

The IEEE Instrumentation & Measurement Magazine
April 2015 Issue

Future of the Telecommunication World

Editorial

Hello?

Wendy Van Moer

The famous words of Alexander Graham Bell on March 10, 1876 were, “Mr. Watson – come here – I want to see you.” It was the beginning of a completely new idea. In less than 150 years, the telecommunication world has known a tremendous evolution and revolution: from one-wired-phone-per-village to multiple cell phones per person [<http://www.loc.gov/loc/lcib/9904/bell.html>]. Telecommunication was my first love, and hence, I became a telecommunication engineer. I have never regretted that decision for a second, because telecommunication is much more than saying, “Hello.” Various applications and research fields use telecommunication techniques, e.g., medical applications, robotics, etc. As we saw in the February issue, living without energy would be impossible. But for most of us, living without telecommunication would also be impossible. We can no longer imagine a life without cell phones, Facebook, Twitter, Domotica, and many more. Every day, we rely on the instrumentation and measurement techniques moving the world of telecommunications forward at tremendous speed. What will the next 150 years bring us? Wait and see, or read this issue! You will get a glimpse of the future...

Groetjes,

Wendy

Article Summaries

*Signal Identification for Emerging Intelligent Radios:
Classical Problems and New Challenges*

(Summary)

Octavia Dobre

Signal identification, which initially found applications in electronic warfare and spectrum monitoring and surveillance, has been recently considered for commercial communications in the context of software defined and cognitive radios. In this article, the author presents a snapshot of

the status of signal identification algorithms, starting from a general description of maximum likelihood and feature based approaches to a more detailed discussion of a practical methodology using cyclostationarity-based features. She discusses the cyclostationarity-based features of various signals and the criteria of decision for their identification, while considering classical problems of identifying single carrier linearly digitally modulated signals, as well as new challenges posed by the identification of orthogonal frequency division multiplexing, single carrier frequency domain equalization, and multiple-transmit antenna signals. The author concludes the article with remarks on practical solutions to signal identification and open research issues.

This summary includes text from the article.

Testing Software Defined and Cognitive Radios using Software Defined Synthetic Instruments

(Summary)

David Carey, Robert Lowdermilk and Michael Spinali

Because they are reconfigurable and flexible, software defined/ cognitive radios (SDR/CR) have proven difficult to comprehensively and cost-effectively test with traditional Radio Frequency (RF) Test and Measurement (T&M) instruments. SDR/CR developers, manufacturers and users often need to perform a variety of manual and automated parameter and performance tests for design verification, factory testing, operational maintenance, and fault isolation. Testing SDR/CRs using conventional fixed-function T&M instruments requires the development of extremely complex test programs that employ multiple instrument measurement sequences and a significant amount of operator intervention. One approach to addressing the SDR/CR test problem that shows a great deal of promise is to use a multifunction Software Defined Synthetic Instrument (SDSI). An SDSI uses DSP software on embedded multicore and/or FPGA processors to *synthesize* T&M instruments and instrument functions. This article describes how SDSIs are essentially high performance SDR/CRs with added intelligence and measurement science that enable them to conduct precision RF and microwave T&M functions with high throughput and excellent precision.

This summary includes text from the article.

Ultra-Wideband Instantaneous Frequency Estimation

(Summary)

Daniel Lam, Brandon W. Buckley, Cejo K. Lonappan,
Asad M. Madni, and Bahram Jalali

Determining the instantaneous frequency of a signal is required for many applications ranging from radio astronomy to defense applications. Unfortunately, the scan rate is often too long over a wideband spectrum compared to the time scale of signals of interest. In this article, the authors present an instantaneous frequency measurement receiver, which allows for simultaneous measurement of multiple frequencies and amplitudes across an ultra-wide instantaneous bandwidth. Powered by the photonic time stretch A/D converter, the high effective sampling throughput of the system provides high temporal resolution and improvement of frequency and amplitude estimation capability through advanced signal processing. This flexible system has adjustable instantaneous bandwidth and frequency resolution, an ultrafast sweep time, and reduced hardware complexity compared to other instantaneous frequency measurement systems.

