

Sensors

From the Editor's Bench

Shlomo Engelberg

Applications of Control Theory to Real Life

Control theory is one of the courses that I most enjoy teaching. I have been teaching the course for well over a decade now, and I still find the material very interesting. Sometimes the parallels between this engineering discipline and real life – the kind that is often not amenable to mathematical analysis – seem very clear to me. One of the first lessons one tries to help students internalize in a control theory course is that adding gain to a closed-loop system is good up to a point. There are many examples of ideal systems in which the more gain one adds to the system the better the system works. Once one starts modeling actual systems, one finds that adding too much gain is dangerous. Very high gain can cause systems to oscillate or, worse still, to become unstable.

In the real world, many people think that pushing their employees or coworkers harder and harder will get better and better results. Applying moderate amounts of pressure usually does increase productivity, and it gives people the pleasant feeling that they are working on something important. Past a certain point, applying pressure may cause one's employees to have nervous breakdowns, but it will not make them more efficient. Another point that one tries to drive home in a control theory course is that delays in a system tend to make the system less stable. In feedback control systems, if the information being fed back is delayed before the system sees it, making use of the information can destabilize the system.

In a school or corporate environment, if it takes too long to implement a decision, what was originally a well thought out and correct decision can turn out to be a very bad decision. Sometimes timing is everything, and delays imperil the whole system. One sees the worst of both possible worlds when management applies a lot of pressure to the rank and file in an attempt to react quickly to information that it has only just received but that is actually very out of date. When this happens, everyone can wind up working very hard to correct problems that no longer exist. What is worse is that the rank and file often realize that they are working on a problem that no longer exists, and they feel powerless to change the decisions that were made by the upper echelons.

Here at the magazine we try to keep the pressure to moderate, helpful levels, and we try to react to problems as quickly as possible. We are always happy to receive feedback from our readers. If you alert us to problems or tell us about things you particularly enjoy, it helps us to keep the

magazine the kind of periodical you enjoy reading. Please feel free to send me your feedback (to shlomoe@jct.ac.il). I will try to see to it that an intelligent response is generated as quickly as possible. In this issue, we have a tutorial that describes rotational speed sensors and how to process the data they provide, articles about high-frequency dielectric measurements, nanotechnology in environmental sensors, and usability testing, a guest column about metrology by Dr. Bryan Kibble, recipient of the 2009 IEEE Joseph F. Keithley Award in Instrumentation and Measurement, and our regularly scheduled columns. I look forward to hearing from you and receiving your feedback about this issue of the magazine.

Shlomo

President's Perspectives

Kim Fowler

AdCom Volunteer Effort

Throughout this year I plan to "advertise" the workings of the society and the Administration Committee (AdCom) to you. I will explore aspects of the society's efforts through the alliterative combination of volunteerism, value, and ventures. This short column focuses on the volunteer effort within the AdCom- a story partly told through a photo-collage.

The AdCom meets three times per year to conduct society business. The first meeting is strategic planning with the vice presidents and EICs in February on the Monday before the SAS conference. The full AdCom meets after the I²MTC conference and then again at the beginning of October, each time for up to three days; members devote the first day or two to committee meetings, followed by a full day general session. Each committee reviews the effectiveness of current activities and then prepares new initiatives for consideration by the general session. The meetings can be tedious affairs, conducted according to IEEE policy and Robert's Rules of Order, but they are always productive. Most initiatives must go through the long-range planning and finance committees before they arrive at the general AdCom for discussion and vote. There are 21 different committees and activities, ranging from Awards Recognition and Publications, to Education, Membership, and Technical Activities.

In the June column, I will cover the offices within the AdCom, how the AdCom nominates candidates, and how you vote in members.

Kim

Article Summaries

Nanotechnology in Environmental Sensors

Cindy Harnett

(Summary)

Nanomaterials can transduce many environmental quantities to an electronic signal, often with improved sensitivity and lower power consumption when compared to a conventional sensor. In

some cases, nanomaterials make entirely new sensor types possible—especially for chemical and biological sensors. This article introduces nanoparticle-enabled techniques that use disposable reagents and may produce excellent new laboratory methods for environmental research, and nanowire or nanocantilever sensors that hold advantages for unattended operation.

This summary includes text from the article.

Usability Testing: Taking the Experience into Account

Dana Chisnell

(Summary)

Usability testing can greatly help I&M developers understand how to measure non-physical aspects of using a device. In this article, the author focuses on usability and how to measure it as a consideration in the design of instrumentation and measurement devices. What is it like for a person to use a device to accomplish a goal, and how can one measure what that experience is like? As one might guess, there's a fair bit of uncertainty, most of which comes from the human factor.

This summary includes text from the article.

Tutorial 23: Rotational Speed Sensors: Limitations, Pre-Processing and Automotive Applications

Fredrik Gustafsson

(Summary)

Rotational speed sensors are used in a variety of applications and are known by many different names: tachometers, revolutioncounters, RPM gauges, etc. There are two different principles, (i) rotary encoders that provide the absolute angle and (ii) incremental rotary encoders that give angular speed. The basic technology in such sensors is based on conductive tracks, optical reflections or magnetic field variations. This tutorial describes the computational process of rotational speed sensors more detail, with a focus on signal processing issues such as sampling, quantization effects, multi-domain signal processing aspects and the pre-processing needed to learn the manufacturing errors in the toothed wheel for very high accuracy applications. For specific examples, attention is directed to the particular rotational speed sensors found in cars equipped with ABS (Anti-locking Brake Systems).

This summary includes text from the article.

Tutorial 24: High-Frequency Dielectric Measurements

James Baker-Jarvis, Michael Janezic, and Donald DeGroot

(Summary)

Knowledge of the response of materials to electromagnetic fields in the frequency range of radio frequency through terahertz is critical to numerous research projects and electronic product development activities. Electromagnetic waves in this high-frequency range achieve behaviors that low-frequency signals cannot achieve, such as the ability to travel through guided-wave structures, the ability to launch from antennas as propagating waves, the ability to carry broadband information over long distances, and the ability to propagate through materials. When applying high-frequency EM fields in scientific exploration and product development, researchers and engineers demand accurate material parameters in order to extract experimental results and to predict their products' behavior.

This tutorial identifies and describes measurement techniques useful for dielectric material characterization. The focus is on materials of practical applications, including microelectronics, electronic packaging and interconnection, compact antenna arrays, and capacitors. One area of interest is high-speed and high-frequency electronic circuit development where knowing the speed *and* loss of signals propagating on integrated circuits and between chip packages is vital to system performance.

