Salute to Education

From the Editor's Bench
Mike Gard

The Education Issue

As the cover indicates, this issue of I&M Magazine includes a salute to education. Technology clearly is an endeavor fueled by education, and engineering is one of the most education-intensive professions in existence. We invest a lot of our time in education both in and out of the classroom, for the pace of technology never slows – as a rule, it accelerates -and we must keep up or be left behind.

Most of us entered the engineering profession because of a mixture of curiosity (how do things work?), the desire to create something useful, an inventive drive to master and create something new, and a desire to improve the world and culture in which we live. It has been my good fortune to know many engineers, scientists, and technologists of all disciplines over the years. I can truthfully say that few, if any, went into engineering and technology primarily for the money. Yes, we have every intention of achieving a good standard of living by means of our professional practice, but there are less rigorous pathways to prosperity. I also can say, with equal truthfulness, that few went into engineering and technology for fame, recognition, and glory. We'll save that topic for another time.

There are at least two powerful reasons for our attraction to technology and a technical education. The first reason is the intellectual satisfaction that comes from our discipline and our work. By discipline, I mean the need to understand and respect the physics and mathematics supporting both a problem and its solution. The flights of fantasy common to science fiction and popular culture are not part of our workaday world; we must understand and respect the laws of physics because we are bound by them and must work within them. J.S. Bach's genius allowed him to create remarkable beauty while respecting the rigid forms of baroque music;

Shakespeare and other Elizabethan writers produced elegant and expressive poetry within the rigid forms and meters of the sonnet. We share that same sense of mastery and discipline when we do our creative work within the physical constraints of the real world. A simple, effective, and clever solution to what seemed an intractable problem is one of the sweetest experiences possible in our professional lives.

I suggest the second, and less obvious, reason is that we are attracted by the educational process itself. We enjoy learning things. As industrial practitioners and academics, we savor the pursuit of a novel and elegant solution or new knowledge. We enjoy the experience of teaching and mentoring, passing along knowledge accumulated in our own careers to students and new graduates just beginning theirs, or to a colleague unfamiliar with our particular specialties.

Virtually all of my professional experience has been in industry, and I am thoroughly familiar with the competitive pressures which accompany the struggle to survive and thrive in the arena of the open marketplace. Despite the competition and commercial pressures, most engineers in industry are similar to their academic counterparts because they also enjoy discussing their work and sharing their ideas and experiences if given an opportunity to do so without compromising their obligations to their employers. On the other hand, I know, and I am sure you also know, very capable individuals who will go to great lengths to avoid preparing a formal paper or making a formal presentation. Yet, those same individuals will patiently explain, sketch, and illustrate to inform and assist colleagues and beginners alike. We know we must be perpetual students, but we also enjoy teaching.

The desire and the need to learn and teach and share is the essence of education. Buildings of brick and mortar are not education. The structures we call schools and universities are only the places and objects established to encourage and promote the process of education. Most of us know that, as with any human institution, the academic process is often confused or obscured by fights over budgets, headcount, policies and rules, athletics, prerequisites, and parking spaces. Real education takes place within each of us, every day, as we pursue our daily tasks and share what we find with friends and colleagues.

The Instrumentation and Measurement Society, its publications, and its activities exist to assist and advance your continuing education by a variety of means. The *I&M Magazine* will continue to provide columns, tutorials, regular articles of general interest, new product information, conference and symposium announcements, reports by Society officers and technical

committees, and other material constituting the direct link between the I&M Society and the Society's individual members.

Some readers have been kind enough to share feedback about features they found interesting. A series of articles about the Theory of Evidence is in preparation as a direct result of positive reader feedback. Special issues in December 2013 and February 2014 will be devoted to petroleum drilling automation and I&M work at CERN, respectively, and both special issues will introduce readers to the complex instrumentation and measurement problems of two very different fields of activity. April 2014 will consider alternative energy. The *I&M Magazine's* objective is to be the vehicle for all members to teach and inform each other. Please let us know how we're doing, and please consider sharing some of your experience and knowledge with others by submitting an occasional manuscript.

Earlier this year, the *I&M Magazine* invited student contributions for this issue and received an article on large amplitude current pulse measurements by Dr. Roberto Ferrero, submitted while he was a student at the University of Pisa. This issue also contains an extended AUTOTESTCON article by Dr. Marco Rossi et al. which was not available for inclusion in the August issue. Other topics include wireless transmission of cooling fan vibration data, cable testing in nuclear power plants, realtime spectral analysis, electromagnetic flowmeters, and magnetorheological fluid damping for vehicles suspensions. Of particular note are columns by John Macpherson, Fred Florence, and Fionn Iversen, Society of Petroleum Engineers (SPE) members who briefly introduce topics which will be explored in detail in December's special issue on drilling automation. We invite you to read them all. By the time you set this issue aside, I am certain you will have learned something new. That's what education is all about.

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More later,
Mike

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Please contact Mike at IandMMagazineEIC@ieee.org. His bio is available at http://www.ieee-ms.org.

