

# *The IEEE Instrumentation & Measurement Magazine*

## *August 2012 Issue*

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### *A Sample of Highlights from AUTOTESTCON 2011*

Jointly presented by the IEEE Instrumentation & Measurement  
and IEEE Aerospace & Electronic Systems Societies

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### *From the Editor's Bench*

Mike Gard

#### **Change of Seasons**

Ecclesiastes 3:1 says, "To everything there is a season..." (The King James Version of the Bible.) Regular readers will find this column has an unfamiliar author. After three years as Editor-in-Chief (EIC), Shlomo Engelberg has transferred EIC responsibilities to Mike Gard. Shlomo worked diligently to stock the editorial calendar, ensuring this transition would take place in good order. A recent readership survey (the I&M Magazine June 2012 issue, pg. 8) confirmed that Shlomo and the Magazine staff, the I&M Editorial Board, and our publishing partners at Allen Press have done a consistently good job of preparing a publication which is informative, useful, and timely. We all deeply appreciate Shlomo's diligence, exceptional effort, and effectiveness.

Will this transition affect the I&M Magazine's content? No – the Magazine is flourishing, and nothing needs to be changed. Reader input will continue to guide editorial effort. Nearly half of Magazine survey respondents indicated a desire for more applications-related material and more information useful in industrial practice. Articles and tutorials with a practical, industrial flavor have always been high priorities, but it is sometimes difficult to get suitable articles. Industrial practitioners typically carry heavy workloads with inflexible schedules, and many industrial employers neither recognize nor reward technical publications as part of the engineering career path. When time is short, we prioritize and do what we must, sometimes forcing would-be authors to delay good material for years.

Some employers discourage publications or subject them to time-consuming internal review processes in an effort to protect intellectual property or commercially valuable technology. The new EIC appreciates these difficulties, having spent forty years as an engineer in industry. So – to the Magazine's industrial readers – we'd very much like to hear from you. An article submission would be wonderful. If that isn't possible, please let us know which topics you wish to see in articles or tutorials. Our society touches almost every aspect of instrumentation and measurement science. In all likelihood, someone will be able to address the topic. We certainly will try to be responsive.

Does this mean articles with a theoretical emphasis will meet with diminished interest? Absolutely not. The Magazine is intended for a more general audience than the Transactions, but there is continued, recognized need for academic knowledge in the industrial workplace. If anything, we believe more applications-oriented articles will bring academic practitioners greater

awareness of industrial issues and problems deserving academic attention. We all win when we educate each other.

This issue contains selected papers from AUTOTESTCON 2011. You will find information about vector network analyzers, power and signal switching relays, ground support equipment test, wiring fault location by TDR, use of SIMICA Standards in a maintenance environment, and .NET test sequence programming. It's a rich mix. We believe you will find this issue informative and useful.

And, finally, a note to Shlomo: thank you for all you've done to make the IEEE I&M Magazine a success. Your friends and colleagues around the world send their best wishes to you and your family.

More later,

*Mike*

Please contact Mike at [IandMMagazineEIC@ieee.org](mailto:IandMMagazineEIC@ieee.org). His bio is available at <http://www.ieee-ms.org>.

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## *President's Perspectives*

### **Welcome to AUTOTESTCON 2012 from Hugh Griffiths, the IEEE Aerospace and Electronic Systems Society President**

As President of the IEEE Aerospace and Electronic Systems Society, I am delighted to have this opportunity to give you my warm greetings on the occasion of the AUTOTESTCON 2012 conference. AUTOTESTCON is the premier event of its kind in the world, bringing together the military/aerospace automatic test industry and government/ military communities to share new technologies, discuss innovative applications, and exhibit products and services. Its two permanent sponsors are the IEEE Aerospace and Electronic Systems Society (AESS) and Instrumentation and Measurement Society (IMS). This year's theme of Mission Assurance through Advanced ATE aligns neatly with the systems Field of Interest of AESS.

The AESS Board of Governors is holding its fall meeting at AUTOTESTCON. I have been keen to hold our meetings to coincide with conferences, so that the Board gets to meet with the wider membership and hear your views. I look forward to meeting as many as possible of you in person, and I encourage you to visit the AESS website, <http://ieee-aess.org/>, to find out more about what we do and how we can help you in your work and in the development of your career.

*Hugh*

### **Greetings from Jorge Daher, the Instrumentation and Measurement Society President**

AUTOTESTCON is the largest conference for automatic test systems for military systems in the United States. This conference has been held for forty-eight years, and the IEEE Instrumentation And Measurements Society (IMS) is one of its sponsors. We are very pleased to co-sponsor AUTOTESTCON with the IEEE Aerospace and Electronic Systems Society (AESS) again this

year. The AESS has also joined with us in co-sponsoring this issue of the IMS's I&M Magazine which highlights selected papers from AUTOTESTCON 2011.

AUTOTESTCON 2012 will be focused on the maintenance aspects of systems readiness and providing Mission Assurance through Advanced ATE. People in the military and the aerospace industry will come together to share ideas, technologies and applications in this field. We will be able to see new products from a wide variety of exhibitors and meet leaders in the field. AUTOTESTCON has been very successful over the years, and we look forward to a very interesting conference this year thanks to the ongoing efforts of the organizers.

Large conferences like this are very important venues for exchanging ideas and experiences in instruments and measurements both for academic and industrial professionals. I hope you plan to attend and find this opportunity stimulating and very useful for your career.

