

*The IEEE Instrumentation & Measurement Magazine*  
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*From the Editor's Bench*

Shlomo Engelberg

**Making the World a Better Place One Action at a Time**

Each time we interact with the world at large, we choose how to structure the interaction. We probably do our best to behave responsibly and to carry out the duties with which we have been entrusted. This, however, is not enough. We should try to help people even when a narrow (and perhaps even correct) definition of our duties does not require it.

Anyone who is in a position of authority and is asked about whether or not something can be done is going to have to tell people “no” from time to time. Some people let that negative response be the end of the conversation. Often it should not be. Sometimes the answer would have been yes had the questioner known about and spoken to the right person. Often the person asked knows of the right person because s/he works in a related area. By taking the time to suggest to the questioner that s/he might consider speaking to this person, the person asked makes the world a better place and causes the questioner to realize that people do their best to help – even when they are not required to. Putting a little bit of extra time and effort into one’s job can make the world a much friendlier and more pleasant place.

“Time-servers,” people who do their job but do it with no real idea that they can and should use their job to help people, will often give a simple “no” when asked to do something which is not in their job description. People with a sense of mission, will answer “No, but I might be able to help you connect with someone who can...”.

At the magazine, we are always looking for helpful people who would like to make the world a slightly better place by sharing their knowledge with our readership. If you have an article you would like to contribute, please contact me at [shlomoe@jct.ac.il](mailto:shlomoe@jct.ac.il).

We at the magazine will be happy to consider your ideas. If you do not feel that you have anything that you wish to contribute right now, consider giving the magazine a “No, but maybe I can connect you with someone...” answer. If you know of someone doing work that you think should be shared with the community of instrumentation and measurement professionals, consider asking the person to write up what s/he is doing.

This month’s issue has tutorials, articles, and columns written by people who were willing to give a bit of themselves to benefit all of us. We have a tutorial on correlation dimension analysis and one about calorimeters. We have articles on a new way to deploy ocean instrumentation and structural health monitoring of bridges. We have a column contributed by Bob Fulks, recipient of the 2008 Keithley Award, which describes ways of applying our measurement expertise to investing.

The authors of our regular columns and departments have done their usual fine job of providing us with enjoyable reading. The regular columns deal with the history of the volt standard, measuring the spectral content of a signal, and some properties of a supercooled fluid. I hope you enjoy the magazine!

*Shlomo*

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## *President's Perspectives*

Kim Fowler

### **Activities and Ventures**

Throughout this year I have been writing about the workings of the society and the Administrative Committee (AdCom). Thus far I have introduced members of the AdCom and the staff. All of these folks are very approachable and will help you with your questions and concerns about the IEEE, the I&M society, and how you might become more involved.

This issue continues the theme of volunteerism, value, and ventures and introduces some of the society's activities and ventures. The goal is that they provide value to you and a forum for volunteering.

#### Current Activities

The I&M Society has several primary activities. It publishes the IEEE Transactions on Instrumentation and Measurement and the IEEE Instrumentation and Measurement Magazine. The society also supports Technical Committees and sponsors conferences. The Technical Committees prepare technical standards, and each committee provides additional guidelines for particular technical arenas. Conferences, of course, are important for networking and exchanging the latest technical information.

#### New Ventures

The society plans to enhance its programs by providing more educational avenues and technical materials. Here are some ventures that the I&M leadership is currently developing:

- education through the International Measurement University (IMU),
- conference tutorials, both paid and free,
- free web tutorials,
- the Distinguished Lecturer Program,
- our society website use and developing our society's presence in the IEEE island in Second Life, and
- books on instrumentation fundamentals.

We are considering more possibilities, too. Your thoughts and suggestions are most welcome. We would love to have more people involved in these activities and future ones, too. Please consider volunteering and collaborating with us to provide even greater value to you and the rest of our membership.

We frequently update the I&M Society's website at <http://www.ieee-ims.org/main/>. It is a good starting point for checking out the current activities and initiatives of the society and where you might contribute. As always, you may contact me at [kimf@ieee.org](mailto:kimf@ieee.org).

(A short photo collage follows this column in the magazine).

Kim

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## *Article Summaries*

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### *The Wave Glider: A New Concept for Deploying Ocean Instrumentation*

Justin Manley and Scott Willcox  
(Summary)

The Wave Glider is a new class of persistent ocean vehicle. Development of the Wave Glider vehicle began in 2005 with a vision of enabling new types of ocean observations independent of costly deep-water moorings or ship operations. The key innovation of the Wave Glider is its ability to harvest energy from ocean waves to provide essentially limitless propulsion. This provides an entirely new approach to deploying ocean instruments and thus enables new concepts of operations for ocean applications.