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Drillers' Notes

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This issue contains three special columns related to current measurement and instrumentation issues in the oil and gas industry written by specialists in the field, including "A New Direction in Drilling" by Fred Florence, "Modeling and Controlling Downhole Pressure during Drilling" by Fionn Iversen, and "The Drilling Environment" by John Macpherson. The impact of the harsh environments, high temperatures, and extreme pressures involved in subsurface drilling are discussed. Projections for future advancements in instrumentation and data collection are introduced and will be covered further in the December 2013 issue of the *IEEE Instrumentation and Measurement Magazine*.

Officers' Reports

VP of Conferences Report
Dario Petri

The strategic plan for Conferences and Technical events was discussed during the Society Officers meeting in Atlanta, GA, on Feb. 21-23 and the Society Ad- Com meeting in Minneapolis, MN, on May 10-11. During the meetings, it was confirmed that Conferences are among the most important activities of the Society because they provide members with the opportunity to be involved in and to promote scientific and technical advancements in the area of instrumentation and measurement, thus boosting their professional careers.

The new Society strategic plan recognizes that the mission of the Conference Committee can be summarized as follows:

- to facilitate the organization of high-quality technical events;
- to be the main catalyst for improving the quality of technical events;
- to foster advancements of science and technology in the I&M fields through conference activities.

To this aim, the main goals of the Conference committee plan are:

- to prepare and to disseminate the Conference Management Guidelines document (now available on the Society website: http://www.ieee-ims.org/conferences/conferences-1);
- to establish a process for a periodic review of the past technically-cosponsored technical events with papers published in IEEE Xplore, to ensure that the expected level of quality is met;

- to implement a procedure to improve the technical quality of financially sponsored events (this procedure might involve a full paper revision process);
- to request budget information well in advance whenever events require financial sponsorship.

A number of metrics should also be defined to supervise all the processes mentioned above. As far as the I^{2}MTC is concerned, the mission of the society's flagship conference is to be the premier international gathering of all people involved in the I&M fields for disseminating and discussing the results of their technical activities. To this aim, the main goals of the I^{2}MTC board plan are:

- to perform a strength/weakness analysis of the conference history;
- to be proactive in identifying and promoting conference venues at least three years in advance;
- to improve the overall quality of the conference;
- to work with other committees to develop a plan to enhance the participation of Society members;
- to require continuity and experiential legacy of organizing committees; and
- to develop strategies for selecting venues that help expand membership, while involving Sections and Chapters around the world.

Summary of the I^{2}MTC Board of Directors Meeting, IEEE IMS Conferences Committee

J. Max Cortner

The Board of Directors of the International Instrumentation and Measurement Technical Conference (I^{2}MTC) was held at the end of the 2013 conference. It began with this review: Preliminary results reported 352 paid attendees, attendance to tutorials was estimated at 175, and the conference exceeded the mandatory 20% surplus over the expenses.

The board reviewed presentations from the three upcoming committed conferences. Juan Carlos Miquez made the presentation for Montevideo – 2014. Roberto Ferraro presented the update for Pisa – 2015, and Dr. Chi Hung Hwang gave a thorough report on the plans for Taipei – 2016. Details of the organizing committee, venue, budget, transportation, and local points of interest were presented in each case.

The board was then presented with bids for the 2017 conference and other possible future conference locations by Prof. Voicu Groza- Ottawa, Canada; by Dr. Sheraz Khan- Kuala Lumpur, Malaysia; and by Drs. Helena Ramos and Artur Lopes Ribiero- Lisbon, Portugal. The meeting schedule did not allow for an in depth discussion, but there are several strategic concerns about regional rotation and financial planning for future conferences. The board did not award any conferences but committed to choosing the 2017 site at the Fall I&M AdCom meeting. There were no motions passed on to the Conference Committee.

Action items: The chair was expected to propose updates to the I^{2}MTC Handbook and to prepare a bid package definition by July 1. Board members will review and provide feedback prior to the Fall meeting. Board members are expected to provide proposed actions in alignment with the I2MTC Strategic Plan.

Education Committee Report
Ferdinanda Ponci

EdCom committee members participated in the Spring AdCom meetings held in conjunction with I^{2}MTC 2013 in Minneapolis, MN, USA. Besides taking care of planned events, such as the Distinguished Lecturer selection, I^{2}MTC tutorials, and Awards, the EdCom works off-line to improve the educational offerings of the Society to the Membership. We seek to disseminate the culture of instrumentation and measurement as broadly shared within the Society and to inform our membership about cutting edge developments and technologies.

The 2013 I^{2}MTC Tutorials were a big event. Fifteen tutorials were held on May 6, organized in four sessions starting at 8:30 am and ending at 5 pm. A final meet and greet with all of the instructors provided an opportunity for afterthought questions and discussions. I2MTC Tutorials are offered as part of the conference fee (although a one day pass for the Tutorials was offered at reduced cost for those who could not attend the rest of the conference). A complete list of the Tutorials is still available for reference on the I2MTC 2013 website. Jenny Wirandi, AdCom's Tutorial Chair, and Dr. Alfredo Arnaud in Uruguay are already working on next year's program in Montevideo.

The Society's Distinguished Lecturers (DLs) visited China, Norway, United Kingdom, Argentina, USA, Taiwan, Canada, Germany, New Zealand, Russia, and Hungary during 2012.