*Jorge*

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## *Article Summaries*

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### *The Test, Usage and Maintenance of Power Switching Subsystems*

(Summary)

Kevin Paton

Unlike signal switching, power switches have significant minimum operational requirements for both voltage and current that affect usage in test programs (TPSs) and self test approaches. In addition to TPS usage and testing considerations, power switches must also be maintained since they have a tendency to build up deposits on their contacts which can degrade the characteristics of the switch. This article presents an overview of techniques which can reduce or remove build-up of deposits, improving switch operation.

*This summary includes text from the article.*

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### *Analyzing Artifacts in the Time Domain Waveform to Locate Wire Faults*

(Summary)

Charna Parkey, Craig Hughes, and Nicholas Locken

Wire integrity is a growing concern with aging vehicles, especially high vibration variants like helicopters, tilt rotor aircraft, and many mobile ground weapons systems. Wiring failures on these systems present a growing safety concern and can lead to loss of equipment and life. This paper presents a novel adaptive time domain reflectometry (TDR) algorithm to analyze artifacts found on the reflected time domain waveform of a high-voltage, low-energy pulse transmitted down wires with uncontrolled or controlled impedances. This method allows for detection of intermittent and hard faults. This paper reviews the theory of TDR and presents implementation and results of the proposed algorithm on real-world data.

## *The Vector Network Analyzer – An Essential Tool in Modern ATE Measurements*

(Summary)

Anthony Estrada

The Vector Network Analyzer (VNA) is a modern piece of test gear that was once relegated to specialized measurements in the RF lab. As technology has advanced and test frequencies increased, however, the VNA paradigm has drastically changed. The measurement flexibility increased as did the ease of calibration. At the same time, the need for accuracy has risen as operating frequencies increased into the tens of GHz. This paper identifies and addresses performance constraints of existing legacy techniques for measuring DUT gain or loss using conventional RF source and receiver techniques and those of its improved cousin, the Scalar Network Analyzer (SNA). The paper shows that the VNA offers a low cost alternative that improves reliability and accuracy, especially as operating frequencies continue to increase.

*This summary includes text from the article.*

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## *Cost Impact of Automated Acceptance Testing of Electrical Ground Support Equipment for Spacecraft Testing*

(Summary)

Hien Nguyen and Iain Miller

One of the areas where costs can escalate is in the integration and test phase of the spacecraft life cycle. A way to help mitigate cost overruns is to incorporate automated testing. This paper presents the implementation of an enhancement to automate the electrical ground support equipment (EGSE) including the design to automate the acceptance testing. The authors offer lessons learned when test durations of the automated and manual test cases are compared. To see the impact on cost of acceptance testing EGSE during the integration and test campaign, the results are then extrapolated to include the typical set of EGSE used at The Johns Hopkins University Applied Physics Laboratory.

*This summary includes text from the article.*

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## *TPS Development Using the Microsoft .NET Framework*

(Summary)

Teresa Lopes and Yönet Eracar

General purpose programming languages such as ANSI-C and C++ are commonly used for test program set (TPS) development when test-specific languages fall short or where TPS developers

and system integrators want to take advantage of the commercial tools available for these languages. This paper explores adding .NET languages, specifically C#, to the list of general purpose programming languages used for TPS development. The paper starts with an overview of the .NET Framework and includes a description of the support for legacy technologies. The authors describe common problems with non-.NET languages and how .NET languages and tools address these problems. Finally, the paper concludes with examples of test development in .NET.

*This summary includes text from the article.*

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## *Demonstrating the Capabilities of IEEE SIMICA Standards in Support of the DoD ATS Framework in a Net-Centric Maintenance Environment*

(Summary)

Mukund Modi and Joseph J. Stanco

The SIMICA standard is an implementation-independent specification for software interfaces to information systems pertinent to diagnosis and maintenance of complex systems. The standard addresses data collection, exchange and analysis. This paper addresses two major areas in achieving effective testing over a product's life cycle: the interoperability and reuse of tests and the effective and rapid utilization of advanced technology in testing. To achieve optimum asset maintenance, the test and test programs must be able to migrate throughout the product's life cycle. Accomplishing these objectives requires a set of standards and guidelines designed for this purpose. The elements that support advanced diagnostics are covered in detail.

*This summary includes text from the article.*

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## *Departments*

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### *New Products*

Robert Goldberg

### **Fast Real-Time Oscilloscopes with 63-GHz True Analog Bandwidth**

Agilent Technologies, Inc. introduces the Infiniium 90000 Q-Series: oscilloscopes with a real-time bandwidth of 63 GHz on two channels and 33 GHz on four channels. The new lineup includes ten four-channel models ranging from 20 GHz to 63 GHz, all of which are bandwidth upgradeable. Agilent claims these new scopes deliver the lowest noise and have the lowest jitter measurement floor in the oscilloscope industry, ensuring superior measurement accuracy.

At its maximum bandwidth, the Q-Series breaks the 60-GHz barrier with a -3 dB point of 63 GHz. The 33GHz model allows engineers to simultaneously trigger on and capture signals on all four channels with no compromise. These two specifications allow the oscilloscopes to make measurements on devices designed to conform to emerging standards.

Key capabilities include:

- direct digitization of M-band signals (60 GHz to 100 GHz),
- capture of the third harmonic on 28-, 32- and 40-Gbps digital signals,
- analysis of IEEE 802.3ba 40/100/400-GbE and Optical Internetworking Forum CEI 3.0 signals,
- measurement of up to four differential channels in a single acquisition for unraveling difficult cross-talk problems, and
- direct measurement of voltage swings larger than 1V when high-bandwidth and general-purpose measurements need to be made with the same instrument.