*This summary includes text from the article.*

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### *Structural Health Monitoring of Bridges Using Wireless Sensor Networks*

Tyler Harms, Sahra Sedigh, and Filippo Bastianini  
(Summary)

Recent years have witnessed the development of wireless Structural Health Monitoring (SHM) systems specifically designed for low power consumption and long-range communication, both of which facilitate autonomous and remote monitoring to ensure public safety on bridges. The Smart-Brick platform presented in this article is a completely wireless and fully autonomous system that offers onboard and external sensors for measurement of environmental and structural phenomena such as temperature, strain, tilt, and vibration. The SmartBrick base station implements the embedded quad-band modem for mobile communications/general packet radio service (GSM/GPRS) which is used for bidirectional long-range communication over the cellular phone infrastructure.

*This summary includes text from the article.*

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### *Correlation Dimension Analysis: A Non-Linear Time Series Analysis for Data Processing: Tutorial 28*

Ruqiang Yan, Yongbin Liu, and Robert X. Gao

(Summary)

Correlation dimension analysis, as one of the non-linear time series analyses, provides a useful tool for characterizing a physical system where non-linear behavior exists. Case studies in applying the correlation dimension analysis for bearing degradation and gearbox wear measurement have demonstrated its effectiveness in revealing non-linear features of a given time series. Because of this capability, non-linear time series analyses have attracted increasing applications in many fields, such as biomedical engineering and manufacturing.

*This summary includes text from the article.*

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## *Calorimeters and Techniques Used for Power Loss Measurements in Electrical Machines: Tutorial 29*

Wenping Cao, Greg M. Asher, Xiaovan Huang, He Zhang,  
Ian French, Jianyong Zhang, and Michael Short

(Summary)

Efficiency and thermal performance have become extremely important to designers, manufacturers and end users of electrical machines and power electronic devices. Accurate power loss results can lead to improved device design in thermal management, overall performance, and energy efficiency. In recent years, there has been a growing use of calorimeters since they directly measure heat losses through convection, conduction and radiation which enable an indirect measurement of power loss. This tutorial gives background about calorimeters, provides a quick reference guide to calorimeters that are used to measure power loss in electrical components and devices, and presents important characteristics to include in the design of a calorimeter.

*This summary includes text from the article.*

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## *Column Summaries*

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### *Instrumentation Notes*

Shlomo Engelberg and Edmond Chalom

#### **Measuring the Spectral Content of a Signal: An Introduction**

(Summary)

Fourier analysis is often thought of as a technique for measuring the spectral content of a signal over the period in which the signal was measured. In this column, the authors discuss techniques that allow the use of Fourier analysis to provide accurate measurements of the instantaneous frequency of a signal. They discuss the short-time Fourier transform and its main problem, the fact that it gives a very coarse estimate of the frequency. The authors show that it is possible to use the phase information provided by the discrete Fourier transform (DFT) to produce a much

sharper estimate of the frequency and how the improved estimate can be used to build a virtual FM demodulator.

*This summary contains text from the column.*

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## *Recalibration*

Robert Fulks

### **Applying our Measurement Expertise to Investing** (Summary)

This column discusses how principles of electronic power analysis can be applied to financial market data to understand and predict stock market trends over time. Technical analysis attempts to find good trades and investments by measuring characteristics of the past prices of an investment, charts that look very similar to the waveforms on an oscilloscope screen. Some examples of economic indicators are presented and compared with traditional signal power “artifacts” introduced by making calculations on sampled data.

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

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## *History of Physical Standards*

James F. Schooley

### **Charge It, Please!** (Summary)

As with all of James Schooley’s columns, this historical survey presents an interesting look at the development of a key tool in electronic measurement over the past centuries. In this issue, he discusses the development of the battery cell and the use of the volt as a measurement unit, presenting an historical account of key discoveries and instruments by European as well as American innovators. The column details the work of Alessandro Giuseppe Antonio Volta and Josiah Lattimer Clark through the work of George Vinal and Walter Hamer at the National Bureau of Standards, and explains the impact of Brian Josephson’s discoveries on the development of international electromotive force measurement standards.