(Thank you all, DLs and hosts, particularly our Chapter Chairs!) Most of our DLs offered multiple lectures during each trip. The guidelines on how to invite a DL, together with related forms, can be found in the DL Toolbox on the Education- Distinguished Lecturer Program page on the IMS website. In the near future, the selection process will involve our Technical Committees directly, as they are the closest to our competence landscape.

The Distinguished Lecturer Program added two new DLs as a result of the selection round held in Minneapolis during I^{2}MTC. They are Prof. Wuqiang Yang, University of Manchester, Manchester, United Kingdom and Dr. Pawel Niewczas, University of Strathclyde, Glasgow, United Kingdom. Wuqiang delivers talks on Electrical Capacitance Tomography for Imaging Industrial Processes, while Pawel delivers talks on Advanced Photonic Sensors for Power and Energy Industries. You can find more details of these and other lectures on our DLP page.

Awardee selection kept our Graduate Fellowship Award Chair Kristi Hummel and our Faculty Course Development Award Chair Dario Petri quite busy. The Committees made their final selections and awarded four Faculty Course Development Awards and three Graduate Fellowship Awards. Award recipients were announced during I^{2}MTC. The list of Awardees and details can be found on related IMS webpages. Congratulations! Regretfully, many submissions had to be turned down; as on one hand we strive for top quality and on the other hand, we must cope with finite resources. Thank you to all who submitted.

The selection process is always challenging, and we continually work to improve the guidelines to facilitate applications and evaluations. To this end, in the aftermath of this round of awards, we are collecting input from the Award Committee Chairs who in turn have synthesized the feedback of the committee members with the objective of refining the existing Award guidelines. Also, we are collecting and evaluating the reports of previous awardees. This will help IMS understand the actual impact of this (financial and organizational) effort.

The EdCom's strategic plan is but a part of the Society's strategic plan. A lot of work is ahead for the EdCom members who will reorganize and coordinate the entire educational effort to fit closely to the needs of the Membership. EdCom is placing increased emphasis on the link between industry and academia to disseminate cutting edge research results and industry needs and to develop joint learning opportunities. As part of this effort, the EdCom plans to establish a new dedicated Award whose guidelines are in development.

As always, input of the membership is precious, from Chapter Chairs on behalf of their groups and from individual members. Let us know what you think, what you would like to see, and what you would like the IMS to give you (email ponci@ieee.org).

Publications Committee
Wendy Van Moer

Early in 2013, the I&M Publications Committee had to set up a strategic plan for the publications. We defined our main mission as: Being in the forefront of published material in the I&M field. This sentence contains a huge challenge: we want to define the state-of-the-art in the I&M field and provide our members with the most comprehensive and high-quality publications.

To reach this challenging goal, the publication committee has worked out a strategic plan for the *IEEE Transactions on Instrumentation and Measurement* as well as the *IEEE Instrumentation and Measurement Magazine*. On one hand, we have our *Magazine*, which we consider to be our gateway to communicate with our members. It allows us to interact with our members (together with our web site) and disseminate our vision on instrumentation and measurement to an audience as wide as possible. A lot is going on behind the scenes for our magazine which will become visible in the coming months. Certainly something to watch out for!

On the other hand, we have our *Transactions*, which we consider to be the cutting edge of our society: the most desirable publication venue for papers in the I&M fields. Every time one of our articles is read, the reader should have learned a new concept in the I&M field. Achieving excellence through quality is the main mission of our *Transactions*. We are heading in the good direction! The number of submitted papers to our *Transactions* as well as our impact factor (IF 2012: 1.357) increases year after year. Update-to-date numbers are published on (http://www.ieee-ims.org/publications/transactions-tim). This clearly reflects the growing desire of researchers to publish in our *Transactions*.

The main reason for this evolution is our growing timeliness which is a very important issue for the quality and desirability of a journal. Of all submitted papers, 63% get a first decision within sixty days, thanks to the dedication of our editor-in-chief, all of our associate editors, as well as our reviewers. Therefore, each year the tremendous efforts of our reviewers and associate editors are recognized by means of Best Reviewer and Best Associate Editor recognition.

Reaching our goal of making our journals THE most desirable publications in the I&M field can only be done with the help and support of dedicated people who are passionately performing their tasks: editors-in-chief, associate editors, reviewers, authors, and assistants. I would like to take this opportunity to say to all of them, on behalf of our entire publication committee: Thank you very much for your excellent work!

Membership Development
Kristen Donnell and Sergio Rapuano

The Membership Development Committee (MDCom) has been busy in the first six months of 2013. MDCom organized a number of events for the 2013 Instrumentation and Measurement Society's (IMS) flagship conference, the International Instrumentation and Measurement Technology Conference (I^{2}MTC), including the annual Graduate Student Panel Discussion, Women in Instrumentation and Measurement (WIM) Panel, and the inaugural annual Chapter Chair Summit.

The MDCom is also pleased to introduce our new Chapter Chair Liaison, Professor Sergio Rapuano. The Graduate Student Panel Discussion was chaired by the IMS Graduate Student Representative, Mr. Erik Timpson. Panel discussions included the differences among graduate programs in different countries, IEEE involvement, and what IMS can do to support students. For more information on this year's Panel, please see Erik's article about the Panel in the Society News column in this issue of the magazine.