This introduction includes text from the article.

Column Summaries

Instrumentation Notes

Shlomo Engelberg, Haim Hay Hazout, and Jonathan Hirshowitz

A Capacitive-Sensing Based Simple Serial Mouse

(Summary)

This column describes how home-grown capacitive sensors made from an analog microcontroller, a few simple chips, and a few cents worth of copper can be converted into a simple serial mouse. Both capacitive sensing and the "serial mouse protocol" are discussed, and the implementation of a very simple mouse is described.

This summary contains text from the column.

By the Numbers

Stephen Dyer and Justin Dyer

Least-Squares Fitting of Data by Rational Functions: Levy's Method (Part 2)

(Summary)

In Part 1 of this article, featured in December 2009, the authors introduced Levy's Method as an approach to the least-squares fitting of rational functions to data, and extended the example in Levy's original work by adding noise at three different variances and noting the effect on the fit. Part 2 provides the general algorithm for Levy's Method, and presents, in an example of the

method's application to a higher-order system, the fitting of frequency-response data obtained from a high-fidelity audio power amplifier operating in both closed-loop and open-loop configuration.

This summary includes text from the column.

Recalibration

Bryan Kibble

In Metrology, Simpler is Better

(Summary)

The history of measurement demonstrates that much better progress is often made by starting again with something simpler which is closer to first principles, which minimizes the number of measurements to those suggested by the dimensionality of the measurand, and which directly satisfies the defining conditions of the quantity to be measured. Examples from metrology that have improved the SI units in time measurement, in measuring weight, in equating the mechanical and electrical SI units of power using a watt balance, and measuring the quantum Hall effect are presented.

This summary includes text from the column.

Departments

New Products

Robert Goldberg

High Temperature Triaxial Accelerometers Simplify Testing and Instrumentation Requirements

Endevco Corporation claims the industry's highest temperature ISOTRON® (IEPE-type) triaxial accelerometers, models 65HT and model 67, both operating to +175°C (+347°F), for reliable performance with simplified testing and instrumentation requirements.

Endevco® model 65HT ISOTRON® high temperature triaxial accelerometer is offered in ranges of $\pm 10,000$ g (0.5 mV/g) and ± 500 g (10 mV/g) in a low-noise, low impedance, 10 mm welded titanium cube design, weighing just 5 grams, and offering mg resolution. The sensors are shockproof and overload protected. Interface to model 65HT is via a single, miniature 4-pin connector, with flexible cable. The reduced size and reliable high temperature performance of this accelerometer enables a test technician to simultaneously measure acceleration across three orthogonal axes of vibration on lightweight structures without the need for charge amplification.

Endevco® model 67 ISOTRON® high temperature triaxial accelerometer is offered in ranges of ± 500 g (10 mV/g) and ± 50 g (100 mV/g) in a 14 mm welded titanium cube. The hermetically

sealed package weighs less than 14 grams. The model 67 accelerometer offers high output sensitivity, low noise and low base strain sensitivity with excellent output stability over time. Like model 65HT, Endevco® model 67 is shock proof and overload protected, offering milli-g resolution. It offers a single connector with flexible cable. Both model 65HT and model 67 include mating cables which terminate into three BNC connectors and an appropriate mounting stud.

For detailed technical specifications or additional information about high temperature IEPE-type triaxial accelerometers or other Endevco® products visit www.endevco.com.

High-Performance Switch Chassis

Giga-tronics announces the Model 8300 and Model 8400 switching chassis' for its ASCOR switch products optimized for integration into Automated Test Equipment (ATE). With these two new models, test engineers and managers gain access to more than 30 years of signal switching experience and tailored switching solutions for ATE. The Model 8300 switch chassis and Model 8400 switch chassis are 3U rack mountable units 5.25" (13.3 cm) high with a LAN and IEEE-488 interface and a built-in resource manager.

The Model 8300 has four card slots which will support any of Giga-tronics' ASCOR line of 3000 Series switch modules. The Model 8400 has 8 card slots which will support any of Giga-tronics' ASCOR line of 4000 Series high-density switch modules. With the Model 8400, switch modules can be internally inter-connected through a 32 single-channel or 16 differential-channel analog bus with > 500 MHz bandwidth. This feature allows the creation of large switch systems without the need for external cabling that may be lossy, have loosely matched impedance, and have widely varying lengths. The result is a switching solution with the ultimate signal integrity.

Giga-tronics offers more than 200 switch modules with frequency ranges from DC to 40GHz, power switching up to 20 AMPS, DMM, and frequency counter instrumentation.

Find more information at www.gigatronics.com.

PXI Flex Digital I/O Card

Expanding on its successful line of 3U PXI dynamic digital I/O cards, Geotest now offers a user-configurable FPGA 3U PXI card that features 160 digital I/O signals for specific application needs. The new GX3500 employs the Altera Cyclone III FPGA that supports clock rates up to 150 MHz and features over 55,000 logic elements.

According to Geotest, the GX3500 supports expansion card assemblies (daughter cards) that can be used to customize the interface to the UUT, eliminating the requirement for bulky add-on boards that normally reside outside of the module. Additionally, unlike other FPGA cards, the GX3500 does not require proprietary design tools. Customers can use Altera's free, Web-based Quartus II design tools, which provides a very cost-effective and high performance FPGA-based solution for end users.

Also included in the GX3500's software bundle is a virtual panel that helps facilitate interactive design, debug, and deployment of the module.

For more information please visit www.geotestinc.com.

Infrared Thermometer with Patented Circle/Dot Laser Sighting and Wireless USB

Omega Engineering introduces the high performance, handheld OS-DT8855W infrared thermometer. It is a non-contact temperature measurement instrument that features a laser circle/dot sight. The patented laser sighting system defines the target for point and shoot measurement of temperatures from -50 to 1370°C (-58 to 2498°F) and reads surface temperature in less than a second. The OS-DT8855W comes complete with hard carrying case, mini-tripod, power supply, one type K thermocouple, USB wireless data receiver, PC software and probe lead adaptors.