The 90000 Q-Series improves upon Agilent's use of custom integrated circuits and multichip module packaging with an exclusive new technology called RealEdge. RealEdge comprises a combination of new architectures, next-generation microcircuits and thin-film components and advanced application of Agilent's indium phosphide semiconductor process.

This new technology enables high-frequency capability while maintaining the industry's lowest noise and jitter measurement floor (75 fs).

The 90000 Q-Series allows engineers to take advantage of many years of hardware and software advancements in Agilent's Infiniium oscilloscopes. Additional information on Agilent's new Infiniium 90000 Q-Series oscilloscopes and the company's complete line of oscilloscopes is available at [www.agilent.com/find/90000Q-Series](http://www.agilent.com/find/90000Q-Series).

### **Radio Telemetry System for Temperature Measurement**

Datapaq® introduces a radio telemetry system that provides live temperature data transmission from inside industrial heating or cooling processes in all kinds of industries. Designed for use with the Datapaq Q18 line of data loggers, the system is comprised of transmitters for installation inside the data logger, primary and secondary receivers, and Datapaq Insight™ analysis software.

While the data logger collects temperature data inside the heating or cooling process, the radio telemetry system enables instant analysis and adjustment of process parameters, if necessary.

Q18 data loggers measure temperatures between -392 and +2,498 °F (-200 and +1,370 °C). A large internal memory allows for the logging of up to 50,000 readings per channel, ensuring no data are ever lost. With six different logger sizes and channel configurations of six, ten, or twelve, the Q18 series enables optimum solutions for many needs. The telemetry system utilizes the latest radio-frequency technology for real-time transmission of product and process temperature data.

Up to six data loggers can simultaneously connect to one receiver, providing the ability to measure from up to 72 thermocouples. The system enables continuous temperature monitoring and analysis. Process parameters can be adjusted almost instantaneously to ensure high product quality, reduce scrap, and save energy. The number and position of the receivers can be easily optimized to ensure best data reception from within the harshest of industrial environments.

Automatic frequency selection, multiple data transmission, and transmitter internal temperature compensation eliminate interference problems and ensure data integrity. The radio telemetry

system operates on license-exempt frequencies and is fully tested and approved for use in Europe and the USA.

Find more information at [www.datapaq.com](http://www.datapaq.com).

### **Extreme High-Temperature Accelerometers Operating to +760 °C**

Meggitt Sensing Systems introduces the Endevco® model 6240M10, a hermetically sealed high-temperature piezoelectric charge output accelerometer with continuous operation to +649 °C (+1200 °F) and intermittent operation to +760 °C (+1400 °F). The high-reliability of this transducer within such extreme high-temperature environments makes it ideally suited for aircraft and ground gas turbine engine vibration monitoring, as well as exhaust and compression systems and high-temperature machinery and equipment.

The Endevco® model 6240M10 offers excellent performance stability over its operating range. Its compact size allows it to be installed within space constrained environments. Units are ground isolated and feature a sensitive axis in-line with its supplied mounting bolt with optional transverse version. Piezoelectric sensing elements and integral shield are also isolated from the case. Electrical connection is achieved via integral hardline triaxial cable, terminating in a 10-32 receptacle that is temperature rated to +260 °C (+500 °F).

As a self-generating device, the accelerometer requires no external power source for operation. At such high temperatures, the use of a charge amplifier or remote charge converter that can accept a 100 k $\Omega$  source resistance is required.

In addition to its supplied mounting bolt, recommended accessories for the Endevco® model 6240M10, sold separately, include: the model 2721B, which is suitable for the accelerometer's low resistance output encountered at high temperatures and the model 3090C-120 coaxial extension cable. In addition, the Endevco® model 6240M10 is accompanied by a comprehensive five-year product warranty with smaller quantities available for immediate customer shipment.

For more details, visit [www.meggittsensing.com](http://www.meggittsensing.com).

### **Vector Signal Analyzer Operates To 6 GHz**

The ZT8650 series is a new addition in the ZTEC's RF & Wireless Communication product line. The ZT8650 Vector Signal Analyzer (VSA) can operate in ranges from DC to 6 GHz. This new VSA provides the signal fidelity and real-time processing capabilities that enable a broad set of necessary RF and wireless test techniques, such as performing EVM (error vector magnitude), ACLR (adjacent channel leakage ratio) and IM3 (3<sup>rd</sup>-order intermodulation distortion) measurements or addressing complex MIMO applications. The ZT8650 provides the combination of high instantaneous bandwidth, high dynamic range, very high linearity, and very low phase noise necessary to test and characterize the latest and next generation of RFIC components.

For RFIC testing the Vector Signal Analyzer (VSA) provides:

- functionality of a one-box multi-protocol tester in modular PXI/PXIe architecture,
- 6 GHz RF Spectrum and Vector Signal Analyzer for analog or digitally-modulated RF signal analysis, and
- separate baseband I/Q inputs and LO output for demodulator RFIC testing.

Specifications include:

- 160 MHz instantaneous IF bandwidth for new wireless standards such as 802.11ac,
- highest linearity with >80 dBc IM3 @ 6 GHz,
- very low displayed average noise level of -163.5dBm/Hz @ 6 GHz, and
- low EVM floor of 0.7% or 43 dB (802.11n 64QAM @ 5.812 GHz).

Its small footprint provides:

- combined RF and baseband I/Q VSA in a 2-slot 3U PXI/ PXIe modular instrument,
- flexible software-defined signal processing that can be upgraded for future wireless standards, and
- on-instrument stored states with test vectors over PXI/PXIe backplane for parallel and instantaneous instrument setup during production test.

A full-featured ZSignal SpectrumAnalyzer GUI is included as a software integration tool. For more information, please visit [www.ztecinstruments.com](http://www.ztecinstruments.com).