The WIM Panel featured guest speaker Dr. Kathleen Sheppard, an expert on the history of women in science. Dr. Sheppard, along with the international panel featuring panelists from industry and academia, discussed historical and current differences in the experiences of male and female engineers. A significant discussion also focused on the importance of mentoring and how men and women can make a professional and personal difference in young engineers' lives.

The inaugural Chapter Chair Summit was attended by Chapter Chairs from the USA, Canada, Uruguay, China, Taiwan, Austria, Italy, and New Zealand. IMS President Jorge Daher and Summit Chair and MDCom Vice President Kristen Donnell provided welcoming remarks and formally introduced the new Chapter Chair Liaison and Summit Co-Chair Sergio Rapuano. The Summit program included several activities to allow Chairs to network together and with the IMS administration. After the opening remarks, the attendees discussed increasing Chapter

membership and providing services to help improve member support. A significant discussion also focused on the support the Chapters need from IMS. The second part of the day was devoted to Chapter best practices, as presented by the attendees. The Chairs presented several interesting Chapter initiatives that included organizing meetings and workshops for current and future members, student contests, academia-industry collaborations, IEEE member grade elevation workshops, and development of dedicated web sites. A common goal among all Chapters is to grow the involvement of younger members and students in Chapter activities. The attendees also networked with IMS Distinguished Lecturers (DL) and learned about the process to request a DL. Overall, the Chapter Summit resulted in many ideas for IMS to consider for improving our support of our many active Chapters. Plans for the 2014 Summit, to take place in conjunction with I^2MTC in Montevideo, Uruguay, are already underway.

IMS has also welcomed three new Chapters to the IMS family in 2013 thus far: a Student Branch Chapter from the Mehran University of Engineering and Technology, the IEEE Russia (Siberia) Section Chapter, and the IEEE Southern Alberta, Canada, Section Control Systems and Instrumentation and Measurement Joint Societies Chapter. MDCom is looking forward to working with both the new and existing Chapters during the remainder of 2013.

The MDCom has enjoyed our IMS work thus far in 2013, and we look forward to continued support and interaction with our current and future members and Chapters. For more information about how to get involved with IMS or how to start a Chapter, please contact the MDCom VP Kristen Donnell at kmdgfd@mst.edu or the Chapter Chair Liaison Sergio Rapuano at rapuano@unisannio.it.

Feature Articles

Spectrum Analyzers Today and Tomorrow: Part 1
Towards Filterbanks-enabled Real-Time Spectrum Analysis

(Summary)

Adnan Al Adnani, Jonathan Duplicy, and Lieven Philips

This is Part 1 of a two-part article on spectrum analyzer technology and the future capabilities enabled by introducing filterbanks. A spectrum analyzer is the primary tool for studying the spectral composition of many electrical, acoustic or optical waveforms. It displays a power spectrum over a given frequency range, changing the display as the properties of the signal change. Today, it is an essential element of the engineer's toolbox. The authors start by reviewing SA architectures in an historical perspective. The architectures and working principles of swept based and Fast Fourier Transform -based spectrum analyzers are discussed. Then, the authors zoom in on the so-called Real-Time Spectrum Analyzers (RTSA) and discuss the more significant performance criteria as a function of the measurement problem at hand. Several applications made possible by RTSA are introduced.

This summary includes text from the article.

Measuring High Impulse Current Distribution: Application to Electromagnetic Launchers

(Summary)

Roberto Ferrero

The study of high-current transients is involved in several research fields, such as high-power electronics, nuclear fusion, applied superconductivity, and electromagnetic launch. Measuring such high currents is not always an easy task because of the critical environment with high magnetic fields that may induce high voltages on the measurement circuits and the fact that the conductors are often not accessible for a direct current measurement. Focusing on a particular application, electromagnetic rail launchers with multi-brush solid armatures, the author recalls some of the most common methods for current distribution measurements and critical issues concerning the uncertainty evaluation. He offers experimental results and the possibility of accurately estimating the uncertainty of the reconstructed current distribution based on an analytical model, since it allows a parametric analysis to identify the conditions in which the method sensitivity is good enough to provide meaningful measurement results.

This summary includes text from the article.

Harnessing Wireless Data from the Containment of a Nuclear Power Plant

(Summary)

Chad J. Kiger, Steve W. Johnson, H.M. Hashemian, and Edward K. Hudson

Wireless systems have successfully demonstrated that wireless data communication can be cost effective while also being reliable and secure. Arkansas Nuclear One (ANO), a two-unit nuclear power plant, collaborated with Analysis and Measurement Services Corporation (AMS) to develop an application for wireless technology in vibration monitoring of the containment cooling fans. This paper presents application requirements and containment specifications addressed by ANO and AMS engineers to maintain the ambient temperature of the containment structure's internal environment. ANO has initiated plans to install a system in Unit 2 and to expand other Unit 1 applications including wireless tank oil-level sensors and eventually video and radiation monitoring.