Key Features of the OS-DT8855W infrared thermometer:

- Accuracy: -50 to 1000°C (-58 to 1832°F) Target Temp: $\pm 1.5\%$ rdg +3°C (5°F)
1000 to 1370°C (1832 to 2498°F) Target Temp: $\pm 1.5\%$ rdg +2°C (3.6°F),
- Spectral Response: 8-14 microns,
- Emissivity: Digitally adjustable from 0.10 to 1.0,
- Power Requirements: 9V battery or supplied AC adaptor,
- Weight: 290 g (10.2 oz),
- Distance to Spot Ratio: 30:1,
- Dimensions: 175 mm H x 38 mm W x 95 mm D (6.87 in x 1.5 in x 3.75 in).

For more information please visit www.omega.com/ppt/pptsc.asp?ref=OS-DT8855W&Nav=dask0.

Ultra Broadband Double Balanced Mixer

Mini-Circuits announces the SYM-63LH+, an ultra broadband double balanced mixer covering an RF/LO frequency of 1-6000 MHz and an IF frequency of DC-1000 MHz enabling it to be used in single conversion and dual conversion transmitters and receivers in a wide range of Applications starting from ULF to mid-microwave frequencies. Typical wideband applications are electronic counter measures, instrumentation, Cable TV etc. Its wide bandwidth permits a single mixer to be used in a host of narrow band applications such as Cellular, PCN, ISM, WCDMA, satellite communication etc. reducing the part types in user inventory. It is designed to operate with an LO power of 7 to 13 dBm with very little effect on its performance, easing the requirements on local oscillator power control. It has high LO-RF (25-65 db typical) and LO-IF (18 to 60 dB typical) isolations minimizing subsequent filtering requirements and cost of the receiver/transmitter chain.

For more information please visit www.minicircuits.com.

Data Capture Software Easily Transfers Data to PC

METTLER TOLEDO introduces LabX direct Density and Refractometry software designed to provide users with easy result and calibration data transfer to a PC. Installation of LabX direct Density and Refractometry software is simple and fast, and operation is intuitive. The entire result memory of Refracto and Densito portable instruments can be downloaded at the end of a day's work, and users will appreciate the multitude of data evaluation possibilities made available by this software.

LabX direct Density and Refractometry transfers results and calibration data automatically into Microsoft Excel® or any other Windows®-based application on your PC. LabX direct gives you a choice of parameters to transfer. Simply select the data and layout format from a list for the transfer to your Excel® spreadsheet (or similar application).

LabX direct supports the download of the entire results data memory of Refracto and Densito portable meters. In this way, a day's worth of field data work can be downloaded upon return to home base.

Research scientists can utilize scientific software or graphical evaluation tools (Microsoft Excel®) for trend analysis, statistical evaluation or the compilation of research papers. LabX direct Density and Refractometry is the latest addition to the expanding LabX software platform from METTLER TOLEDO. Other LabX modules include LabX Balance and LabX Titration, each available in a light and professional version, and LabX pH.

Find more information at www.mt.com.

New Temperature Logger for Harsh Environments

Measurement Computing Corporation announces the release of a new temperature data logger with a rugged, stainless steel body. The USB-501-PRO standalone data logger is corrosion, impact, and weather resistant and designed for data logging in harsh environments.

The USB-501-PRO offers a storage capacity of up to 32,510 temperature readings over the -40 to +125°C (-40 to +257°F) range with a typical accuracy of $\pm 0.2^{\circ}\text{C}$ ($\pm 0.4^{\circ}\text{F}$). The body is made from machined 316 grade stainless steel and provides an IP67 ingress protection rating. It is powered by a user-replaceable long-life lithium battery which allows logging for up to three years.

The USB-501-PRO logger is supported by USB-500 Series Data Logger Application software included with the package. This user-friendly, intuitive software is used initially to configure the logger, program alarm thresholds, logging rates, start times and measurement units. When the logger is retrieved from the field, the software provides simple, one-click access to download, display, and export the data. The user can display time-stamped temperature and alarm limits on a powerful strip chart graph. The data can also be downloaded to a text or a .csv (comma separated values) file. With these file types, users can easily export data to Excel® spreadsheets with a single mouse click. The software and all Measurement Computing USB-500 series data loggers are compatible with Windows 2000/XP/Vista® (32-bit) operating systems.

More information is available on the Web at www.mccdaq.com.

Slim Line Power Supplies with Universal Input Power

Acromag now offers a space-saving series of power supplies with universal input power and worldwide industry approvals. The PS5R-S Slim Line series of power supplies includes nine models ranging from 10 W to 240 W of power. Space-saving 10 W and 15 W supplies require only 22.5 mm on a DIN rail and 240 W units are only 80 mm wide. All models are UL508 listed and UL1604 approved for Class I Div 2 hazardous locations.

PS5R-S Slim Line power supplies are very easy to use. All power supplies have a wide input range (85-264 V AC, 100-350 V DC). Nine available models provide 10 W at 5 V, 15 W at 12 V or 24 V, 30 W at 12 V or 24 V, plus 60 W, 90 W, 120 W and 240 W at 24 V. Output voltage is adjustable $\pm 10\%$. The units quickly snap onto a DIN rail with built-in DIN rail clips that require no additional brackets. They can also be directly mounted on a panel, which means installation is a snap. Spring-up screw terminals are IP20 finger-safe and allow easy installation of ring lugs. Built-in over-current and over-voltage protection help eliminate power supply or equipment damage.

All PS5R-S power supplies are SELV (Safety Extra Low Voltage) compliant and a host of industry approvals. For use on semiconductor fabrication machinery, the 120 W and 240 W units meet SEMI F47 sag immunity requirements.

For more information about this and other Acromag products please visit www.acromag.com.

Oscilloscope Hardware Yields Fast Waveform Update Rates

Agilent Technologies announces the inclusion of faster PC hardware in the Infiniium 90000 Series oscilloscope family. Agilent claims these high-performance, real-time oscilloscopes are the most responsive in their class with waveform update rates more than 20 times faster than comparable scopes.

Engineers designing high-speed serial data links such as USB, SATA or PCI Express® rely on high-performance oscilloscopes to measure jitter and other signal parameters. Complex analysis is often critical but can be time consuming to execute. For example, a jitter separation algorithm can take more than 30 seconds to run on competitive scopes using 20 Mpts of memory. With the new performance enhancements, the Infiniium 90000 Series scopes yield results in less than 2 seconds. This performance superiority combined with the industry-leading 1 Gpts of memory offered in the Infiniium 90000 Series enables developers to quickly document results of their design performance across a wider range of test conditions.

