to its success as a major centre for trade, communications and tourism. Rich in contrast and color, Singapore is a harmonious blend of culture, cuisine, arts and architecture. Its skyline boasts of distinctive and exotic ethnic enclaves to efficient business center, serene gardens to sleek skyscrapers, embodying the finest of both East and West. It is also the home of advanced research and modern technology. Singapore offered an ideal setting for stimulating discussions on new developments and results in research and engineering practice of instrumentation and measurement.

The meeting offered the traditional unique, interdisciplinary forum promoting dissemination, understanding, and discussion of the most recent advancement and practice in theoretical foundations, technologies, methodologies, and applications of measurement science and instrumentation. The conference featured 1 plenary lecture, 351 papers, and 8 tutorials. The technical program was structured in 6 parallel sessions, including several special ones on hot or emerging topics, and 2 large poster sessions to allow for more interactions with the attendees. High technical quality was assured by a careful peer-review process performed by international renowned experts. The availability of a wide common area and the lunches served at the conference site were very effective to support people networking all days along, creating a friendly and convivial setting to facilitate personal communication and networking. The conference constituted an excellent opportunity for meeting old and new colleagues and friends from all over the world in a friendly atmosphere of true collaboration and mutual respect.

The organization of such a reputable and large conference as IEEE I2MTC 2009 has been a big-scale and complex task. Efforts from many people were required to promote the event, solicit and review the submissions, shape the technical program, organize the exhibits, prepare and edit the proceedings, arrange the logistics, and set up the social functions. We would like to take this opportunity to thank all and each of the contributors to the Conference organization. We would also like to thank the public and private organizations that supported the meeting in different ways, especially the IEEE Singapore Section and the Singapore Polytechnic.

This experience enriched every attendee and helped achieve a better understanding of the needs, aspirations and beliefs associated with the technology in the modern post-industrial society related to instrumentation, measurement and the related applications. This will make this conference alive and relevant as an important catalyst of economic growth, leading to a more homogeneous social development as well as to a true and solid prosperity and peace.

I hope that I2MTC 2009 was a memorable experience for all attendees and organizers and I wish that we could meet again at the 2010 edition in Austin, Texas, USA: a hot place for hot achievements in instrumentation, measurement and the related applications!