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

Smart Sensing and Smart Material for Smart Automotive Damping

(Summary)

Vincenzo Paciello and Paolo Sommella

Vehicle suspensions represent one of the most interesting applications of dampening, where the introduction of smart damping technologies and control policies lead hardware and software designers to overcome new measurement challenges. In this article, the authors investigate smart sensing issues concerning a challenging motorcycle application. Advanced sensing techniques have been proposed and tested for real-time execution by an automotive engine control unit based on a DSP-microcontroller. Smart sensing is able both to improve noise filtering of the signals provided by low-cost sensors and detect specific motorcycle dynamics which most influence the road holding and comfort. An artificial neural network has been modeled, which can be effectively adopted as a benchmark (in terms of false alarms and correctly detected faults) in the development of fault detection strategies (i.e., threshold identification) directed to the sensor validation of the rear suspension stroke.

This summary includes text from the article.

Methods for Testing Nuclear Power Plant Cables

(Summary)

H.M. Hashemian, Bryan McConkey, Gary Harmon, and Casey Sexton

Nuclear power plants are currently addressing two general types of cable problems: aging degradation, a precursor to failure or unreliability, and failure of the circuit to operate due to spontaneous faults. This article summarizes the cable testing techniques that the nuclear industry uses to comply with prevailing regulations and standards, as well as perform preventive maintenance, condition monitoring, and aging management of cable circuits. Some of the current mechanical and electrical cable testing techniques discussed can be applied *in-situ* to identify and locate degradation in polymeric cables.

This summary includes text from the article.

Low Cost Arc Fault Detection in Aerospace Applications
(Summary)

Riccardo Grassetti, Roberto Ottoboni, Marco Rossi, and Sergio Toscani

Protection of the electrical plant, equipment, and components in aerospace applications is currently a hot research topic, with particular attention being paid to parallel arc fault detection. In this paper, the authors propose a low cost implementation of a previously developed parallel arc fault detection algorithm based on the acquisition of the current waveform. The main advantage of the approach is that parallel arc detection relies on the evaluation of the specific energy related to the arcing phenomenon, allowing estimation of the arc's severity as well as high reliability. The effect of a lower sampling rate and a greater quantization noise has been analyzed; both the sampling frequency and the ADC resolution can be significantly reduced without altering the effectiveness of the method. The authors discuss a prototype that was developed and evaluate its performance through a comparison with the previously developed fault detection system.

This summary includes text from the article.

Instrumentation Notes:
The Problems of Pulse Excitation in Electromagnetic Flowmeters

(Summary)

Jacek Jakubowski, Zbigniew Watral and Andrzej Michalski

The advantages of an electromagnetic flow meter include no mechanical moving or rotating parts, bidirectional use, measurement of the mean flow velocity regardless of its transversal

distribution, and extremely long service life. The fundamental obstacle to using electromagnetic flow meters in distributed systems is that they require high power to operate. In this discussion, the authors show that it is possible to produce successful low energy measurements of flow velocity with the use of a pulsed magnetic field. Shorter pulses bring about lower energy consumption causing considerable increase in the operation time of batteries and reducing the frequency of replacing them. Detailed analysis of the signal chain comprising the electronic switch which pulses energy from the power source responsible for the magnetic field, as well as the signal conditioning high-pass filter, shows the output voltage is formed by a linear combination of two exponents with amplitudes modulated by the flow velocity and the transformer effect.

This summary includes text from the article.

Departments

New Products

Robert Goldberg

160-MHz Bandwidth and Real-Time Capability for Signal Analyzer
Agilent Technologies Inc. has announced significant enhancements to its midrange N9020A MXA X-Series signal analyzer. New options for 160-MHz analysis bandwidth and real-time spectrum analyzer (RTSA) capability address the challenges of measuring interference in the next generation of heterogeneous wireless networks.

The options can be included in new MXAs or added to existing units. The RTSA option is one-seventh the cost of a single- purpose real-time analyzer. With increased deployment of small cells and wireless LANs, there is a greater likelihood of unwanted signal interaction in the RF spectrum. For developers, real-time spectrum analysis is a powerful tool for capturing and analyzing highly elusive signals. Agilent's MXA with the RTSA option delivers 160-MHz real-time bandwidth and the industry's fastest overlap processing. The combination enables accurate triggering on short-duration transients. In addition, the signal analyzer's frequency-mask trigger and various real-time displays help users pinpoint intermittent interference problems.

On measurements up to 26.5 GHz, the MXA now offers analysis bandwidths of 85, 125 and 160 MHz, all of which are available as upgrades to existing units. The 160-MHz option meets the requirements of 802.11ac wireless LAN and LTE-Advanced specifications, both of which use wider transmission bandwidths to satisfy an ever-increasing demand for data. The MXA's ability to capture signals within a 160-MHz bandwidth with 72 dBc of spurious-free dynamic range enables users to rapidly characterize small signals near large ones.

For deeper analysis, the real-time MXA also works with Agilent 89600 VSA software. This combination enables users to thoroughly demodulate and characterize highly complex signals. More information is available at www.agilent.com/find/ MXA and www.agilent.com/find/RTSA.