Oscilloscopes also need processing power to remain responsive when manipulating complex algorithms such as de-embedding algorithms. This improved responsiveness allows engineers to account for the effects of channels, probes and fixtures on high-speed signals. Agilent's InfiniiSim waveform transformation software (N5465A) which also uses hardware acceleration takes advantage of the new performance enhancements to provide superior waveform update rates for measurements that use de-embedding algorithms.

The new performance enhancements come standard at no additional cost on all Infiniium 90000 Series Oscilloscopes.

Additional information on Agilent's Infiniium 90000 Series oscilloscopes is available at www.agilent.com/find/90000A.

Multitechnology Production Tester Now With Signaling For GSM, WCDMA and LTE

Rohde & Schwarz present the new signaling mode of the R&S CMW500 for production tests on wireless devices. The wideband radio communication tester simulates a wireless connection and then performs transmitter and receiver measurements. This makes the R&S CMW500 ideal both for signaling and non-signaling tests. As a flexibly scalable multistandard platform, the R&S CMW500 covers all phases in the development of a wireless device.

In the production of wireless devices, the adjustment of individual modules is usually carried out in the non-signaling mode. Signaling tests are primarily used for the verification of the entire device at the end of the production line. The R&S CMW500 wideband radio communication tester can now handle signaling tests as well as non-signaling tests.

In comparison to RF-only measurements in the non-signaling mode, signaling procedures clearly require more time since the devices under test (DUTs) are tested virtually under real conditions in the future network. Particularly with high-end multitechnology phones or during the introduction of new technologies such as 3GPP LTE, manufacturers want to avoid the risks associated with the initial stages. After devices and technologies have gained a foothold, users can later convert their production lines to the faster non-signaling tests due to the flexibility of the R&S CMW500.

In the case of production tests in the non-signaling mode, according to Rohde-Schwarz, the wideband radio communication tester has already set standards. It achieves adjustment times that are up to ten times faster than conventional solutions. Moreover, the instrument supports all relevant cellular and non-cellular standards for measurements in production. The R&S CMW500 is the first all-in-one solution on the market that can be used in all phases of the development and production of wireless devices.

Find more information on the R&S CMW500 wideband radio communication tester at www.rohde-schwarz.com.

Compact Datalogger

Key characteristics of the MSR 160 mini datalogger from MSR Electronics GmbH are four integrated analog inputs and a measurement rate of up to 1000/s in a compact and small format. With the MSR160 datalogger, sensors can be connected to the integrated analog inputs ensuring maximum flexibility for a multitude of measurement tasks. The analog inputs (0 to 3.0 V, 12 bit) can be used to connect conventional sensors with analog outputs. In addition, a multiple output switching power supply is also provided. The MSR160 is used for example in the automotive industry (vehicle manufacture and development), in measurement and testing applications, and also in the environmental technology sector. Its robust small format is ideally suited to outdoor applications. With the corresponding sensors connected, the MSR160 is equally suited for applications in the food processing industry, laboratory technology or in patient monitoring.

The MSR160, which is also available as a waterproof version, features a measurement rate of up to 1000/s. The basic datalogger model includes four analog inputs. It can be further expanded by adding up to four different optional sensors for temperature, humidity, pressure and attitude. If required, external sensors (temperature, humidity or pressure) can be fitted to replace the internal

ones. A memory capacity of over 2 million parameters is standard. Using an optional microSD card the MSR160's recording and storing capacity can be enlarged considerably. The lightweight device (approx. 80 g) has an anodized aluminium case and a 900 mAh rechargeable lithium polymer battery. All saved data can be rapidly transferred to a PC or laptop via the USB interface. The user-friendly data acquisition and analysis software is supplied free along with the datalogger.

Technical information may be found at www.msr.ch.

Compact Multi-Function Data Logger

HEM Data has introduced the Mini ADAC. HEM claims that the Mini ADAC is the industry's smallest multi-function data logger. The 8 channel logger acquires a variety of inputs including voltages, currents, and temperatures, and converts pulses to counter/timer signals. Its small size means it is easy to install for in-vehicle testing and other field testing applications. The Mini ADAC Logger works well for a wide range of applications including performance, monitoring, R&D, and duty cycle measurements. Its on-board storage is a 2 GB Micro SD card.

An optional companion product, the DAWN Mini Logger, acquires CAN (Controller Area Network) data from the in-vehicle network to acquire automotive OBD and Enhanced Diagnostic data and the J1939 heavy duty protocol. Together the Mini ADAC Logger and DAWN Mini Logger simultaneously acquire analog and in-vehicle network data.

The Mini ADAC Logger's A/D is 16 bits with a maximum rate of 100 samples/sec per channel. The standard voltage ranges are 0-5 V and 0-36 V. Other voltage ranges can be ordered. Temperature inputs are K type thermocouples. Current range is 0-40mA. Each channel is configured independently. Up to two channels can be configured as counter/timers. An option is a 3-axis MEMS accelerometer.

A Windows user-interface allows easy configuration of the logger without any programming using flowcharts, tables and dialogs. The Windows software also provides the option to acquire and display real-time data on a PC and configures the stand-alone logger with the parameters to acquire. The software also displays the data as a post process. Computer interface options include USB, Wi-Fi, and an optional cellular modem with GPS.

The size is 120 mm x 65 mm x 40 mm. Operating temperature is -40° to +70°C. Operating voltage is 6 to 40 V. Supply current is 30 mA and power draw while sleeping is 5 mA @ 12 VDC.

For more information please go to www.hemdata.com.

Ultra-Stable Tunable Diode Laser Now Available At All Diode Wavelengths

TOPTICA's DL pro is now available at all laser diode wavelengths that the DL 100 / pro design provides. The DL 100 / pro design offers the same superior mechanical setup as TOPTICA's successful DL pro. It is a design that allows for the most stable external cavity diode lasers (ECDL) against acoustical / mechanical and thermal disturbances. At the same time, the design allows for easy, coarse tuning across the complete gain spectrum of the integrated laser diode.

The DL pro and the DL 100 / pro design are particularly easy to operate and tune, and they enable a much more hands-off operation than other ECDLs. These attributes make it ideally suited for the integration into complex and demanding experiments like Bose-Einstein condensation or quantum computing.

Until now the DL pro was available in only four versions with special AR diodes that are coarsely tunable up to 95 nm around 780 nm, 850 nm, 940 nm or 1040 nm. Now TOPTICA has adopted the mechanical design for the integration of their complete range of AR and FP laser diodes for external cavity diode lasers. The DL 100 / pro design is available at most wavelengths between 372 nm and 1670 nm. Output powers range up to 300 mW. The characteristics of these lasers greatly depend on the integrated laser diode.