*This summary was written by Kristy Virostek.*

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## *My Favorite Experiment*

John Witzel

### **At What Temperature Does Water Actually Freeze?** (Summary)

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After discovering that very cold bottles of water would transform from liquid to ice upon being removed from the refrigerator and jostled about, the author conducted a methodological look at the temperature changes occurring in supercooled water to explain the observed phenomenon. He identified the originating temperature of the water and the amount of agitation necessary to produce the exothermic event of producing slush.

*This article was summarized by Kristy Virostek,*

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## *Departments*

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### *Society News*

Alessandro Ferrero and Dario Petri, IMU CoChairs

#### **IMU Celebrated Its Third Anniversary**

In July, 2010, the third session of the International Measurement University (IMU) took place in Trento, Italy. It followed the first two editions of the school organized by the IEEE Instrumentation and Measurement Society in 2008 and 2009. During this third year, the I & M Society has witnessed that the IMU met the expectations that led to its organization. The attendees have learned and developed relationships that will foster sharing knowledge.

It is organized as a week-long program aimed at providing a strong background of the fundamentals of measurement to Ph.D. students, young scientists, and entry level engineers in all fields. IMU promotes collaborative networks among researchers and experts in a variety of fields. During the university experience the participants meet some of the major worldwide experts in the different fields of instrumentation and measurement. They have the opportunity to spend one-on-one time with the speakers to get useful mentoring advice and discuss problems specific to their area of research and their projects. An exchange of ideas among students is promoted and considering the good friendships that students have built during the last three years, we can now say that mentoring goal has been fully achieved.

IMU students learn that the knowledge of instruments and their operating principles is important, but it is not enough. In fact, a solid background in the fundamentals of measurement science, measurement methods, the mathematical basis of either signal analysis or digital signal processing, the mathematical and statistical theories for representing incomplete knowledge, and the current standards and recommendations is needed.

To this aim, advanced multi-disciplinary topics at IMU have included:

- measurement fundamentals, including a survey on uncertainty expression and evaluation, and the International System of units and standards;
- fundamentals of the architecture of the modern instruments, including a survey on ADC and DAC structures, DSP theory, distributed measurement systems, sensors and sensor networks; and
- modern and next generation measurement systems, including system identification problems, future power systems (smart grids) measurement problems, non-destructive test methods, and biomedical measurements.

IMU has been more than a technical school. Hosted in the very nice, efficient campus of the University of Trento students have been surrounded by the magnificent scenery of the Italian Dolomite Mountains, enjoyed the landscape while socializing with speakers and fellow attendees, and tasted delicious Italian cuisine at luncheons and dinners. Social activities have been organized to strengthen networking among participants and guest lecturers, so that IMU will be remembered not only as an occasion to build a solid technical background, but also some lasting friendships that, we hope, will foster new collaboration for the advancement of knowledge in the I&M field. Feedback from participants makes us confident that the goals for IMU have been achieved, and we hope new students will join us in the coming years.

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## *New Products*

Robert Goldberg

### **Handheld Spectrum Analyzer Makes In-field Measurements Easier, Faster, and More Precise**

Agilent Technologies, Inc. introduces the N9342C handheld spectrum analyzer (HSA). It is a powerful and straightforward instrument designed for RF technicians and engineers performing installation, maintenance and surveillance of RF systems in the field. The N9342C HSA makes field testing easier by providing faster, more precise measurements, ease of use, and a range of user customization and ergonomic features.

Agilent's N9342C HSA provides fast and accurate measurement of RF and microwave equipment and RF environments from 100 kHz to 7 GHz, tunable to 9 kHz. RF and microwave equipment measurements include transmitter and component test, receiving path signal monitoring and antenna tuning. RF environment measurements include band clearance, signal coverage and interface hunting. The HSA's RF performance ensures first-time measurement accuracy, while a unique Task Planner capability which cuts test setup time by 95 percent and allows users to boost their work efficiency automates routine measurement tasks.

An optimized keypad design allows access to most measurement functions within just two button pushes. A rugged, fanless design makes it well suited for tough field environments, while a unique optional three-in-one ergonomic backpack ensures comfort and provides true hands-free operation. Moreover, with automatic LCD brightness and keypad backlight control, the instrument's screen can be easily viewed day or night.