Ethernet-Based MIL-STD-1553 Bus Testing

AIM GmbH introduces a new line of Ethernet-based MIL-STD-1553 test and simulation products, the ANET1553 series. Following the successful introduction of its line of USB-based products, AIM has developed this latest generation product to provide high performance and flexibility in avionics bus testing wherever an Ethernet-based system is employed.

The ANET1553-x boxes are based on AIM's latest Common Core Architecture and can be operated over Standard Ethernet, incorporating all functions and features of AIM's portfolio of MIL-STD-1553 Interfaces. They also provide a LINUX operating system on board which means that the ANET1553-x can also perform tasks like executing embedded PBA.pro™ or running custom applications.

The addition of a general purpose USB port allows additional capabilities such as data recording to removable media and wireless networking. The hardware and software architecture is well-suited for Web based applications which would allow use with any browser capable host. The ANET1553-x is packed with features to enhance your experience when analyzing, simulating, monitoring and testing MIL-STD-1553A/B data buses. Full function versions concurrently act as Bus Controller, Multiple Remote Terminals (31), Chronological Bus Monitor/ Mailbox Bus Monitor on one or two dual redundant streams per box. Single function or Simulator only versions are also available.

Powerful features include full MIL-STD-1553A/B Protocol Error Injection/ Detection (AS4112/ 4111 compliant), multilevel Triggering and Filtering, Real Time Recording (100% bus loads –all dual redundant channels concurrently) and Physical Bus Replay. The physical bus interface provides programmable bus coupling modes and variable output amplitude to the MILSTD-1553A/B bus. The ANET1553-x also supports IRIG-B time code and integrates eight software controllable (Avionic Level) General Purpose Discrete I/O (GPIO) signals. Dedicated Trigger I/O strobes are available as well.

The Application Programming Interface (API) is bundled into the module price and compatible with Windows XP/ Vista/7 and Linux. Host applications can be written in C and C++. A LabVIEW VI application interface is also included. The new AIM ANET1553-x Ethernet based interfaces open up new directions and methods for avionics data bus testing and simulation by combining the latest technologies in hardware, software and networking.

Find more information at www.aim-online.com.

Touch Screen Technology Improves Battery Life

Peratech has used its recently launched QTC™ Ultra Sensor to create a touch screen solution for OLED displays for phones, monitors and large interactive displays. The QTC Ultra Sensor is so sensitive that it can be placed behind the OLED display and it still detects finger touches on the front of the display to create a touch screen interface. By positioning the touch screen sensor behind the display, there is no loss of light from the display, enabling the battery life to be longer. This new QTC Ultra Touch Screen technology follows on from Peratech's QTC Clear touch screen solution that was launched in 2011.

QTC Ultra Touch Screen technology uses Peratech's QTC™ technology. Quantum Tunneling Composite material is anisotropic and changes its resistance when pressure is applied and only at the point where pressure is applied. This enables it to use accurate, multi-touch location sensors that can respond to the lightest of touches for the familiar range of touch screen gesture inputs such as squeeze, stretch, flick, etc. A deflection of a micron or so is needed for QTC Ultra to sense the touch through the layers of glass and display. This means that Peratech's solution provides not only multi-touch x and y coordinates but also z, according to the amount of pressure applied enabling new gesture inputs to be created.

Other benefits include longer battery life as power is only used when touched, unlike Capacitive, which needs to continually power the active sensing matrix. Capacitive technology also becomes increasingly expensive as the display size increases due to the design challenges of the matrix creating interference. QTC Ultra Touch Screens can be made using standard ink printing techniques to any size and Peratech has already made examples that are 2m by 1m.

You can view a video demo at:
www.peratech.com/assets/publicfiles/PERATECH_QTC_MULTI-TOUCH_UNDER_FLEXIBLE_DISPLAY.mp4.

Optocoupler and Relay Modules Monitor/Control High-Voltage Devices
Acromag's new BusWorks® XT Series multi-channel optocoupler and interposing relay modules connect discrete field devices to measurement and control system I/O modules. The XTA-120V-6 optocoupler modules have six individually isolated 120V AC/ DC digital (discrete) inputs to sense on/off levels and provide 5-32V DC logic outputs to a fieldbus input module or a controller. The XTA-MRNO-6 interposing relay module receives 4-32V DC logic-level signals from an output module or controller to switch six mechanical relay outputs. These two high-voltage relay interface modules offer a high-density, cost effective solution to safely monitor or control inductive and other high-power loads (motors, valves, solenoids, etc.) with control system input/output modules that only support low level DC signals.

The XTA-120V-6 six-channel optocoupler is intended for use with control system digital input modules to monitor contact closures or mains power supply on/off voltage levels. Each channel senses the presence or absence of high-level voltage to determine the status of proximity switches, limit switches, toggle switches, push buttons, contacts, and other devices. Opto-isolators control a MOSFET switch for a TTL-level output to safely interface the status of the monitored device.

The XTA-MRNO-6 six-channel mechanical relay is used with digital output modules to drive high energy loads. This unit serves as an interim digital interface to switch high voltage devices at high currents based on digital DC logic inputs. Each output has normally open Form A mechanical relay contacts (SPST-NO). LEDs on each channel indicate the output state for convenient troubleshooting.