Available AR and FP diodes with output power and tuning specifications are available from TOPTICA's website: www.laser-diodes.com.

TC News

Kang Lee

Technical Committee Reports on Technical and Standards Activities Fall 2009

TC-2 DC-LF Measurement: by Yicheng Wang

- Planned activities in the next six months:
 - Recruit committee members from developing countries where DC-LF measurement needs are increasing.

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

- Activities in the last six months:
 - Keeping close reports with the MTT-11, NCSLI, MSC, and ARFTG.
 - Standard working group P378 meeting was held in Boston in conjunction with the MTT and ARFTG Symposiums in June 2009.
 - Participated in the P1785 meeting in June.
- Planned activities in the next six months:
 - Continue recruiting members to join this committee.
 - Decide on merging of the TC-4 and TC-5.
 - Liaison with other professional societies in the high frequency measurement.
 - Set up P378 IEEE web site.
 - Form working groups for the IEEE microwave and RF power measurement standards by the end of 2009.

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

- To be merged with TC-4.

TC-6 Emerging Technologies in Measurements: by Vincenzo Piuri

- Activities in the last six months: The committee is completing a special issue on "Biometrics Instrumentation and Measurement" in the *IEEE Transactions on Instrumentation and Measurement*.
- Planned activities in the next six months:
The committee is planning to organize a special session on biometrics at I2MTC 2010.

TC-7 Signals & Systems in Measurement: by Laszo Sujbert

- Ruqiang Yan of the Southeast University in the Nanjing region of China was appointed as TC-7 Co-chair. He will collect and boost activities in his region.

TC-8 Test and Instrument Systems: by Mike Stora and Joseph Czapski:

- Activities in the last six months:
 - 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.
 - TC-8 Working Group Meetings were conducted in July and September 09 (at AUTOTESTCON).

TC-9 Sensor Technology: by Kang Lee

- Activities in the last six months:
 - The Technical Committee on Sensor Technology TC-9 sponsored the following working group (WG) activities for standards development.
 - IEEE 1451.7 WG - Sensor and RFID Integration Working Group- The draft is completed and awaiting Standards Board approval.
 - IEEE 1451.1 WG - Network Capable Application Processor Information Model Working Group - John Schmalzel has agreed to be the new working group chair.
 - IEEE 1451.2 WG – Transducer to Microprocessor Communication Working Group- Working group meetings were conducted bi-weekly to revise the IEEE 1451.2-2007 standard.
 - IEEE 1588 - Precise Networked Clock Synchronization Working Group- The IEEE 1588 Interpretation Subcommittee is active in addressing the issues brought to its attention on the IEEE 1588 standards specification.
 - 2009 International IEEE ISPCS
The 2009 International IEEE Symposium on Precision Clock Synchronization (ISPCS) for Measurement, Control, and Communication was held on October 15-19, 2009 at the University of Brescia in Brescia, Italy. About 110 international attendees participated in the symposium. Eighteen companies and universities participated in a Plugfest that was conducted to test the interoperability of the IEEE 1588 standard-based products and prototypes hardware and software. Fourteen companies sponsored a reception and an industrial exhibit which provided an excellent opportunity for sponsors to present their latest IEEE 1588-based technologies and products and for attendees to learn about the products for use in their time synchronization applications. See the web site for more detail: <http://www.ispcs.org>.
 - ICEMI 2009

We worked with the ICEMI organizer for the IMS to technically cosponsor the 9th International Conference on Electronic Measurement & Instruments (ICEMI 2009), which was held on August 16-18, 2009 in Beijing China. Four hundred people attended the conference.

- Planned activities for the next six months:
 - The IEEE 1451.7 Working Group will work with the IEEE editor to get the standard ready for publication.
 - The IEEE 1451.7 Working Group will continue to develop the revised specification.
 - The 2010 International IEEE Symposium on Precision Clock Synchronization (ISPCS) for Measurement, Control, and Communication is planned to be held on September 27-October 1, 2010 at Portsmouth, New Hampshire. Organizing committee meetings will be conducted monthly to plan the symposium. See web site: <http://www.ispcs.org> for the call for papers and further development.

TC-9 Subcommittee on Capacitive Sensors (SCS) by Georg Brasseur and Gerald Meijer

- Activities in the last six months:
 - "Technical co-sponsorship" was established in co-operation with TC-20 of the 6th International Conference for Conveying and Handling of Particulate Solids (CHoPS) between IEEE I&M and the Conference organizer. The Conference was held in Brisbane, Australia on 3rd - 7th August (<http://www.chops2009.org.au/index.html>).
 - TC-20 carried out in co-operation with TC-9 SCS a special track at CHoPS for sensors usable for materials the conference is focused on.
 - TC-9 SCS 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>).
- Planned activities for the next six months:
 - TC-9 SCS supports the set-up process of the IEEE Austria Subsection on Instrumentation and Measurement.

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

- Activities in the last six months:

TC-10 is 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 1241, 1658, and 1696 at our June 2009 meeting in Norwood, MA sponsored by LTX-Credence. Work on the ADC standard focused on completing the outstanding tasks in preparation for balloting this fall. The DAC standard progressed well with the addition of an architecture annex. The probe subcommittee is getting restarted under Travis Ellis, who is recruiting new members to broaden the subcommittee. SCOPT and the waveform digitizer subcommittees were not active during the last half year. Because of the difficulty experienced by TC-10 members in traveling to our usual, three-times-per-year, face-to-face meetings, the fall 2009 meeting will be held by NetMeetings (or equivalent) and conference call once reliable means are established to do so. During the next six months, we expect to ballot and publish the revised version of the ADC standard (1241), continue work on DAC standard (1658), and restart the probe

standard (1696) development. Planning will begin for participation in I2MTC 2010 in Austin, TX and the next ADC Forum in 2011 in Perugia, Italy. Specific activities of the five subcommittees are described below.