For added flexibility, the N9342C HSA can be remotely controlled via a USB/LAN connection and free N9342C HSA PC software. A dedicated user key and customizable frequency channel table, frequency/amplitude correct and limit allow the user to personalize the instrument setup. Other key features of the N9342A HSA include:

- . a built-in optional 7 GHz tracking generator;
- . a built-in optional GPS receiver and GPS antenna that provide precise location information;
- . an optional spectrum monitor with spectrogram record and playback functions;
- . optional support for an optional Agilent USB power sensor that offers high-accuracy, power measurement up to 24 GHz;
- . an optional user data sanitation feature for security purposes;

- . an optional 8 GHz directional antenna that enables users to hunt for interference; and
- . a built-in power connector for an Agilent active RF probe that ensures precise in-circuit measurements.

Please visit [www.agilent.com/find/n9342C](http://www.agilent.com/find/n9342C) for more information.

## **Microwave Test Solutions Up To 500 GHz**

Rohde & Schwarz (R&S) announces new Test & Measurement solutions covering up to 500 GHz. The highlights include the R&S FSVR real-time spectrum analyzer up to 30 GHz, the R&S SMZ frequency multiplier up to 110 GHz as a practical supplement to the R&S SMF100A signal generator, as well as network analysis up to 500 GHz based on the R&S ZVA high-end network analyzer from Rohde & Schwarz. In addition, the company presents its two new oscilloscope families with bandwidths ranging from 500 MHz to 2 GHz.

The new R&S FSVR real-time spectrum analyzer combines a fully functional signal and spectrum analyzer with a real-time spectrum analyzer. In real-time mode, the R&S FSVR detects everything, from highly sporadic single events to ultra-short signals. Measurement without blind times benefits developers of RF components for commercial transmission systems such as LTE, WiMAX™, WLAN, Bluetooth® or RFID, and for general-purpose RF applications such as radar or frequency-hopping transmission. R&S claims the FSVR measurement speed is up to five times higher than that of other analyzers on the market.

The new R&S SMZ frequency multiplier family provides convenient microwave measurement capabilities in the 50 GHz to 110 GHz range. The family includes the R&S SMZ75 (50 GHz to 75 GHz), R&S SMZ90 (60 GHz to 90 GHz) and R&S SMZ110 (75 GHz to 110 GHz) models. The R&S SMZ multipliers can be optionally equipped with either a built-in mechanical or electronic level controller. They can be controlled by the R&S SMF100A microwave generator via USB so that the generator and the multiplier function as a single unit. Via this interface, the R&S SMF100A receives all required data, such as configuration, multiplication factor, or the pre-calibrated frequency response needed for automatic correction. As a result, the frequency and level values that were set on the microwave generator are present at the multiplier's output. This eliminates error-prone and time-consuming level measurement with a level detector or power sensor which usually takes place in conventional development and production test setups.

The new 500 GHz converter expands the frequency range of Rohde & Schwarz network analyzers to 500 GHz. The converter is simply connected to a Rohde & Schwarz high-end network analyzer from the R&S ZVA family. No extra hardware is required. The combined unit can be operated and calibrated exactly like the base unit. The new R&S ZVA-Z500 converter allows millimeter-wave measurements with a dynamic range typically greater than 65 dB. Components such as amplifiers, mixers, filters, couplers or components on wafers can be analyzed with the converter.

The new R&S RTO family of oscilloscopes is designed for speed and signal fidelity. Capable of analyzing one million waveforms per second, these scopes make even the rarest errors visible in an instant. Trigger jitter is minimized by the digital trigger system which R&S claims to be the first to be implemented in an oscilloscope. The clever user interface provides a good overview, even in the case of complex measurements. The new oscilloscopes will initially be available in

two-channel and four-channel models with bandwidths of 1 GHz and 2 GHz and a maximum sampling rate of 10 Gsample per second.

Find more information at [www.rohde-schwarz.com](http://www.rohde-schwarz.com).

### **Tester Supports 3GPP WCDMA Release 9**

Aeroflex announces added support for the TM500 Test Mobile for the 3GPP WCDMA Release 9 standard, the latest evolution of the HSPA+ standards, which permits concurrent operation of MIMO (Multiple-Input, Multiple-Output) and DC-HSDPA (Dual Cell High-Speed Download Packet Access). This doubles the maximum data rate to 84 Mbps.

The TM500 Rel-9 DC-HSDPA L1L2 Test Mobile enables 3G infrastructure equipment manufacturers to perform rigorous testing of their DC-HSDPA base stations, speeding up the development of infrastructure equipment and its deployment in networks.