The housing design is only 22.5 mm wide and features removable front-facing terminal blocks for easier wiring. All units run off a 12 to 32 V DC power source at the terminals or through an integrated power connector bussed along the DIN rail that can provide primary or redundant power. Fail-safe operation is supported. Suitable for use in harsh environments, modules operate from -40 to 85 °C with 1500V AC isolation and surge/transient protection.

For more information, visit www.acromag.com.

Glass Encapsulated Thermistor Probes

The TH-21 Series thermistor probes from Omega are constructed with a glass encapsulated thermistor element, which provides excellent stability and accuracy. With a maximum continuous temperature rating of -80 to 200 °C (-112 to 392 °F) and intermittent operation to 250 °C (482 °F), these thermistor sensors can be used in applications previously out of reach of epoxy coated thermistor sensors. The probes can be ordered in any length but Omega recommends a minimum immersion depth of 1.5 in (3.81 cm). Short probes run the risk of error due to stem conduction effects. The probe is ideal for laboratory, R&D, automation and automotive applications. Other applications include the HVAC, manufacturing and chemical industries.

Go to www.omega.com/ppt/pptsc.asp?ref=TH-21&Nav=temw01 for more information.

Enhancements to Web-Based Monitoring Software

Onset announces a new, enhanced version of the company's HOBOlink webenabled software platform that provides 24/7 data access and remote management for Onset's web-based HOBO U30 data logging systems.

HOBOlink now makes accessing performance and weather data faster and more convenient than ever. It enables users to schedule automatic delivery of exported data files, in CSV or XLSX format, via email or FTP. Users now have the flexibility to configure the data export in a highly customized way. For example, a user who has four HOBO U30 systems measuring multiple parameters may configure HOBOlink to automatically export temperature data only – and within a specified time range. This speeds up data analysis time and enables users to focus only on the data that is important to them.

HOBOlink also enables users to easily access current and historical data, set alarm notifications and relay activations, and manage and control HOBO U30 systems without having to go into the field. An API (Application Programming Interface) is available to organizations that want to integrate energy and environmental data from HOBOlink web servers with custom software applications.

Learn more about HOBOlink at www.onsetcomp.com/ products/software/hobolink.

New Lighting and Optics Features for Barcode Readers
Cognex Corporation has introduced new lighting and optics features for its DataMan® 300 series of industrial barcode readers. The DataMan 300 is a popular barcode reader due to its outstanding read rate performance and ease of use. Cognex continues improvements with the introduction of flexible optics and lighting features. The DataMan 300 features modular lighting that can be configured and replaced in the field. The eight integrated light banks and external lights can be individually controlled.

Lighting options include:
- IR for challenging metal parts and operator eye comfort
- Polarized red for reflective parts or parts under plastic
- Blue for metal parts or barcodes printed in color
- High-intensity red for general purpose applications
- Cognex's custom high-powered illumination accessory (HPIA) for long-range barcode reading applications
- Several external lights powered directly from the reader, and
- Reduced need for additional hardware.

The DataMan 300 lens mount supports all popular lens styles without any additional hardware. Lens options include:
- Variable focus S-Mount liquid lens
- S-Mount in 10, 16 and 25 mm, and
- C-Mount in industry standard sizes.

The DataMan 300 automatically adjusts to optimal settings. With the press of a button, the DataMan 300 "intelligent tuning" feature runs an automatic calibration routine that determines which combination of lights, and focal distance on the liquid lens will provide the best results for each application.

The DataMan 300 series includes three models: DataMan 300, with a standard resolution of 800x600 pixels; the DataMan 302, with a higher resolution of 1280x1024 pixels; and the DataMan 303 with the highest resolution of 1600 x 1200 pixels.

For more information about the DataMan 300 series of fixed-mount barcode readers, visit www.cognex.com/300.

Video Testers Now Support Testing for Ultra-HD Consumer Electronics Equipment
Manufacturers and test houses can now use the R&S VTC and R&S VTE video testers from Rohde & Schwarz to test next generation HDMI sink devices with ultra-HD or 4k screen resolution. This is possible thanks to the new R&S VT-B360 HDMI TX 300 MHz HDMI module, which is equipped with four parallel HDMI channels with ultra-HD resolution. Tests can be performed on TVs, monitors, projectors and A/V receivers with conventional screen resolutions as well.

The video testers use the new module to generate HDMI A/V test signals and play them out via one or more outputs, improving the efficiency of product tests during manufacturing. Developers can also compare devices directly with one another.

In addition, consumer electronics equipment can be tested comprehensively with respect to the HDMI protocol. These tests encompass HDMI protocols such as CEC, E-EDID and the HDMI Ethernet audio channel (HEAC). The new module also offers the option of performing CTS compliance tests on HDMI sinks. Finally, these test systems are ready to keep pace as standards evolve and new extensions are defined. For example, the new 4k 50/60 Hz mode with 4:2:0 pixel encoding is now supported.

For more information, visit www.the-av-experts.com.