This summary includes text from the article.

A Cloud-Based Approach to Spectrum Monitoring (Summary)

Todor Cooklev, James Darabi, Charles McIntosh, and Mahdis Mosaheb

Thousands of wireless communication systems have been fielded, with hundreds more under development. The RF spectrum has growing economic value to consumers, businesses, and governments worldwide. This has generated such a demand for wireless bandwidth that spectrum allocation, the existing primary method of spectrum management, is becoming increasingly inadequate. In this paper, the authors briefly summarize the response to the U.S. National Telecommunications and Information Agency's Notice of Inquiry concerning a Spectrum Monitoring Pilot Program and present a cloud-based system-of-systems for spectrum monitoring based on the response to the Inquiry. They describe the interface to the cloud as an important enabler and propose a solution that allows ontology descriptions to be used for both spectrum management and monitoring. These ontology descriptions support the use of semantic techniques such as queries, responses, and reasoning.

This summary includes text from the article.

Software Defined Network Traffic Measurement: Current Trends and Challenges (Summary)

Abdulsalam Yassine, Hesam Rahimi, and Shervin Shirmohammadi

Next generation networks such as Software Defined Networks (SDN) must support the integration of new paradigms of service offerings such as virtual cloud computing, big data

applications, data centers services, and rich multimedia content. Operators of next generation SDNs are responsible for configuring policies that employ traffic monitoring tools and measurement mechanisms to detect and react to a wide range of network events and applications. In this article, the authors take a look at traffic measurement methods in SDNs, cover their strengths and weaknesses, point to open issues, and identify remaining future challenges.

This summary includes text from the article.

Columns

Framing I&M Topics

Instrumentation and Measurement in Communication Systems (Summary)

Leopoldo Angrisani, Dario Petri, and Mark Yeary

The strategic importance of measurements in the field of communication systems is corroborated by the significant increase in the number of papers on this topic – both submitted and accepted – experienced by *IEEE Transactions on Instrumentation and Measurement* in recent years. Unfortunately, many submitted papers are rejected because they fall clearly outside the journal scope. This fact motivated the authors – as researchers in the field—to write this paper to specify what can be considered an instrumentation and measurement technical contribution in the field of communication systems: papers that offer a prototype system or a fully developed system for which practical measurements can be made; perform a proper uncertainty analysis of the considered communication system or measuring system, or parts of them; and position the technical contribution of the paper with respect to the recent literature (and especially qualified international journals) in the field of I&M in the considered or related subjects, by comparing this contribution with existing state-of-the-art methods and techniques.

This summary includes text from the article.

Basic Metrology

Nature is Exact! (Summary)

Bryan Kibble

Presenting examples of historical strides in measurement, the author describes how standards of measurement exhibit exactness to the limit set by the available technology of the time.

Sometimes, deviations have been found which generate fundamental advances in metrologists' understanding, such as general relativity, or quantum field theory, which arose from unexpected anomalies in the spectrum of atomic hydrogen, and how exactness is restored with accompanying increased understanding. The author stresses that metrologists should not merely accept what has been discovered so far in setting up standards of measurement but seek to advance the investigation of nature's exactness in all its manifestations.

This summary was written by K. Virostek and includes text from the article.