### **USB Oscilloscopes Offer Fast Sampling and Deep Memory**

Picotech claims the PicoScope 6000 Series oscilloscopes have the highest sampling rates and deepest memories of any oscilloscope in this price range. The six oscilloscopes in the series offer 4 channels with a maximum sampling rate of 5 GS/s, a range of input bandwidths from 250 MHz to 500 MHz, and buffer memory depths from 128 M to 1 G sample.

The PicoScope oscilloscope software includes, as standard, all of the oscilloscope and spectrum analyzer functions you would expect, as well as serial decoding, ask limit testing, segmented memory and advanced triggers. These features often cost extra on other manufacturers' scopes.

Running on your Windows PC, Pico-Scope provides a large, clear display that shows waveforms in great detail and allows easy zooming and panning under keyboard or mouse control.

Other built-in features include persistence displays with fast waveform update rates, math channels, automatic measurements with statistics, programmable alarms, and decoding of I2C, UART/ RS232, SPI, CAN and LIN bus signals.

The advanced triggering modes include pulse width, interval, window, window pulse width, level dropout, window dropout, runt pulse, variable hysteresis, and logic. Digital triggering ensures lower jitter, greater accuracy, and higher voltage resolution than the analog triggering found on many competing scopes. The AUX input can be used as an additional trigger or as an external sampling clock.

A Software Development Kit (SDK), supplied free, allows you to control the new scopes from your own custom applications. The SDK and PicoScope software are compatible with Microsoft Windows XP, Vista, and Windows 7.

Please visit [www.picotech.com](http://www.picotech.com) for more information.

### **Radio Spectrum Monitor**

The RFeye is the intelligent engine at the heart of CRFS systems and represents a breakthrough in cost-effective, continuous, real time 24/7 monitoring of the radio spectrum.

Capable of sweeping from 10 MHz to 6 GHz in less than 100 ms, housed in a compact lightweight housing designed for hostile environments, and suitable for use in both indoor and outdoor environments, the RFeye may be deployed in fixed or mobile applications.

The built-in Linux PC permits fully programmable autonomous operation, and high-accuracy GPS provides accurate position and time stamping to allow correlation of data between different RFeyes. Data may be stored locally, transmitted over the air via the built-in GPRS/UMTS modem, or downloaded via standard wired interfaces to a centralized database.

The RFeye also supports direction-finding (DF) using both AOA (angle of arrival) and TDOA (time difference of arrival) techniques. The RFeye enables cost-effective deployments of small to very large networks for both civilian and non-civilian applications.

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

### **Mini Temperature Transmitter**

Omega's exclusive TX-M12 series of temperature transmitters offer an innovative new range: -200 to 850 °C and -328 to 1862 °F, offering improved performance over conventional in-head devices. Housed in a rugged stainless steel enclosure, they provide fast, secure and watertight connections for both the sensor and the instrumentation. At a fraction of the size of standard head-mounted transmitters, measuring 38 mm diameter with a height of 20 mm and weighing just 100 g, they are ideally suited to a broad range of applications including process control and monitoring equipment.

They can accept a variety of resistance sensors, including Pt100, Pt500 and Pt1000, Ni100, Ni1000 and variable resistance up to 10,000 Ω. The integral M12 connectors maintain IP67 protection, while allowing for a quick and simple change of sensor. Two outputs are available with either 4-20 mA or 0-10 VDC with an accuracy of  $\pm 0.2$  °C + 0.05% of reading. Default scaling for the output is 0 to 100 °C and other ranges can be specified at the time of purchase. It is also possible for the user to scale the transmitter in the field by programming the device with the optional USB module that is supplied with free software.

For a spec sheet, please visit [www.omega.com/pptst/TX-M12-RTD.html](http://www.omega.com/pptst/TX-M12-RTD.html).

### **High-Accuracy Multipole Strip Magnet for Linear Position Measurement**

Dexter Magnetic Technologies has announced a new line of multipole strip magnets for use with the austriamicrosystems line of high resolution linear Hall encoders. The multipole magnet, manufactured from a flexible ferrite, is produced through a repeatable proprietary method which yields accuracy within 2.0% of the pole pair (40 μm for 1.0 mm pole). The cumulative pole accuracy is within 1.0% per 10 mm.

A major benefit of this new technology is that Dexter is able to offer multiple customer defined strip configurations including industry standard pole spacing of 1.0 mm, 1.2 mm or 2.0 mm, custom magnet lengths and pressure sensitive adhesive backing, while retaining the high level of accuracy.

For more information about multipole magnets or other magnetics related products, or to request samples, please contact Dexter Magnetic Technologies at +1 (847) 9525592 or visit them on the web at [www.dextermag.com](http://www.dextermag.com). For more information about linear Hall encoders or to request samples, please visit austriamicrosystems at [www.austriamicrosystems.com](http://www.austriamicrosystems.com).

## **Coordinate Measuring Machines Offer Portability**

Hexagon Metrology announces the launch of the Brown & Sharpe 4.5.4 SF, the latest generation of shop floor coordinate measuring machines (CMMs). Designed from the ground up to excel in harsh manufacturing environments, the SF series introduces a variety of advancements based on decades of experience with thousands of prior models in the field worldwide. With a focus on portability, the new CMM has a small footprint of 52.2" x 32.8" x 79.5" (132.6 x 83.3 x 201.9 cm) which fits through a standard door. Its computer, controller, and interface boxes are integrated into one self-contained unit with locking wheels, adding an unparalleled level of mobility throughout the shop floor.