The new TM500 model provides full implementation of HSDPA Categories 1-28, including DC-HSDPA, MIMO, and 64QAM. Support for seamless reconfiguration from single cell HSDPA to dual cell HSDPA and vice versa is provided via HS-SCCH orders. Legacy features from Release 99 to Release 8 are also supported, including soft handover for up to six cells.

For more information, please visit <http://www.aeroflex.com/>.

### **Innovative Connector for the Test & Measurement Industry**

Virginia Panel Corporation (VPC) announces i2 Micro iCon as the newest member of VPC's iCon connector family. VPC developed the low I/O 168 signal pin connector to serve as a drop-in replacement for 156 pin ZIF DL connectors.

i2 offers a solid state, one piece module receiver in each connector, making it ideal for low I/O applications in a variety of industries including automotive, aerospace, and telecommunications. i2's 0.8 in (2 cm) foot-print enables horizontal stackability and the 30 degree angled cable exit reduces the height required by the connector, mini-mizing the vertical space between connectors in a multi-connector panel layout. i2's engaging mechanism inte-grates spring locking tabs that fasten over the latching post for secure engagement.

The use of VPC's QuadraPaddle® signal contact technology in a standard crimp or twin female configuration allows multiple options. VPC's new 84 pin right-angle header enables direct connection from the i2 receiver to a PCB using solderless compliant pins for easy installation.

For more information about i2, visit [www.vpc.com/i2](http://www.vpc.com/i2).

### **Cable Brings Ethernet Communication to Analog Signal Conditioning Modules**

Acromag cable interfaces industry-standard 3B and 5B backpanel's 26-pin IDC ribbon cable connector to Acromag's Ethernet Analog I/O modules for Modbus TCP/IP transmission of sensor signal measurements. Users of the popular 3B and 5B isolated signal conditioning

modules can now connect to Acromag's BusWorks® 958EN or several of their EtherStax® Ethernet analog I/O modules for an easy interface to remote control networks.

The new 4001-110 cable provides a DB25 male to 26-pin female IDC ribbon cable connection which interfaces a rack of up to 16 3B or 5B modules providing conditioned voltage signals from analog sensors to the Ethernet I/O modules. Converting the signal conditioners' outputs to digital data, the Ethernet I/O modules can provide Modbus TCP/IP communication to PCs, PLCs, and other distributed control devices. Typical applications include SCADA, process control, and test and measurement systems.

For more information about Acromag, please visit [www.acromag.com](http://www.acromag.com).

### **Literature Describes Sensor Products for Sanitary Applications**

Literature from Omega's DILBERT™ NEW HORIZONS® in Products for Sanitary Applications Version No. 27 contains over 180 pages of the latest information on products for the sanitary food, beverage, pharmaceutical, biomedical and related process markets or lab operations, including Digital RTD Thermometers with NEMA 4 Enclosures for wash down, sanitary, and marine applications.

The products described are 3-A approved and include Sanitary RTD Sensors, RTD Temperature Transmitters with 316 Stainless Steel Construction, ideal for Wash-down, Outdoor, Sanitary or Marine Environments and Wireless RTD Probe/Transmitter Assemblies for use in Sanitary Applications.

The literature is complete with six informative sections on Sanitary Temperature Sensors, Sanitary Process Sensors, Control/ Displays, Enclosures/Components, Sanitary Laboratory Instruments, and Data Loggers.

Please visit [www.omega.com/literature/sanitary/](http://www.omega.com/literature/sanitary/) for more information.

### **Thermal Imaging Camera Offers Thermal Imaging and Temperature Measurement**

The new FTI-E 1000 camera from Land Instruments is suited for high-temperature applications. Operating at 1µm, the new instrument combines high-resolution thermal imaging with accurate temperature measurement from 600 to 3000°C/1100 to 5400°F, over a range of 4 models.

The FTI-E 1000 can resolve targets as small as 0.013 mm square. Features include:

- . High resolution radio-metric thermal imager – giving detailed temperature information transmitted via a high speed digital connection,
- . Choice of robust housing suitable for harsh industrial environments ensuring ultimate measurement reliability and availability,
- . Choice of 4 models ranging from 600 to 3000°C/1100 to 5400°F, plus 3 field of view options – suitable for a wide range of applications, and
- . High temperature measurement accuracy – enabling optimum process control, simple installation and ease of use – minimizes cost and complexity.

For further details, please visit [www.landinst.com](http://www.landinst.com).