Women in I&LM

Women in Engineering (Summary)

Ferdinanda Ponci,
WIE Liaison for the IMS Magazine

IEEE Women in Engineering (WIE) counts about 13 300 members as of Sept. 2014 and aims at facilitating the global recruitment and retention of women in technical disciplines. WIE celebrated its 20th anniversary throughout the year in 2014 and with a special ceremony at the Sections Congress. The diverse gender composition of the IMS AdCom has facilitated the reciprocal support of IMS and WIE. This connection is formally maintained by the IMS Liaison-to-WIE who is also a member of the WIE Committee. Monthly teleconferences guarantee continuous updating. WIE offers to members an Award winning magazine (4 times APEX Award of Excellence in the category of New Magazines and Journals, between 2008 and 2012), and ancillary support to local initiatives. On a larger scale, the major upcoming event is the 2nd IEEE WIE International Leadership Conference, to be held April 23-25, 2015 in Silicon Valley at the San Jose Marriott, San Jose, CA. Details are listed at www.ieee-wie-ilc.org. The first edition of this conference was held May 1-3, 2014 in San Francisco, CA, USA with 375 attendees.

WIE has produced and posted to YouTube over 25 videos, receiving currently over 92 000 likes and over 11 million impressions on Facebook! This material, also linked on the IEEE WIE webpage, supports in a very tangible way the outreach to females in the technical area, particularly students. I encourage instructors, mentors (and parents) of the IMS to use this content to motivate and energize younger women.

In terms of membership by region, WIE presence in Region 10 is very significant (more than the U.S. and Region 8 together), although fluctuating. And even more interesting is WIE presence in Latin America, currently comparable to Region 8, which is on a steep growth: +8% from Sept. 2013 to Sept. 2014. This is a vibrant community and we want to connect with them.

As we strive to make the most of each trip and activity we support, we joined the kick-off event of the newly founded IMS Chapter in Puebla, Mexico on January 13, 2015 with a WIE-IMS event. Kristen Donnell, the IMS VP Membership, was in Puebla to energize the new Chapter and spoke at the WIE event as well. This was a great opportunity for IMS to reach out to a broader public and strengthen its connection with local active IEEE volunteers. Dr. Pilar Gómez Gil was the local contact for this event.

IMS or WIE Members who would like to organize activities within the scopes of IMS and WIE are warmly invited to contact the IMS Liaison to WIE, Ferdinanda Ponci at FPonci@eonerc.rwth-aachen.de, to learn about available resources.

Recently, our very own Wendy Van Moer has organized and moderated the “Women in Measurement Panel” at I2MTC 2014. The panel session was held on April 14 in Montevideo, Uruguay at the Radisson Montevideo Victoria Plaza Hotel & Conference Center. The panelists were Irene Pazos Viana (Uruguay Catholic University, Uruguay), Sabrina Grassini (Politecnico Di Torino, Italy), and Octavia Dobre (Memorial University, Canada). The topics of discussion were focused on the mentoring of young female students. Experiences were shared, and tips and tricks were provided to manage the work and life balance of mothering and engineering. A new edition of the Panel “Women in Measurement Panel” is also on the way for I2MTC 2015 in Pisa, Italy!

Life after Graduation

Doctoral Graduation!

(Summary)

Erik Timpson

This issue’s column is the story of Erik Timpson, a recent doctoral graduate who is also a leader in the I&M Society after having served as the Graduate Student Representative. Erik is currently

a professional metrology engineer for Honeywell where he is responsible for the calibration of electrical instruments and is the owner of the shock and vibration metrology laboratory.

This summary was written by K. Virostek,

Chapter Report

The IEEE IMS Chapter Nanjing/Shanghai/Wuhan Jt. Sections (Summary)

Ruqiang Yan, Chapter Chair

The IEEE Nanjing/Shanghai/Wuhan Jt. Sections of the Instrumentation and Measurement Society (IMS) Chapter was established on February 25, 2010. It is the first local IMS chapter formed in China aimed at promoting instrumentation and measurement (I&M) related activities. With the support from the IMS Distinguished Lecture Program, the chapter held its first meeting at Southeast University on March 19, 2010, where IEEE Fellow Kang B. Lee gave a lecture about smart sensor networks and standards. Since then, the local chapter has organized various activities every year, ranging from a virtual instrument contest for students to topic-specific workshops for faculties. Recently, the most significant activity was the 2014 National Young Scholar Forum on Machinery Fault Diagnosis (Fig. 1) held on May 23. With the financial support from the School of Instrument Science and Engineering, Southeast University and the Jiangsu Instrument & Control Society, more than forty young scholars from over twenty universities and industries took part in this event.