The 4.5.4 SF also uses standard 110/220 V outlets with no need for shop air. Product availability is limited to North America, with other worldwide launches planned later in 2012.

The 4.5.4 SF incorporates evolutionary design improvements for measurement and inspection applications, such as advanced thermal isolation and temperature compensation elements to ensure accuracy in changing shop floor environments.

The CMM's unique design and standard elastomeric dampers isolate the measuring platform from most vibrations. Hardened linear drives and recirculating bearings contribute to the CMM's overall durability. For extreme environments, an optional active vibration dampening system is available.

The SF series comes standard with PC-DMIS, the world's most popular metrology software. PC-DMIS STI+ (single touch interface) is controlled via a touch screen, expediting inspection program selection and launch. The software makes it easy for shop floor personnel to check parts without becoming CMM experts.

Learn more at [www.HexagonMetrology.us](http://www.HexagonMetrology.us).

## **Low-Cost Triaxial MEMS Capacitive Accelerometer Module Family**

Silicon Designs, Inc. has announced the global market introduction of its new model 2445 series: a family of single-ended low-noise analog MEMS capacitive accelerometer modules, designed to support a variety of low-to-medium frequency triaxial measurement requirements.

The rugged design of the model 2445 features three orthogonally mounted, low-noise MEMS capacitive sensing elements, packaged in a nitrogen-damped, epoxy sealed lightweight aluminum housing, finished with a  $\pm 5$  V single ended output.

The outputs are referenced to external ground. Units are available with individual standard measurement ranges from  $\pm 2$  g to  $\pm 400$  g, with all units designed for reliable operation over a temperature range of  $-55$  °C to  $+125$  °C. Non-standard units with enhanced measurement and temperature ranges, as well as alternative housings and outputs, are available upon request.

The model 2445 features a six-wire connection with an instrumentation amplifier on each axis, for higher drive capability and low-impedance output. Both on-board voltage regulation and an internal voltage reference eliminate the need for precision power supplies and help ensure low power consumption.

All model 2445 modules are shipped from the factory fully calibrated, each serialized for traceability. All products are manufactured in the USA.

For more information about new model 2445 or other Silicon Designs products, visit [www.silicondesigns.com](http://www.silicondesigns.com).

### **Remote Measurement Display**

Setra Systems, Inc. has introduced its Remote Measurement Display, allowing for clear and remote viewing capabilities of real-time “at a glance” conditions. The product ensures, for example, effective climate control management within a variety of critical environments.

The CE-compliant Remote Measurement Display accepts 0-10 and 0-5 VDC analog signals from virtually any sensing technology, including temperature, humidity, CO<sub>2</sub>, pressure, and others. The unit visually displays sensor output with zero and span adjustment capabilities. Readings may be easily calibrated by the user. Its 1-in (2.5 cm), 3.5 digit LCD display may be clearly viewed from across a room with reduced glare.

The new Remote Measurement Display is designed for direct compatibility with Setra Systems Humidity Sensors (SRH) with temperature output. Units may be shipped as a factory calibrated bundle along with the measurement display for faster installation and commissioning. Units are available in a choice of red, green, or blue, and may be ordered as either a single or dual display.

For more information on the Remote Measurement Display or other products available from Setra Systems, Inc., or to request a product sample, visit [www.setra.com](http://www.setra.com).

### **Compact Digital High-Speed Camera**

Vision Research presents the Phantom® Miro® M320S digital high-speed camera which takes portable high-speed imaging to the next level by combining the lightweight, rugged design of Vision Research’s latest Miro family with advanced features not found on any other camera in its class.

The Miro M320S is capable of recording 1320 frames-per-second (fps) at its full resolution of 1920 x 1200; 1540 fps at 1920 x 1080; 2250 fps at 1152 x 1152; and higher frame rates at reduced resolutions. The M320S offers exceptional light sensitivity and picture quality with 35 mm depth of field thanks to the camera’s 2-megapixel CMOS sensor.

Featuring a single HDSDI output, the M320S can adapt to a wide range of monitors and HD field recorders for a video-based workflow. For maximum quality using uncompressed raw files, the M320S takes advantage of the new Phantom CineFlash Storage system which ships standard with every M320S camera. The removable CineFlash drives offer up to 240 GB of non-volatile flash storage.

When used together with the Phantom Remote Control Unit (RCU), the Miro M320S becomes a fully portable high-speed camera system. In addition to controlling all recording parameters, the RCU’s built in video monitor allows for live preview, framing, focus and full control of the HD-SDI playback. Additional Features are:

- HD-SDI video output, for 720p, 1080psf and 1080i monitoring,
- Canon EOS, Nikon F, 35mm PL, and C lens mounts,

- size & weight: 7.5 x 3.5 x 4 in, (19 x 9 x 10 cm), Weight: 3.0 lb, (1.4 kg),
- internal mechanical shutter,
- phantom RCU compatible,
- standard rechargeable battery,
- extreme dynamic range (EDR),
- image-based auto-trigger,
- continuous recording, and
- Gb Ethernet on camera, eSata on CineFlash Dock.

Find more information on this at [www.visionresearch.com](http://www.visionresearch.com).

## Easy to Use Timer IC

Touchstone Semiconductor announces its newest high accuracy, low power timer: the TS3001. The TS3001, like its predecessor product, the TS3002, uses only 1 $\mu$ A supply current which Touchstone claims is 15 times less than its closest competitor.

The TS3001, like the TS3002, is simple to program, and accurate. The TS3001's timer frequency is set with just one resistor while the TS3002 is set with a resistor and a capacitor. Frequency out period drift is a very low 0.021% / °C for the TS3001, compared with the TS3002's frequency out period drift of 0.044% / °C.