### **Radio Telemetry System for Temperature Profiling**

Datapaq introduces the new RF Radio Telemetry system TM21 to complement their TPAQ21 and MultiPaq21 datalogger products. The TM21 system utilizes the latest radio frequency technology to allow temperature data transmission from the datalogger in real time. As the Datapaq system travels through the process (oven, furnace or kiln), temperature data can be viewed, analyzed and reported instantaneously. Such a system improves the way in which many processes can be monitored more efficiently and productively.

New features of the TM21 system include:

- . Multiple Logger Operation – Operates with multiple loggers running at the same frequency and collects data with one installation of the Datapaq Insight™ software,
- . Auto Frequency Set-up – Automatic transmission frequency optimization and selection from software, eliminating interference problems and guaranteeing signal quality,
- . Intelligent SW Diagnostics – Comprehensive onscreen real time diagnostics reporting signal status for each transmitting logger and receiver,
- . Transmitting Power – Transmission performance optimized for high temperature operation with internal self calibration routines and listen before transmit features,
- . Improved Logger Performance – Reduced power consumption, extending battery life and operating life, and
- . Modular Configuration – The primary receiver can be complemented by a series of secondary receivers positioned at regular intervals along a process to guarantee data quality.

The benefits of combining RF telemetry and temperature profiling are many. Before the Datapaq datalogger has even left the heating device, you will have the information necessary in real time to make any adjustments needed in your process to ensure product quality and reduce scrap. For many batch processes, such information may permit significant reduction in cycle times, thereby increasing productivity and reducing energy costs. In optimization or validation studies, the ability to see the effect of process parameters on the temperature profile can help significantly reduce process set-up times and allow quicker production start up.

For more information, please visit [www.datapaq.com](http://www.datapaq.com).

### **Miniature High Intensity Piezoresistive Pressure Microphone**

Meggitt Sensing Systems introduces the Endevco® model 8510B, a miniature, rugged, high-sensitivity piezoresistive pressure microphone, designed for the precision measurement of high-intensity sound within a variety of demanding environments.

With available ranges of 1, 2 and 5 psig, the Endevco® model 8510B offers a 300 mV full scale output and a range of at least 100 to 190 dB SPL, in a highly rugged four-active arm strain bridge design that is diffused in a sculptured silicon diaphragm. This miniature pressure microphone offers integral temperature compensation from -18°C to +93°C, ensuring measurement accuracy over its full temperature range with excellent linearity, even at three times over-range. Units also offer high resonance frequencies for accurate measurements over the full audio range, with five

times minimum burst pressure and 20,000 g shock survivability. These technical attributes make the Endevco® model 8510B a high performing pressure microphone.

The Endevco® model 8510B pressure microphone uses a 10-32 thread (metric threads available on custom order) for convenient mounting within space constrained environments, and also permits flush mounting on flat or contoured surfaces for boundary layer measurements in flight test, wind tunnels and engine inlet acoustic studies. A 30-inch (76.2 cm) integral cable is standard, with custom lengths available on request. For customer convenience, the model 8510B comes standard with a vent tube, which can be vented to the ambient atmosphere or connected to a standard reference manifold. Recommended for use with the Endevco® model 8510B are the model 136 three-channel signal conditioner, model 4430A signal conditioner, or the model 4990A (Oasis), all available from Meggitt Sensing Systems.

For detailed technical specifications, drawings or additional information about the Endevco® model 8510B or other products available from Meggitt Sensing Systems, visit [www.meggittsensing.com](http://www.meggittsensing.com).

### **Dual Channel Phase Noise Test System Uses Cross-Correlation to Cancel Noise**

Noise XT features its unique Dual Channel Phase Noise Test System (DCNTS). The DCNTS is a two-channel phase and amplitude noise analyzer designed with a dual demodulator architecture that allows the test system to use cross-correlation to cancel its internal noise. The resulting tests are similar to comparing the output of two separate systems, while displaying only the similarities and rejecting the differences. The residual noise measurement front-end includes all the necessary hardware to automatically measure noise on 2-port devices, either in RF or microwave frequencies. Pulse compatible, the DCNTS meets the needs for demanding aerospace and defense applications.

For more information, please visit [www.noiseXT.com](http://www.noiseXT.com).