The forum started with an invited talk delivered by Prof. Zhike Peng from Shanghai Jiaotong University. Prof. Peng presented an overview on the theory and methodology of parameterized time-frequency analysis and its application in engineering signal processing, for example, instantaneous rotating speed measurement in rotor systems. The attendees then had an in-depth discussion on machinery fault diagnosis, including problems encountered in basic research on fault diagnosis, directions, and breakthrough potentials of fault diagnosis in the future, as well as fault diagnosis technology development and applications. They also recognized the importance of instrumentation on helping improve the effectiveness and efficiency of fault diagnosis. At the end of this forum, Prof. Xuefeng Chen from Xi'an Jiaotong University gave a talk titled "Progress and Challenges on Machinery Operation Safety and Remaining Useful Life Prediction."

Through the forum, young scholars had a more clear understanding on machinery fault diagnosis and expressed possible collaboration and even cross-research direction. Prof. Chen also expressed his willingness to create a local IMS chapter in northwest China and is preparing the petition forms that will be submitted in 2015.

This print article includes a photograph from The 2014 National Young Scholar Forum on Machinery Fault Diagnosis organized by the IEEE Nanjing/Shanghai/Wuhan Jt. Sections of the IMS Chapter.

Departments

Society News

The Graduate Fellowship Grant Award (Summary)

**Kristi Paranjape,
Chair of the Graduate Fellowship Grant Award**

One of the goals of the Education Committee of the Instrumentation and Measurement Society is to support and encourage graduate-level research in the areas of instrumentation and measurement. This article provides a profile of each of the recipients from 2011 and 2012 and the results of this program. The stories of these recipients illustrate the benefits to the advancement of our profession that are promoted by the Graduate Fellowship Grant Award.

In 2011, the Fellowship Grant Awards were given to Jonathan D. Armstrong for research titled, “Steadiness/Tremor Measurement Using General Systems Performance Theory (GSPT)” and to Arpit Kothari of the Missouri University of Science and Technology for work titled, “A Calibration-Free Vector Network Analyzer.” In 2012, a Graduate Fellowship Award was presented to Lee Gonzales Fuentes of the Vrije Universiteit Brussel for research in “Density Estimation for the Disturbing Noise in Sampling Oscilloscopes,” and a second award was presented to Jie Huang, who was studying at the time at the Missouri University of Science and Technology, Rolla, MO, USA. His work was titled, “Novel coaxial cable interferometric sensors for distributed measurement of large strain in structural health monitoring.”

This summary includes text from the article. The print article includes photos of each award recipient.

New Products

Robert Goldberg

Please send all “New Products” information to:
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High-Performance Test System

The Spectrum HS Functional test system joins Teradyne’s Spectrum family of functional ATE and is designed around and ready for Teradyne’s High Speed Subsystem (HSSub) instrumentation. The Spectrum HS is aimed at circuit boards, assemblies and boxes requiring digital bus, mixed-signal or real-time test.

As electronic communications standards evolve, the speed and volume of test data keep increasing, which drives the requirement for test systems that can perform real-time test at ever-higher I/O speeds. Teradyne has designed the Spectrum HS around their High Speed Subsystem. It enables the entire test system to meet demanding bus performance specifications as well as reconfigure instruments at runtime to meet a proliferation of standardized and custom I/O port protocols and be able to handle a massive amount of real-time data. Tackling multiple concurrent buses at Gigabit speeds and manipulating data at hundreds of megabytes per second are common requirements.

This test system represents Teradyne’s first Spectrum system centered on PXI-based instrumentation, which is rapidly emerging as a preferred means to address current and future analog and digital functional test requirements. Teradyne believes that the Spectrum HS is the ideal combination of a fully configurable tester designed to meet increasingly challenging functional test requirements, all packaged in a standardized and supportable system.