- **Subcommittee on Pulse Techniques (SCOPT) (181)** (Nick Paulter, Chair):
The IEEE-SA Standards Board approved a PAR to revise Std 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 (1057)** (Bill Boyer, Chair):
IEEE Std 1057-2007 was published April 18, 2008. The subcommittee will now focus 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 (1241)** (Steve Tilden, Chair):
The committee completed the editing at and after the June meeting in Norwood, Massachusetts. Then after final editing, we submitted the draft for ballot. The balloting committee has been formed with 38 registered voters. We did not receive the MEC edit requirements until 30 September which prompted a PAR extension of one year. Now the final edits have been completed and we are just waiting on Kathryn Cush and member services of IEEE to help us upload the new draft and resume the ballot. This subcommittee also participates actively in I2MTC and ADC Forum conferences. Further, we hope to increase promotion through papers and presentations at conferences and in publications as well as at the next ADC Forum to spread the word about the standard.
- **DAC Subcommittee (P1658)** (Steve Tilden, Chair):
The subcommittee made significant progress on the initial draft at its June meeting in Norwood, Massachusetts. It will continue that work toward creating an initial draft for ballot well before the PAR deadline of 31 December 2010. This subcommittee has now stopped recruiting new working members due to the impact new members usually have on committee work. Due to restrictive travel policies for most of our members, we intend to take more advantage of online WebEx meetings.
- **Subcommittee on Probe Standards (SCOPS) (P1696)** (Travis Ellis, Chair):
The subcommittee met by teleconference on June 4, 2009. The purpose of the meeting was to discuss increasing the activity amongst current members and how to recruit additional participants. The group continues to recruit new members but at this point we do not have any additional commitments. The overall activity level has been low as key members are tied up with other commitments.

TC-11 SCC-20 (ATLAS) Coordinators: by Joe Stanco

- Activities in the last six months:
This liaison report covers the Test and Diagnosis for Electronic Systems SCC20 organization / committee's activities from the last report up to the 2009-2 meeting held in Anaheim, CA in September of 2009. The status is presented by subcommittees:
 - The Diagnostic and Maintenance Control (DMC) subcommittee's Standard for Software Interface for Maintenance Information Collection and Analysis IEEE 1636 (SIMICA) companion dot standard IEEE 1636.1 Test Results and Session Information standard is planned to be updated to move it from trial use to full use.

The 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 review. IEEE 1445 DTIF was reaffirmed.

- The Test Information and Integration (TII) subcommittee currently has IEEE standard 1671 ATML overview and Architecture in the process being updated. The companion trial use dot standards, IEEE 1671.3 UUT Description and IEEE 1671.4 Test Configuration are planned to be updated to move them from trial use to full use. IEEE 1671.5 Test Adapter standard and IEEE 1671.6 Test Station standard were published in December 2008.
- The Test and ATS Description (TAD) subcommittee have the following active standards. IEEE standard 1641- 2004 Standard for Signal and Test Definition has undergone an update and is in ballot. The IEEE P 1671.1 Test Description completed ballot and has been approved for publication. IEEE 1671.2 Instrument Description was published in December 2008. IEEE-771 Guide to the use of ATLAS was reaffirmed.
- The Hardware Interface (HI) subcommittee standard IEEE-1505 RFI is in the process of being updated. IEEE 1505.1 was published in November 2008.
- A number of these TII, TAD and DMC standards were demonstrated at AUTOTESTCON 2009.
- Planned activities for the next six months:
Continue liaison and report salient SCC 20 activities and meetings. SCC 20 plans to meet in conjunction with AUTOTESTCON 2010.

TC-13 Wireless and Telecommunications in Measurement: by Reiner S Thomä

- Activities in the last six months:
 - Publication on calibration and evaluation of angular resolution potential of channel sounders at EUCAP 2009, Berlin and DSP&SPE Workshop 2009, Marco Island, FL
 - Organization (together with Prof. M. Jensen, BYU, Provo, UT) of a convened session on “Measurements Methods and Model Extractions for Wireless Systems” at XXIVth URSI General Assembly, 2008, Chicago (actually took place more than 6 month ago, but was not reported previously)
- Planned activities for the next six months:
 - Prepare convened session for EUCAP 2010 on “Propagation Measurement Based Performance Evaluation of advanced MIMO Systems” related to 3GPP LTE and LTE Advanced System test beds
 - Contribution of propagation measurements results at 60 GHz to IEEE P802.15 WPAN and IEEE 802.11ad WLAN standardization
 - Contribution to COST2100 activities on Over-The-Air (OTA) testing of MIMO terminals. Currently OTA testing sparks a lot of interest in 3GPP RAN4 and WIMAX forum for MIMO terminal performance and CTIA compliance evaluation

TC-15 Virtual Systems in Measurements by Emil Petriu

- Activities in the last six months:
 - Organized, 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.
- Planned activities for the next six months:

- Organize, 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 *HAVE2009 – 8th IEEE International Workshop on Haptic Audio Visual Environments and Games*, 7- 8 Nov, 2009, Politecnico di Milano, – Lecco Campus, Italy
- Organize, 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 and Fred. Surre

- Activities in the last six months:
 - Restructuring the whole TC to be effectively active (still on-going as new members have been contacted)
- Planned activities in the next six months:
 - informing the direction where industry research, development, and application are moving.
 - organizing/sponsoring conferences related to our topics in partnership with other scientific society For example, we will support 2 national conferences:
 - on interdisciplinary instrumentation (January 2010, France)
 - on optical measurements for industry (November 2009, France).
 In both cases, at least 100 participants will be present.

TC-19 Imaging Measurements: by George Giakos and George Zentai

- Activities in the last six months:
 - Organized, in collaboration with Tsinghua University, Shen Zhen, of the 2009 IEEE Workshop on Imaging Systems and Techniques (IST 2009) 11-12 May 2009, Shen Zhen, China.
 - Wuqiang Yang was an Honorary Chair of the IST 2009, Shen Zhen, China.
 - George Zentai was an invited speaker in IST 2009, Shen Zhen, China.
- Planned activities in the next six months:
 - Organization of the 2010 IEEE International Conference on Imaging Systems and Techniques (IST 2010), July, 1-2, 2009, Thessaloniki, Greece. An international team of experts has been assembled aimed to have another successful event.