The TS3001 and TS3002 are available in the space saving TDFN-8 package.

### Key Specifications:

- ultra Low Supply Current: 1  $\mu$ A at 25 kHz,
- supply Voltage Operation: 0.9 V to 1.8 V,
- PWMOUT Duty Cycle Range: 12% to 90%,
- single Resistor Set Output Frequency (TS3001), and
- single Resistor and Capacitor Set Output Frequency (TS3002).

Free samples and free demo boards are available for engineers wanting to test the product. Visit [www.touchstonesemi.com/timers.html](http://www.touchstonesemi.com/timers.html) for more information.

## *Society News*

### **Instrumentation and Measurement Society Awards**

Each year, the IEEE Instrumentation and Measurement Society (IMS) accepts nominations for its awards. The AdCom Awards Committee manages the nominations process, reviews the candidates, and recommends a slate of recipients. The slate is then submitted to the Society AdCom for approval and the awards are presented at our annual Awards Banquet held as part of the I2MTC conference. The following awards were presented at the I2MTC 2012 Conference held in May, in Graz, Austria.

## **The IMS Technical Award**

The IMS Technical Award is given to an individual or group of individuals for outstanding contribution or leadership in advancing instrumentation design or measurement technique.

The 2011 Technical Award recipient is:

- Dan Apetrei, Electrica Romania, Bucharest, Romania:  
“For leadership in implementation of novel measurement solutions in power distribution systems”

Dr. Apetrei is a project director at S. C. Electrica S. A. in Bucharest, Romania. He oversees the measurement, collection, and sharing of power flow data within Romania. These data are used for identification and management of monetary losses, both unintended and malicious. Towards this end, he has developed software and hardware for an automatic meter accuracy checking system and led training for personnel in electronic meter programming for one-quarter of Romania. Dr. Apetrei is a member of the IEEE, Chief of the Romanian Eurelectric Networks Committee, and he has published over one hundred technical papers on power grid management.

## **The Outstanding Young Engineer Award**

The IMS Outstanding Young Engineer Award is given to an individual or group of individuals for outstanding contribution or leadership in advancing instrumentation design or measurement technique. This award recognizes an outstanding young IMS member who has distinguished him or herself through achievements, which are technical, of exemplary service to the IMS, or a combination of both, early in his or her career. The nominees must not have reached their thirty-ninth birthday and must be IMS members at the time of nomination.

The 2011 Outstanding Young Engineer Award recipient is:

- Kurt Barbé, Vrije Universiteit Brussel, Brussels, Belgium

Dr. Kurt Barbé received the M.S. degree in Mathematics (Statistics option) from the Vrije Universiteit Brussel (VUB), Brussels, Belgium in 2005, and the Ph.D. in Electrical Engineering in 2009, also from the VUB, Brussels, Belgium. Presently, he is working as a Postdoctoral Fellow of the Flemish research foundation at the Department ELEC, VUB. His main interests are in the field of system identification, time series analysis, and signal processing for biomedical and mechanical engineering. Dr. Barbé is an active reviewer for a number of IEEE Transactions and coauthor of multiple international top level scientific journal articles and conference papers. Dr. Barbé has been serving as an Associate Editor for the IEEE Transactions on Instrumentation and Measurement since 2010. He was also a recipient of the ‘Outstanding Reviewer Award’ of the IEEE Transactions on Instrumentation and Measurement in 2009.

## **The IMS Distinguished Service Award**

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

The 2011 Distinguished Service Award recipient is:

- Ruth Dyer, Kansas State University, Manhattan, KS, USA:

“For outstanding service of thirteen consecutive years on the Society’s AdCom, including serving at various times as Vice President of Membership Development, Publications, and Finance, and for fifteen years in leadership roles in I2MTC”

Dr. Ruth Dyer received the B.S. and M.S. degrees in Biochemistry from Kansas State University (1973, 1975) and the Ph.D. in Mechanical Engineering from the University of Kentucky (1980). Ruth is presently the Senior Vice-Provost for Academic Affairs and Professor of Electrical Engineering at Kansas State University. She was elected an IEEE Fellow in 2008. Ruth is honored today for her many years of distinguished service to the IEEE IMS, to the IEEE as a whole, and to engineering education.

Her work in the IMS alone has included three four-year terms of elected AdCom membership; membership in numerous Ad-Com committees; Vice-Presidencies of the AdCom’s Finance, Publications, and Membership Development committees; support of the International Instrumentation and Measurement Technology Conference (I2MTC) in such capacities as Technical Program Co-Chair, General Conference Co-Chair, and Session Chair; membership on the I2MTC board of directors; and service as the IMS representative to a number of IEEE Councils and Committees. She is also active in the IEEE’s Engineering in Medicine and Biology Society and a large number of educational committees at KSU and in a variety of national organizations.

### **The IEEE IMS Career Excellence Award**

The IMS Career Excellence Award is awarded to recognize a lifetime career of meritorious Achievement and outstanding technical contribution by an individual in the field of instrumentation and measurement.