Please visit www.teradyne.com for more information.

Bluetooth Test Set Supports Longer Data Packets of Latest Bluetooth 4.2 Specification

Anritsu introduces an option for its MT8852B Bluetooth Test Set that supports the Data Length Extension associated with Bluetooth Low Energy (BLE) as part of the latest Bluetooth Core Specification version 4.2. With the new Data Length Extension option, designers and

manufacturers of Bluetooth® Smart and Bluetooth Smart Ready devices can use the MT8852B to conduct radio layer tests in full compliance with the newly adopted Bluetooth 4.2 standard to improve product throughput and speed time to market.

The new measurement option in the MT8852B test set has been specifically developed to support the extension of the data packet length in BLE from 37 octets to 255 octets. The new test cases in the Data Length Extension option can be run as part of a test script to simplify the creation of test programs and reduce test times. For example, engineers can use the MT8852B to complete a test script implementing Bluetooth Basic Rate, Enhanced Data Rate (EDR) and BLE measurements in less than 15 seconds by pressing one key or sending a single remote command, greatly simplifying production test programs. Engineers can conduct BLE measurements directly on the MT8852B. The test set controls the device-under-test (DUT) using the Direct Test Mode (DTM) over USB and RS232 HCI, 2-wire or USB-to-serial-adaptor control interfaces.

For development applications, the BLE Data Length Extension capability of the MT8852B is supplied with a PC application. Reference test packets can be displayed in a graphical format with the option, which also provides a clear pass/fail status for all supported measurements against the specified limits. This facilitates identifying any device failure caused during the critical design and development stages.

The new Data Length Extension packet structure expands the test capability of the MT8852B test set. It also supports six other BLE test cases as well as eight Bluetooth Basic Rate and six Bluetooth EDR transmitter and receiver test cases. EDR test cases supported include Relative Transmit Power, Carrier Frequency Stability/Modulation Accuracy, Differential Phase Encoding, Sensitivity, and BER Floor Performance.

For more information, please visit www.anritsu.com.

Impedance Analyzer Evaluates Passive and Semiconductor Component and Materials

Keysight Technologies announces the E4991B impedance analyzer, specifically designed for R&D, quality assurance and inspection engineers characterizing and evaluating passive electronic components, semiconductor devices, dielectric materials and magnetic materials.

The E4991B offers impressive measurement accuracy (0.65 percent basic accuracy) for evaluating components over a wide impedance range, from 1 MHz to 3 GHz. The analyzer

features accurate material measurement options that include temperature characteristics analysis from -55 °C to 150 °C (Option 007) and direct read function of permittivity and permeability up to 1 GHz (Option 002).

An optional DC bias function, Option 001, can be used with the E4991B to supply DC voltage (± 40 V) and current bias (± 100 mA) across the device under test. This allows engineers to easily observe their device's behavior under various DC bias conditions without having to use an external DC bias source. A probe station connection kit (Option 010) is also available that enables easy and accurate on-wafer or microcomponent impedance measurement up to 3 GHz.

The E4991B impedance analyzer is available in three different frequency ranges: 1 MHz to 500 MHz, 1 MHz to 1 GHz, or 1 MHz to 3 GHz and replaces the industry-standard E4991A. The analyzer's flexible frequency options allow engineers to select exactly what they need for their application today and easily upgrade later as the need arises.

More information on the E4991B impedance analyzer is available at www.keysight.com/find/E4991B.