PCI Express Board Features Two Optically Isolated Serial Ports

Sealevel's 7203e PCI Express serial interface provides two optically isolated serial ports, each individually configurable for RS-232, RS-422, or RS- 485 interfaces. Each serial port utilizes a high-performance UART with 128-byteTx/Rx FIFOs that enables data rates to 460.8K bps for reliable high-speed communications in data intensive applications.

The 7203e is a great choice for electrically noisy conditions and protects against harmful current loops and power surges commonly found in industrial environments. The board's 16C952 UART includes 9-bit framing support and is register-compatible with legacy 16550 software applications. In addition, the board derives a 62.5 MHz clock from the PCI Express link. This ultra-high speed clock is divided by a flexible 8-bit clock prescalar with 1/8 steps to provide support for the widest range of standard and non-standard baud rates. The 7203e is a PCI Express X1 board compatible with any PCI Express slot.

In RS-485 mode, the board provides automatic control of the RS-485 driver in hardware, eliminating the need for application software control. This allows the 7203e to be used with standard serial communications applications and removes the risk of bus contention and data corruption. Additionally, RS-485 network termination, critical to robust multi-drop communication, can be selectively added to the circuit via DIP-switches. In RS-232 mode, all modem control signals are implemented for maximum compatibility with a variety of serial peripherals. The 7203e's advanced features and scalable performance make it an ideal I/O solution across a broad range of platforms. Sealevel's SeaCOM software makes installation and operation easy using Microsoft Windows and Linux operating systems.

Find more information at www.sealevel.com.

General Purpose Load Cells

PCB Load & Torque announces the launch of its redesigned line of general purpose and fatigue rated load cells. The product line includes competitively priced fatigue rated and general purpose load cells that come in a variety of mechanical configurations such as low profile, canister, rod-end, and s-type, all of which provide excellent accuracy at an affordable price.

General purpose load cells are suitable for a wide range of general force measurement applications such as weighing, structural testing, and material test machines. All offer a high level of accuracy and operate in both tension and compression.

PCB general purpose load cells are available in standard capacities that range from 25 lb to 200 klb, with a standard static error band (±0.03% to 0.06%) non-linearity, hysteresis, non-repeatability, and extraneous load sensitivity. In addition, they have an A2LA accredited calibration to ISO 17025 in both tension and compression directions and include thermal and barometric compensation.

For more information, please visit www.pcb.com or www.pcbloadtorque.com.

Wireless Data Logger with Low Energy Bluetooth and OLED Display

Swiss technology company, MSR Electronics GmbH, introduces its universal MSR145 mini data logger for the first time as a wireless data logger with Bluetooth Low Energy (BLE) communication and an OLED color display. Also new is the web-based "MSR SmartCloud" service for mobile data monitoring.

The new features of the Bluetooth Low Energy Option (Bluetooth 4.0 Smart) and the OLED (organic light-emitting diode) graphic display of the MSR145 mini data logger significantly extend the possible applications of the wired MSR145 data logger, which was launched five years ago.

The BLE short-range radio technology is particularly advantageous for applications that require monitoring of measured data from locations that are difficult to access. The latest version of the MSR145 data logger also features impressive wireless communication via BLE. BLE allows the user immediate data visualization irrespective of the location. The free MSR Smartphone app can be used to recall the current and last recorded values at any time. A smartphone, a PC or the BLE receiver box by MSR Electronics GmbH transmits the measured data to MSR SmartCloud, if required.

MSR SmartCloud facilitates the storage of measured data on a server via the Internet, allowing the user to view, print or download the measured values of their data loggers to a PC for a detailed analysis, wherever they are. If required, the user can grant further participants access to their measured data with a personal MSR SmartCloud login, thus facilitating efficient and easy

co-operation. The user-friendly MSR SmartCloud can notify the user of incoming alarms via text messages and e-mail.

Depending on the data logger type and existing infrastructure, measured data can wirelessly enter the MSR SmartCloud in different ways using BLE: via a smartphone, PC or the BLE receiver box by MSR Electronics GmbH. A further possibility is to connect via a PC using a USB cable.

The MSR145 data logger can now be equipped with a color OLED display for a compact representation of data and graphic charts. The high screen resolution enables the user to easily read measured values, even in total darkness and from virtually any viewing angle.

For technical data, please use the following link:
www.msr.ch/en/news/MSR145_radio_data_logger_OLED_remote_monitoring.html.

New AC Temperature Controller

Oven Industries announces the new 5R1-1400 AC Temperature Controller with integrated potentiometers or control via a PC through the TTL level UART Communication port. This compact design measuring 2.5 in^2 (16.16 cm^2) can deliver up to 15 Amps of load current from a zero voltage switched, low noise, solid state relay. Operator safety is achieved with 1KV of AC line power isolation for the communication port and sensor input.

Features include:

- Universal AC Input
- Integrated Potentiometers for Set Temp and PI Control
- PC Programmable Set Temp and PID Control
- TTL Level UART Communication Port
- Set Temp Range Determined by Thermistor Type
- Temperature Resolution of 0.1 °C, and
- Open Sensor Protection.

Accessories include a USB to TTL Interface Cable, a Flange Mount Model (# 5R1-1400FL) and a Temperature Sensor.

For more information about the 5R1-1400 controller, visit www.ovenind.com.