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

- Activities in the last six months:
 - "Technical co-sponsorship" was establishment in co-operation with TC-9 SCS of the 6th International Conference for Conveying and Handling of Particulate Solids (CHoPS) between IEEE I&M and the Conference organizer. The Conference was held in Brisbane, Australia on 3rd - 7th August (<http://www.chops2009.org.au/index.html>).
 - TC-20 carried out in co-operation with TC-9 SCS a special track at CHoPS for sensors usable for materials the conference is focused on.
 - TC-20 has establish technical co-sponsorship between IEEE acting through its I &M Society and the K2 Competence Center "Virtual Vehicle" relating to the Graz Symposium Virtual Vehicle, GSVF held in Graz, Austria on the 27th – 28th April (<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 was held in Hong Kong May 11-13.
- Planned activities in the next six months:
 - At the CHoPS conference in August 2009 an agreement between Prof. A. Levy, chair of the CHoPS International Scientific Council, and TC-20 was established to cooperate more closely in the future. The instrumentation & measurement knowledge of I&M represented by TC-20 is helpful for CHoPS and I&M will profit from the scientific as well as application challenges illustrated by ChoPS.
 - The set up of 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 The Hague.
 - TC-20 supports the set-up process of the IEEE Austria Subsection on I & M.

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

- Activities in the last six months:
 - Co-chaired an engineering research and innovation conference sponsored by the National Science Foundation.
 - Contributed an article (co-authored with Dr. Ruqiang Yan) to the *I&M Magazine* on wavelet transform as a mathematical tool for non-stationary signal analysis.
 - Participated in an international conference on damage assessment of structures, chaired a session on signal processing and algorithms, and presented papers on adaptive processing of sensor signals for rotary machine conditional monitoring and health diagnosis.
 - Served on the scientific committee of the North American Manufacturing Research Institution of the Society of Manufacturing Engineers.
 - Served on the editorial boards of international journals on manufacturing research and mechatronics.
 - Initiated new collaborative research projects with the aerospace industry on manufacturing process monitoring using capacitance tomography technologies.
 - Co-organized a session on condition monitoring and diagnosis for the IEEE Prognostics & System Health Management Conference.
- Planned activities in the next six months:
 - Serve on the Technical Program Committee and review papers for the I2MTC 2010 conference.
 - Organize a session on advancement of built-in and self testing for the I2MTC 2010 conference.

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

- Activities in the last six months:
 - Organization of the 2009 IEEE International Conference on Computational Intelligence For Measurement Systems And Applications, May 11-13, 2009, Hong Kong, China, sponsored by the IEEE Instrumentation and Measurement Society and the IEEE Neural Networks Society.
 - The committee has also collaborated to the organization of the co-located IEEE International Conference on Virtual Environments, Human-Computer Interfaces, and Measurement Systems (VECIMS) 11-13 May, 2009.
 - The Committee has also organised the ROSE 2009 workshop, the IEEE International Workshop on Robotic and Sensors Environments, Lecco, Italy, 6-7 November 2009,

which was sponsored by the IEEE Instrumentation and Measurement Society. The committee has also collaborated to the organization of the co-located HAVE 2009 workshop.

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

- Activities in the last six months:
 - TC members were engaged in the organization of the 5th International Workshop on "Intelligent Data Acquisition and Advanced Computing Systems" – IDAACS2009, Cosenza, Italy (September 2009). IEEE I&M Society sponsored this event, which was co-chaired by two members of TC-23 (Prof. A. Sachenko and Prof. D. Grimaldi). Prof. Th. Laopoulos is chairing the International Advisory Board of IDAACS workshops. Papers related to I&M educational issues were presented at the workshop by TC-23 members and others.
- Planned activities in the next six months:
 - A novel educational approach to environmental education for high-school and college students is planned by TC-23 members, coordinated by TC chair. The idea is to illustrate the importance of measurements in relation with environmental monitoring issues by a "measurement systems" prospective. The role of measurements towards understanding environmental problems in every-day life is investigated as a new educational tool for the field of "environmental awareness education".

TC-25 Medical and Biological Measurements: by Marco Parvis

- Activities in the last six months:
 - The TC continues supporting the Medical Measurement and Application workshop which is gaining audience and popularity. The fourth edition has been MEMEA-2009 May 29-30, 2009 Grand Hotel San Michele, Cetraro, Cosenza, Italy. The workshop had 72 submissions, 57 accepted papers, 30 IEEE participants and a quite interesting figure of 19 non-IEEE attendees. The great success is confirmed by the final balance which shows more than 25% surplus.
 - The TC subcommittee on Blood Pressure Measurement (SCOBPM) is working on the first draft of the IEEE P1721 "Standard for Objective Measurement of Systemic Arterial Blood Pressure in Humans". A SCOBPM meeting has been held in Cetraro (CS), Italy, on May 30th 2009, just after the 4th IEEE MeMeA workshop, where the calibration of electronic blood pressure measurement instruments has been discussed by researchers coming from the medical field as well as electronic engineering and computer science fields.
- Planned activities in the next six months:
 - The TC is working on the organization of the next edition of the Medical Measurement and Application workshop. The 2010 location is still not decided.
 - The SCOBPM continues working on the draft standard and looks for people wanting to help in this activity. Volunteers aiming to participate to the draft preparation are welcome by sending an application to Prof. Voicu Groza (groza@site.uottawa.ca).

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

- Activities in the last six months:
 - Chaired and organized an NSF sponsored weather radar educational program at the National Weather Center.
 - Reviewed papers for *I&M Transactions*.
 - Continued development of a new multi-channel digital receiver system at the National Weather Radar Testbed in Norman, OK.
- Planned activities in the next six months:

- To attend I2MTC 2010, and Yeary will serve as the Technical Co-Chair
- Working to develop an anechoic chamber on campus over the next year or so.
- Working to develop radar based improvised explosive device (IED) detection techniques.
- Reviewing papers for the I2MTC conference and I&M Transactions.
- Continued interactions with the National Severe Storms Laboratory for the development of new weather radar systems.

TC-28 Instrumentation and Measurement for Robotics and Automation: by Mel Siegel and Pierre Payeur

- Activities in the last six months:
 - 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, 11-13 May 2009, Hong Kong.
 - Organization, in collaboration with TC6 - Emerging Technologies, TC22 -Intelligent Measurement Systems, TC-30 "Security and Contraband Detection", 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, 11-13 May 2009, Hong Kong.
- Planned activities in the next six months:
 - 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*, 7-8 Nov. 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*, 6-7 Nov. 2009, Politecnico di Milano, – Lecco Campus, Italy 18 October 2008

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

- Activities in the last six months:
 - Organization, in collaboration with TC6 - Emerging Technologies, TC22 -Intelligent Measurement Systems, TC-28 Instrumentation and Measurement for Robotics and Automation, 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*, 11-13 May 2009, Hong Kong.
- Planned activities in the next six months:
 - 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*, 6-7 Nov. 2009, Politecnico di Milano, – Lecco Campus, Italy

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

- Activities in the last six months:

- Sensor Standards Harmonization Working Group meeting
A Sensor Standards Harmonization Working Group (SSHWG) meeting was held on July 14, 2009 at NIST. Projects and issues of sensor devices and equipment interoperability were presented and discussed. Through the series of SSHWG meetings, participants can coordinate sensor-related standards activities in industry and government in support of homeland defense.
- Planned Activity for the next 6 months:
 - The next Sensor Standards Harmonization meetings are planned to be held in November 2009 and February 2010. Party interested to participate in the meeting can contact Kang Lee at kang.lee@nist.gov.