PXI Semiconductor Test System

The TS-900 PXI Semiconductor Test System, from Marvin Test Solutions, is an integrated test platform that offers comparable system features and capabilities found in proprietary ATE systems. Available as a bench top, with an integrated cart, or with an integrated manipulator, the TS-900 takes full advantage of the PXI architecture to achieve a cost-effective and full-featured test solution for device, SoC (System On a Chip) and SiP (System in Package) test applications. The test system incorporates a custom-designed, performance test interface that supports the use of PCB Device Under Test (DUT) boards, a proven and high-performance method for interfacing to the device under test. Additionally, the receiver interface's pin blocks are field configurable, allowing users to upgrade the receiver when they modify or upgrade the system for new applications. The configuration of the receiver can support up to 512 dynamic digital channels, as well as a range of analog, power supply and RF resources.

The basic system includes 64 digital I/O channels, 64 static digital I/O channels, a programmable user power supply, a system self-test and fixture, DIOEasy software for digital waveform editing/ display, ICEasy - device test development tools, and Marvin Test Solutions' ATEasy

software. The software provides an integrated and complete test executive and test development environment, allowing users to quickly develop and easily maintain test applications.

The TS-900 can be configured with up to 512 dynamic digital channels. The base TS-900 platform uses the GX5295, a 3U PXI, 32 channel, 100 MHz digital I/O card with per channel PMUs. The TS-960 platform uses the advanced GX5296 - a 3U PXI, 32 channel 125 MHz digital I/O card featuring timing and PMU per pin capability with 1 ns edge placement resolution. In addition, a wide range of digital and analog instrument test options can easily be incorporated into the TS-900, offering users a compact test system that can support both functional and DC parametric test capabilities. With the incorporation of an integral, modular test interface, the TS-900 offers users an application ready test system, which can be upgraded or reconfigured in the field, if needed.

Find more information at www.marvintest.com.

200 MHz Bandwidth and Education Modes Added To RTM Bench Oscilloscope

Rohde & Schwarz has designed the new 200 MHz models of the R&S RTM oscilloscope especially for universities and educational institutions. The education mode was developed for test and measurement practical application and makes it possible to disable all analysis tools (e.g., Autoset and QuickMeas) and automatic measurements. This improves the learning effect as students and learners have to calculate measurement results on their own. The mode is password protected and available for the other bandwidth models of the R&S RTM family as well.

The R&S RTM is also designed for general T&M applications in development, manufacturing and service. Using the R&S RTM B200, B201 and B202 bandwidth upgrade options, the 200 MHz models can grow with future requirements and be expanded to 500 MHz. The new R&S RTM-K32 digital voltmeter option enables the R&S RTM to measure various values such as AC, DC, peak and crest factor with three digit accuracy regardless of the oscilloscope's triggering. A seven digit frequency counter has also been integrated into the scope.

With a sampling rate of 5 Gsample/s and a memory depth of 20 Msample, the R&S RTM bench oscilloscope is the best in its class, and its functional range can be further expanded with additional options. There is, for example, a large selection of options available for triggering and decoding serial buses (R&S RTM K1 to K7). With 460 Msample memory depth, the R&S RTM-K15 history and segmented memory option is especially beneficial for seamless analysis of data

sequences with long rest periods such as pulsed signals and serial bus data packets. The R&S RTM-K31 power analysis option provides users with specialized measurement functions to automatically verify the quality of all components of switching power supplies.

For more information, see www.scope-of-the-art.com/ad/press/rtm.

Portable, Wireless Six-Axis Force/Torque Sensing System

The Wireless F/T is a small wireless transmitter that streams data from up to six 6-axis transducers simultaneously. It was recently introduced by ATI Industrial Automation. The Wireless F/T communicates using IEEE 802.11 a/b/g/n wireless standard at 2.4 GHz or 5.0 GHz and can stream to the user's host device for data collection, real-time motion control, or user-defined signal processing. The Wireless F/T comes in two configurations: one that supports up to six transducers and one that supports up to three transducers.