### **Near Infrared Digital High-Speed Camera**

Vision Research has added more versatility to its digital high-speed cameras with the introduction of the Phantom® ir300. At the heart of the new Phantom ir300 is a specially engineered 800x600 CMOS sensor that allows users to image fast-action events which occur beyond visible light into the near infrared (NIR) spectrum. While the sensitivity of most CMOS sensors begins to rapidly decline at wavelengths above 600 nm, the Phantom ir300 extends that point to greater than 800 nm, giving the camera a usable range to about 1100 nm. If illumination is required, NIR light sources, such as lasers or 850 nm wavelength LED lights, can be used. This allows users to illuminate a subject and capture high-speed video without having to resort to the use of visible light. Imaging at these wavelengths is extremely beneficial for a number of applications where the use of visible light would be detrimental.

The Phantom ir300 can capture images between 6,688 fps and 190,000 fps, depending upon resolution, and users have the ability to adjust exposure to as short as 2 microseconds. Additional features of the Phantom ir300 include:

- . 14-bit image depth,
- . 4800 ISO monochrome (in the visible spectrum),
- . Continuously adjustable resolution in 32x8 increments,

- . Global on-chip shuttering to 2 microseconds,
- . Extreme Dynamic Range (EDR) and Auto Exposure,
- . 8GB or 16GB versions,
- . IRIG-B timing capture, modulated or unmodulated, IRIG lock with phase shift,
- . Video output (NTSC, PAL, HD-SDI),
- . Gb Ethernet control,
- . Automated continuous recording for remote, unmanned operation,
- . Optional external mechanical shutter for hands-off black references, and
- . Optional Canon EOS lens mount for remote lens control.

Additional information and detailed specifications for the Vision Research Phantom ir300 can be found at [www.visionresearch.com](http://www.visionresearch.com).

### **Expanded Measurement Options for Data Loggers**

Onset has broadened its offerings for energy and environmental monitoring by expanding the range of measurement options for its line of HOBO U12 data loggers. Specifically, multi-channel versions of HOBO U12 data loggers can now measure and record kilowatts, air velocity, gauge pressure, differential pressure, dc current and other energy and environmental parameters.

The expanded measurements are possible through the introduction of a new, compact power adapter. The adapter enables energy and building management professionals to conveniently power external sensors that require 12 volt ac excitation power. This augments the company's existing line of measurement options, which includes air temperature, relative humidity, light intensity, ac current, and ac voltage. The adapter can also power any user-supplied external sensor that requires up to 400 mA at 12 Vdc.

HOBO U12 data loggers are small, durable devices designed for high-accuracy indoor environmental and energy monitoring. They can record data unattended for days, weeks, or months at a time storing up to 43,000 measurements. Using a USB connection, HOBO U12 data loggers offer convenient, high-speed data offload directly to a computer or to a HOBO U-Shuttle data transport device.

For plotting and analyzing data gathered by the HOBO U12 data loggers, Onset offers HOBOWare® software, an intuitive graphing and analysis software package for Windows and Macintosh. HOBOWare provides a user-friendly interface for graphing, analyzing, and printing data files as well as exporting data to Microsoft Excel and other spreadsheet programs.

For more information, please visit [www.onsetcomp.com](http://www.onsetcomp.com).

### **Laser Field Probes Do the Work of Several Probes**

AR RF/Microwave Instrumentation has introduced two new laser-powered E-Field probes, Model FL7040 (2 MHz – 40 GHz) and model FL7060 (2 MHz – 60 GHz). They are versatile in that they do the work of multiple probes with high accuracy and linearity for demanding field monitoring requirements. They contain an internal microprocessor that provides advanced control and communication functions while automatically correcting for measurement drift caused by temperature changes.

The two models cover a very wide frequency range; and because they are laser-powered, they provide the added convenience of never having to replace or recharge batteries. The new probes are the latest additions to AR's selection of probes, and AR claims it to be the largest family of probes in the industry.

For more information, visit [www.ar-worldwide.com](http://www.ar-worldwide.com).

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## *Membership Notes*

Mihalea Albu

### **Interview with Lorenzo Peretto, a Member of the Italian IMS Chapter**

At the end of 2010, our Society has 37 chapters. Local IEEE communities have helped organize activities that span engineering subjects, measurement science, and new technical views and, equally importantly, that help satisfy the curiosity that lives within each of us. While trying to better serve our members, we need to know more about how they see themselves shaped by the IEEE membership – beyond names, technical excellence, and volunteering – who are our colleagues?