TC-34 Nanotechnology in Instrumentation and Measurement: by Cindy Harnett

- Activities in the last six months:
 - TC chair presentation at IEEE Michigan Section, USA meeting (November 2008) on integrating nanotechnology into microfabricated electronic devices.
 - Fall 2009 Introduction to Engineering seminar at Louisville emphasized sensor applications of nanotechnology to all incoming engineering students.
- Planned Activity for the next 6 months:
 - An article on nanotechnology in environmental sensing and measurement is forthcoming in IEEE Instrumentation and Measurement Magazine.
 - A summer 2010 undergraduate research program at University of Louisville is in place. Six engineering students will be supported for eight weeks to work on nanotechnology-enabled environmental measurements.

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

- Planned activities in the next 6 months:
 - Organize a seminar of two presentations:
 - 1) Advanced sensor technologies for aerospace applications (by Dr. Nezhir Mrad)
 - 2) Sensor Fusion (title to be determined) (by Dr. Erik Blasch)
 This event will be collaborated with other TCs in Ottawa.
 - Continue the work on inspection data format.

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

- Activities in the last six months:
 - Participation in I2MTC 2009, presentation of measurement and networking related papers at several IEEE conferences and workshops.
 - The TC is sponsoring the 8th IEEE International Workshop on Haptic Audio Visual Environments and their Applications (HAVE 2009 - <http://have.ieee-ims.org/>), that will take place in Lecco, Italy, next November.
 - Proposal of dedicated conference sessions for I²MTC 2010.
 - The organization of a dedicated workshop on TC-37 topics in 2011 has been discussed and a proposal will be submitted (by Prof. Leopoldo Angrisani, University of Naples “Federico II”) to I&M AdCom.
 - The progress of the European Union COST Activity named TMA (Traffic Monitoring and Analysis - <http://www.tma-portal.eu/>) has been monitored in view of possible cooperation.
- Planned activities in the next six months:

- Promote interest in “Measurements and networking” topics among the scientific community.
- Cooperate with the I2MTC 2010 Technical Committee by and offering help in the selection of suitable papers for possible dedicated sessions.
- If the proposed workshop on “Measurement & Networking” (M&N 2011) is approved, TC-37 will provide sponsorship and members will support the organization of the workshop, tentatively scheduled for Fall 2011.

TC-38 Space Measurements by John Schmalzel

- Activities in the last six months:
 - Organized IEEE 1451 Plugfest at SAS-2009, New Orleans, LA (Dr. Deniz Gurkan). Hardware and software was demonstrated from vendor (Mobictrum) and compliance testbed lab (U. Houston). Good discussion afterwards for planning input to next Plugfest. Use of standard application demo planned.
 - Sought to further IEEE 1451.x applications—e.g., demonstration system embedded in Smart & Intelligent Sensor Payload (SiSP) developed in conjunction with NESC’s Max Launch Abort System (MLAS) crew escape flight test article.
- Planned activities in the next 6 months:
 - Organization of the IEEE 1451 Plugfest at SAS-2010, Limerick, Ireland. Dr. Deniz Gurkan and Dr. John Schmalzel are planning for an expanded Plugfest.
 - Collaborate with TC-9 to help advance Smart Sensor standards to include elements of ISHM—e.g., health electronic data sheets (HEDS).
 - Organize smart sensor session at SAS-2010.
 - Organize smart sensor session at I2MTC-2010.
 - Contribute article/column to I&M Magazine.

TC-39 Measurements in Power Systems by Lorenzo Peretto

- Ongoing activities:
 - Collaboration with PES as chair of TC-39 of I&M Society for the organization of a Special Session in the field of measurements in power systems in the 1st IEEE PES Conference on Innovative Smart Grid Technologies that will be held on January 19-21, 2010, in Washington D.C.
- Organization of the 1st IEEE AMPS Workshop (Applied Measurements for Power Systems) to be held at E.ON Energy Research Center RWTH Aachen University, 22 - 24 Sept. 2010, Aachen, Germany.

Society News

Kang Lee

Report on ICEMI 2009

The I&M Society made its presence in IEEE Region 10 again. The Society was a technical cosponsor of the 9th International Conference on Electronic Measurement & Instruments (ICEMI 2009) held in Beijing’s Hot Spring Leisure City, August 16–18, 2009. ICEMI 2009 was hosted

by the IEEE Beijing Section and by the Chinese Institute of Electronics(CIE). It was organized by the Electronic Measurement and Instrument Society of CIE, Beihang University, and the Journal of Electronic Measurement and Instrument.

Over four hundred people attended the Conference. Although the majority were from China, other attendees came from 12 foreign countries, including Brazil, Croatia, Czech Republic, Germany, Italy, Japan, Korea, Malaysia, Netherlands, Sweden, USA, and UK. Academician Wei Li, the General Chair of the Conference and Beihang University President, opened the Conference to welcome the attendees. The Assistant General Secretary of CIE, Runhua Lin, then addressed the Conference and stated that, "The symbol of the modernization of a nation is mainly embodied in the level of electronic measurement and instrumentation of the nation." Afterwards, Kang B. Lee, I&M Society Vice President of Technical Activities and Standards, spoke to the attendees about the IEEE and in particular, the I&M Society, the fields of interest common to both the Society and the Conference, and the Society's support for the Conference. Several hundred complimentary copies of the I & M Magazine were offered to the attendees as a way to introduce the Society's technical activities to the attendees. This Conference took a slightly different approach in planning the keynote talks. Thirteen experts and scholars invited by the Program Committee addressed the attendees on state-of-the-art subject matters: from transducer design to test and instrumentation to new frontiers in measurement to next generation test system to smart sensor networks and standards. This diverse selection of topics was well received. In two years, the 10th International Conference on Electronic Measurement & Instruments (ICEMI 2011) will be held August 15-18, 2011 in Chengdu, Sichuan Province, China.