The Wireless F/T's range in an office environment is 30 m (98 feet) and may reach up to 100 m (328 feet) in an unobstructed environment. Battery life is approximately one hour at maximum capacity (full measurement rate with six transducers enabled) and is extended at lower data rates and/or by disabling one or more of the transducers. Power options include a removable, rechargeable battery that can be charged internally or externally via a Micro USB connector using an external, 5VDC power supply. The Wireless F/T features a small enclosure with robust mounting features. The Three Transducer Wireless F/T measures: 150 mm × 82 mm × 19 mm (5.9 in × 3.2 in × 0.75 in), excluding mating connectors. The Six Transducer Wireless F/T measures: 150 mm × 82 mm × 33 mm (5.9 in × 3.2 in × 1.3 in), excluding mating connectors.

ATI's Force/Torque Sensor System measures six components of force and torque (F_x , F_y , F_z , T_x , T_y , T_z) and features a compact design, hardened stainless steel construction, high-speed output, overload protection, span temperature compensation options, and high signal-to-noise ratio. ATI offers a wide range of custom and standard sensor models from 17 mm to 330 mm and include environmental protection on most models.

For more information about the Wireless F/T and other ATI products, please visit www.ati-ia.com.

High Accuracy Temperature Calibrators

GE Measurement & Control announces new high performance temperature calibrators from the GE Druck family of products. The calibrators provide a high accuracy, stable temperature

reference to help achieve optimum operation of temperature sensors and instrumentation. The high performance calibrators are designed for use throughout the process, industrial, oil and gas, power generation, pharmaceutical, and general engineering sectors.

When used in conjunction with a multi-function calibrator, such as GE's Genii, an instrument technician can cover more than 80 percent of all calibration tasks, including those relating to HART and Fieldbus devices, with just two portable instruments.

The new series includes four, easy-to-use temperature calibrators: two Dry Blocks; and two Liquid Baths. The Dry Block calibrators cover a temperature range of -35 °C to 650 °C. They incorporate the latest metal block and electronic control technology to achieve accuracy to 0.2 °C with a stability of 0.05 °C and rapid heating and cooling to improve productivity. They offer a choice of precision-bored, interchangeable well inserts to accommodate a wide range of test devices.

The Liquid Bath temperature calibrators cover a temperature range of -35 °C to 255 °C. They feature a large capacity bath to accept irregularly shaped or multiple devices. The large capacity bath can be removed to allow a new bath to be inserted if the heating fluid needs to be changed. The bath has a leakproof cover for transportation. With a stability of 0.05 °C and accuracy to 0.1 °C, these versatile temperature calibrators are multifunctional and can be used as a black body source and as a Dry Block with interchangeable inserts.

For further information, visit www.ge-mcs.com.

Video Extensometer for Strain Measurement

Instron announces their newest advanced video extensometer, the AVE 2, which conforms to the most rigorous testing standards, such as ISO 527, ASTM D3039, and ASTM D638. This second generation advanced video extensometer utilizes patented measurement technology in the fastest, most accurate non-contacting strain measurement device commercially available.

The fully-integrated device easily adapts to the normal fluctuations of environmental conditions in your lab and is easily adapted to any testing machine on the market that uses a ± 10 v analog input (performance depends on the system). Designed to dramatically reduce errors from thermal and lighting variations that are common in most labs, the AVE 2 is the only device on the market to utilize the real-time 490 Hz data rate while also achieving a 1 micron accuracy.

Its versatility allows for testing under multiple environmental conditions and can be used for advanced strain measurement with Digital Image Correlation (DIC). The AVE 2 measures both modulus and strain to failure of almost any material including plastics, metals, composites, textiles, films, bio-materials, and more.

Find more information at www.instron.com.

Handheld Wireless Bluetooth® Transmitter

The UWBT Series of Bluetooth® transmitters from Omega combine the accuracy of an industrial sensor/transmitter with the convenience of smartphones and tablets. It measures different sensor inputs such as thermocouple, RTD, relative humidity, and pH and transmits the data to your smart phone or tablet via wireless Bluetooth communication from the free UWBT app running on an iOS or Android™ smart phone/tablet.