The 2011 Career Excellence Award recipient is:

- Mario Savino, Politecnico di Bari, Bari, Italy:  
“For decades of advancements in measurement science and its dissemination”

Prof. Mario Savino received his M.S. degree cum laude in Electrical Engineering from Politecnico di Bari. Since 1971, he has been with the Electrical Institute (now Dept. of Electrical and Electronic Eng. of the Polytechnic of Bari) first as a Researcher, then, from 1973 as an Assistant Professor, from 1982 as an Associate Professor, and from 1985 as a Full Professor in the field of Electrical and Electronic Measurements. Prof. Savino has authored more than 250 publications. His research interests are in the area of metrology, particularly automatic instrumentation and measurement methods, measurements of electrical and electronic circuits, electro-optical measurements and optical sensors, digital signal processing and in the area of modeling and testing of digital instrumentation and A/D, and D/A conversion channels, automatic diagnosis of electrical and electronic systems and artificial vision systems for quality control of surfaces. His most recent contributions are in the field of accuracy and reliability of biomedical instrumentation. Prof. Savino has been serving as Technical Committee Member of the Italian Electrical Committee, a member of the Editorial Board of Measurements, L’Elettrotecnica and L’Energia Elettrica, and Chairperson of several International Conferences, most recently serving as General Chair for MeMeA 2011.

### **The 2012 IEEE Joseph F. Keithley Award**

The IEEE Joseph F. Keithley Award in Instrumentation & Measurement was established in 2000, and it is sponsored by Keithly Instruments, Inc. Recipients are selected by the Technical

Field Awards Council of the IEEE Awards Board. The award is presented to an individual or a team of not more than three, for outstanding contributions in electrical measurements. In the evaluation process, the following criteria are considered: innovation or development, social value, uniqueness of concept, other technical accomplishment and the quality of the nomination. The award consists of a bronze medal, certificate and cash honorarium. The Nomination deadline is 31 January in each year.

For additional information on IEEE Technical Field Awards and Medals, to view complete lists of past recipients or to nominate a colleague or associate for IEEE Technical Field Awards and Medals, please visit [http:// www.ieee.org/awards](http://www.ieee.org/awards).

The 2012 Joseph F. Keithley Award recipient is:

- Rik Pintelon, Vrije Universiteit Brussel, Brussels, Belgium:  
“For the development of innovative system identification methods for measurement applications”

Rik Pintelon has played a pioneering role in introducing system identification to the instrumentation and measurement field as a modern approach to solving measurement problems. System identification involves using statistical methods to build mathematical models of dynamic systems using measured data. Dr. Pintelon’s innovative methods have found important use in diverse areas, including measurement and modeling of metal corrosion and deposition, electric machines, inner-ear dynamics, and analysis of civil engineering structures. Dr. Pintelon also developed a frequency domain approach to system identification and pushed for its adoption within the control systems community. In 1991, he and his colleagues were successful in developing the Frequency Domain System Identification (FDIDENT) Toolbox for the popular MATLAB program, which exposed his work to a large audience. Dr. Pintelon also published a highly cited book on system identification in 2001, *System Identification: A Frequency Domain Approach*, IEEE Press, with a second edition that appeared in spring 2012. An IEEE Fellow, Dr. Pintelon is currently a professor with the Electrical Measurement Department at Vrije Universiteit Brussel, Brussels, Belgium.

### **2011 Senior Member Elevations**

The I&M Society Members elevated in 2011 were:

Jonathan Allen	Edoardo Fiorucci
Joaquin Barros	Yanfeng Gong
Ronald Bartos	Timothy Griffin
Francesco Basile	Dardo Guaraglia
Arijit Basu Ray	Takafumi Hayashi
Souheil Benzerrouk	Yukio Hiranaka
Anders Bergman	Kristi Hummel
Ram K. Bhattacharya	Mikhail Itskovich
Richard Candell	Raymond Keefe
Wenping Cao	Ratko Magjarevic
Clinton Cathey	Jagadeesh Kumar
Fong-Zhi Chen	Linus Michaeli
Yonuk Chong	Dong Ming
Sandra Costanzo	Joaquin M-Romeu
Robin Dykstra	Carl Pettiford
Eric Femi	Christian Pichot

Yihong Qi  
Seetharamaiah Ramisetty  
Ramesh Rayudu  
Jose Rocha Neto  
Philip Sallis  
Georg Schitter

Jun Ichi Takada  
Leon-Martinez Vicente  
Daniel Watzenig  
Ruqiang Yan  
Romuald Zielon

For additional information on IEEE Senior Member grade and to apply for grade elevation, please visit:  
[http://www.ieee.org/membership\\_services/membership/senior/new\\_senior\\_members.html](http://www.ieee.org/membership_services/membership/senior/new_senior_members.html).

### **IEEE 2011 Fellows**

The IEEE Grade of Fellow is conferred by the Board of Directors upon a person with an extraordinary record of accomplishments in any of the IEEE fields of interest. The total number selected in any one year does not exceed one-tenth of one percent of the total voting Institute membership. Each new Fellow receives a beautifully matted and framed certificate with his or her name and a brief citation describing the accomplishment, a congratulatory letter from the incoming IEEE president and a gold sterling silver Fellow lapel pin with antique finish.

- Rafik Goubran, Carleton University, Ottawa, Canada:  
“for contributions to voice quality measurement and its applications to audio improvement”

Rafik Goubran received the B.Sc. and M.Sc. degrees in Electrical Engineering from Cairo University, Egypt, in 1978 and 1981 respectively. He received the Ph.D. degree in Electrical Engineering from Carleton University, Ottawa, Canada, in 1987 and joined the Department of Systems and Computer Engineering. He chaired the Department from 1997 to 2006 and is now Dean of the Faculty of Engineering and Design. Dr. Goubran was involved in several research projects with industry and government organizations. His research interests include: Digital Signal Processing and its applications in speech processing and biomedical engineering. He has led many research projects in the areas of voice quality measurement, audio quality improvement, VoIP, sensors, noise and echo cancellation, microphone arrays, and the design of smart homes for the independent living of seniors. Dr. Goubran is the founding Director of the Ottawa-Carleton Institute for Biomedical Engineering, a member of the association of Professional Engineers of Ontario, and a research scientist at the Bruyère Research Institute.