One of the largest and extremely active IMS Chapters in Europe is the Italian Chapter. Many of its members contribute significantly to the Society. Here we present an interview with one member, Lorenzo Peretto. A short biography of his states:

Lorenzo Peretto received his MS and PhD degrees in Electronic Engineering and Electrotechnical Engineering from the University of Bologna in 1993 and 1997, respectively. He joined the EE Department as an Assistant Professor and then became an Associate Professor. He is a Senior Member of IEEE, participated in the IEEE working group for the revision of Standard 1459-2000 and has worked in the IEC TC 25, “on the new definition of the Ampere.” He is an IEC representative in the BIPM Joint Committee for Guides in Metrology. He is chair of the IMS TC 39. He has authored or co-authored more than 150 scientific papers and is a co-inventor of 21 Patents.

Intrigued by such prolific activity, I asked Lorenzo these questions:

*M.A.: Please tell us a about your engineering profile.*

L.P.: I own a company along with my business partner, Altea B.V., which sells voltage and current sensors for a variety of applications in medium voltage power systems. We also sell distributed measurement systems for fault detection and location in power networks. All of our products are designed to be suitable for Smart Grids architectures. They are small, compact, light, have low power consumption and mainly, they can be connected to communication devices for a remote control and measurements.

*M.A.: Did the Engineer in you ever come in conflict with the Educator?*

L.P.: Never! I find that the more I learn about the issues, mechanisms, and challenges in power networks and in actual electrical systems, the better and more clearly I can transfer that knowledge to students. A good teacher needs to be experienced in both theory and practice. So

having the knowledge of practical issues and how to solve them makes the theory description provided to the students clearer. This has been demonstrated many times.

M.A.: *In short, what is your IEEE trajectory? What do you think is the "core" of IEEE membership?*

L.P.: I have been a member of IEEE since 1998 and a senior member (SM) since 2003. I joined the IEEE Instrumentation and Measurement Society (I&MS) at the beginning of my career. In my opinion, the core benefits of IEEE membership are represented by some important features. First of all one can share discussion, opinions, and principles with colleagues coming from around the world during International Conferences. Second, these are extraordinary opportunities to update your knowledge, to get to know new people, to learn the state of the art in research themes of your interest, and to face new challenges. IEEE offers a very large variety of conferences, so one can choose the ones better suited to his/her research topics. Third, the IEEE also gives us the very important opportunity to join Technical Committees whose main goals are to propose and provide Technical Standards related to both real-world applications and academic research.

M.A.: *What would you like to see the I&M Society doing in the future?*

L.P.: I would like to see I&M Society more involved in the applications world (in a technological perspective). During the years I have been going to conferences, I have gotten to know people who were expert in their fields who were attending both workshops and I&M Conferences. It would be very useful if we could exploit their vast knowledge of practical information from their fields. From my activity as an engineer, I have realized that many of these different fields of measurements also need new technical standards, definitions and guidelines written for industry. I have seen a need for guides: cookbooks on how to perform measurements, how to manage the uncertainty information, etc.

M.A.: *You are the chair of Technical Committee 39, Measurements in Power Systems. How does this TC's work keep up with the world's 24/7/on-line and fast evolving electrical engineering times?*

L.P. This area of power systems and their measurement is growing very fast worldwide and is gaining more and more attention by a large variety of people involved in this field. One goal of this TC is to provide fast responses to current issues and problems found nowadays in electrical power systems. I think that the first beneficiaries of this TC should be the electrical utilities and the industries of this sector. Many measurement problems can be collected from people in industry as well as in utilities and addressed by the TC members who are qualified to provide answers. Today, many people in industry are faced every day with people's inputs who are 'not experts' with often tragic consequences. That is why I consider it a must that researchers and experts in this field have a way to convey their knowledge freely.  
(This interview took place on August 13, 2010.)

### **The Graduate Fellowship Grant and the Faculty Course Development Grant** Kristen Donnell

The I&M Society is pleased to announce the Graduate Fellowship Grant, to support and encourage graduate-level research in the areas of Instrumentation and Measurement, and the Faculty Course Development Grant, to support and encourage faculty members to develop a new course or significantly revise an existing course with specific focus on Instrumentation and/or

Measurement, taught in an engineering/physics/science curriculum. Details on the grants can be found in the Education area of the I&M website ([www.ieee-ms.org](http://www.ieee-ms.org)). For questions, please contact Kristen Donnell ([kmdgfd@mst.edu](mailto:kmdgfd@mst.edu)).