The free app has many features including the ability to be configured in 9 different languages, can be paired with multiple transmitters simultaneously, monitors and logs sensor data on your smart phone or tablet, and displays sensor data in digital, graph, or gauge format. This CE compliant product has the capability to download logged data to your smart phone or tablet and email the data to an email address or to the Cloud.

The UWBT logs up to 10 samples per second and logs data to the handheld transmitter with date/time stamping or directly to your smartphone/tablet and works with mobile devices and computers with USB communications.

For more information and a complete spec sheet, please visit ww.omega.com/pptst/UWBT.html.

Fluorescent Crack Detection System for Non-Destructive Surface Testing

In aerospace applications, as well as other sectors, even the tiniest defects can entail serious consequences. Toolcraft has developed a system with high precision to enable non-destructive surface testing. The precision parts and high-tech components are wetted with a fluorescent penetrant for this purpose, thereby making even the smallest cracks visible under UVA light.

On an area of 105 m², Toolcraft can now offer the opportunity to check components using a non-destructive method for cracks, overlaps, folds, pores and binding errors in the surface. The

process is predominantly used on metallic materials, although it can also be applied to other materials such as ceramics, assuming the surface is suitable for testing with penetrants. The system itself occupies an area of 75 m². Great emphasis was placed on cleanliness when building the crack detection system. The system and all equipment are made from stainless steel. As a result of its properties, this material is ideally suited for crack testing, because substances with elevated pH values are used. Harmful, flammable and volatile substances are employed, so the entire area is strictly monitored and is just allowed to be entered by specialist personnel during the entire test procedure.

Each testing process starts with preliminary cleaning of the components in an alkaline bath. Following this, the alkali is washed off again in a three-stage bath cascade using demineralized water. Once the fluorescent penetrant has been applied by an electrostatic method, the component undergoes intermediate cleaning. Following this, it is immersed in an emulsifier bath in order to partially dissolve the penetrant.

Immersion in the water stop bath is used to finish the process. The testers apply a dry developer before assessing the component. This picks up the penetrant remaining in the defects, and they become visible under UVA light. Even microscopically small cracks are revealed in the evaluation cabin; these are cracks, which can have a decisive effect in aerospace applications.

For more information, please visit www.toolcraft.de.

Level Switch Provides an Innovative Approach to Level Measurement

SOR Inc. is introducing a new float operated level switch that provides a truly wireless level monitoring solution for use on any WirelessHART mesh network. The 1780 level switch uses a float mechanism similar to the one used in the 1710 compact level switch and 2210 side mounted level switch which moves a magnetic array inside a sealed housing. The movement of the magnetic array is then sensed through the housing by the position monitor via a Hall Effect Sensor. This creates a truly wireless solution with no wires required between the 1780 level switch and the position monitor.

The 1780 level switch is best suited for applications in the oil and gas, chemical and other industries. It is also available with WirelessHART communication only or with an additional pneumatic relay output.

Find more information on this switch at <http://www.sorinc.com>.

Heavy Duty Explosion Proof Pressure Transducers for Oil and Gas Equipment

Applications

Gems Sensors & Controls has announced the launch of its 31EP/EA and 32EP/EA Series. The Gems 31EP/EA and 32EP/EA Series is a family of heavy duty explosion-proof pressure transducers expressly designed to withstand the more extreme environmental and pressure conditions common to oil and gas equipment applications. With reliable operation over more than 100 million cycles, the transducers provide a more robust, reliable, and cost-effective alternative than has been previously available with certain other industry solutions.

Design of the Gems 31EP/EA and 32EP/EA Series incorporates sputtered thin-film pressure sensing technology, all stainless steel wetted parts and an IP67 enclosure. Their compact design facilitates ease of installation within space constrained hazardous environments. The designated “32 Series” of each group features higher proof pressure specifications. In addition, depending upon selected range, Series full-scale burst pressure performance can exceed 60,000 PSI (4000 bar).

For more information, please visit www.GemsSensors.com.