- Thomas E. Linnenbrink, Hittite Microwave Corporation, Chelmsford, MA, USA:  
“for leadership in standards for instrumentation and measurement systems”

Mr. Thomas Linnenbrink received a B.S.E.E. degree from the Illinois Institute of Technology in 1967 and an M.S.E.S. with a major in Automatic Control from Rensselaer Polytechnic Institute in 1970. In 1977, Mr. Linnenbrink co-founded Q-DOT which was sold to Hittite Microwave Corporation in 2005. At these companies, he developed unique instrumentation, data-conversion, signal-processing, and control systems emphasizing creative integrated circuit and system architecture. He holds twelve U.S. patents. Mr. Linnenbrink was invited by the National Institute of Standards and Technology (NIST) to join an initial working group to develop standards for digitizing waveform recorders in 1977. This group eventually became the IMS TC-10 of which he became chairman in 1997. Under his leadership, TC-10 has expanded the geographic membership beyond the original U.S. citizens and developed standards for ADC, DAC, and pulse measurements.

- Kenneth W. Tobin, Oak Ridge National Laboratory, Oak Ridge, TN, USA:  
“for contributions to computer vision technology for instrumentation and measurement”

Dr. Kenneth Tobin is the Director of the Measurement Science and Systems Engineering Division at the Oak Ridge National Laboratory. After receiving his Ph.D. in nuclear engineering at the University of Virginia in 1987, Dr. Tobin took a position on the research and development staff at Oak Ridge National Laboratory. He continued on at Oak Ridge, working on many challenging projects and taking on increasing levels of responsibility, and was eventually named one of twenty-six corporate research fellows. His work focuses on electronic imaging encompassing scene analysis and machine learning for applied computer vision applications that address problems of energy, security, human health, and economic development. Within the IEEE, Dr. Tobin was co-sponsor of the first ORNL Biomedical Science and Engineering Conference in 2009 and since served as that conference’s general chair. He is author of dozens of peer reviewed articles and a named inventor on ten U.S. patents.

- Samir Trabelsi, Agricultural Research Service, United States Department of Agriculture, Athens, GA, USA:  
“for contributions to microwave measurements on particulate materials for agriculture”

Dr. Samir Trabelsi earned his Ph.D. in electronics engineering with highest honors at the National Polytechnic Institute of Toulouse, Toulouse, France in 1993 with the thesis: “Contribution to the Characterization of Plant Matter by Microwave Techniques.” He started his professional career as a research scholar at the Russell Agricultural Research Center, eventually reaching the current position of Lead Scientist in the Dielectrics Group of the Quality and Safety Assessment Research Unit. His research involves development of methods and sensors for rapid and nondestructive determination of bulk density and moisture content in granular and articulate materials and measurement and modeling of dielectric properties of water-containing materials at radio and microwave frequencies. His expertise is in dielectric measurements, microwave and millimeter nondestructive testing, moisture content measurements, and high-frequency measurements. His discovery of linear relationships between the permittivity components in the complex plane and their dependence on important variables such as temperature and water content constitutes an unusually significant contribution to knowledge about these relationships in granular dielectric materials. Within the IEEE, Dr. Trabelsi has had leadership roles on the ISEMA conference, has served on the I2MTC technical program committee for several years, and was an associate editor of the IEEE Transactions on Instrumentation and Measurement. Dr. Trabelsi is author of over 200 peer-reviewed journal articles and named inventor on three U.S. patents.

- Wuqiang Yang, University of Manchester, Manchester, UK:  
“for contributions to electrical capacitance tomography”

Dr. Wuqiang Yang received his BEng (with Distinction), MS and PhD (with Distinction) degrees from Tsinghua University in Beijing, China. After three years as a lecturer at Tsinghua University, he joined the University of Manchester’s Institute of Science and Technology in 1991. He is currently a professor at the University of Manchester. His main research interests include industrial process tomography, especially electrical capacitance tomography, image reconstruction, sensing and data acquisition systems, and instrumentation and multiphase flow measurement. Professor Yang is a Chartered Engineer, Fellow of IEE, and Fellow of InstMC. He has published 300 papers, including review articles. He reviews papers for forty journals. He is a visiting professor advisor at six universities and organizations. He is an editorial board member of four journals. He received the 1997 IEE/NPL Wheatstone Measurement Prize, the 1997 Honeywell Prize from the Institute of Measurement and Control, the 2000 IEE Ayrton Premium,

and was the 2009 IET Innovation Award Finalist. His biography has been included in Who's Who in the World since 2002. He is recognized by the International Center for Scientific Research (France) as one of top thirty technology researchers in the world. Since 2010, he has been an IEEE Instrumentation and Measurement Society Distinguished Lecturer.

**The IEEE Transactions on Instrumentation and Measurement  
Outstanding Associate Editors**

The outstanding associate editors named for 2011 are:

Salvatore Baglio, University of Catania, Spain

Kurt Barbé, Vrije Universiteit Brussel, Belgium

Robert Gao, University of Connecticut, USA

Deniz Gurkan, University of Houston, USA

Sergey Kharkowsky, University of Western Sydney, Australia

Carlo Muscas, Università di Cagliari Dipartimento di Ingegneria Elettrica ed, Italy

Dario Petri, Università degli Studi di Trento, Italy

Rik Pintelon, Vrije Universiteit Brussel, Belgium

Shervin Shirmohammadi, University of Ottawa, Canada

Wendy Van Moer, Vrije Universiteit Brussel, Belgium

George Xiao, Institute for Microstructural Science, National Research, Canada