

Measurement Technologies

From the Editor's Bench

Mike Gard

Mr. Roger's Other Neighborhood

One of my favorite stories in fiction is a short novel describing the experiences of a Mr. Anthony Rogers, the story's main character. I first read the story when I was in junior high school in roughly 1963 or 1964, and the description given in the following paragraphs struck me then, as now, as imaginative. The scene described by the main character involves two fictional cities: Fis-Ko, which I believe is a corruption of San Francisco, and Lo-Tan (identified only as being in America's Rocky Mountains). I've never determined where Lo-Tan was supposed to be.

In this excerpt from the novel, Philip Nowlan wrote:

The imperial apartments were located at the very summit of the Imperial Tower, the topmost pinnacle of the city, itself clinging to the sides and peak of the highest mountain in that section of the Rockies. There were days when the city seemed to be built on a rugged island in the midst of a sea of fleecy whiteness, for frequently the cloud level was below the peak. And on such days the only visual communication with the world below was through the viewplates which formed nearly all the interior walls of the thousands of apartments (for the city was, in fact, one vast building) and upon which the tenants could tune in almost any views they wished from an elaborate system of public television and projectoscope broadcasts.

Every Han city had many public-view broadcasting stations, operating on tuning ranges which did not interfere with other communication systems. For slight additional fees a citizen in Lo-Tan might, if he felt so inclined, "visit" the seashore or the lakes or the forests of any part of the country, for when such scene was thrown on the walls of an apartment, the effect was precisely the same as if one were gazing through a vast window at the scene itself.

*It was possible too, for a slightly higher fee, to make a mutual connection between apartments in the same or different cities, so that a family in Lo-Tan, for instance, might "visit" friends in Fis-Ko taking their apartment, so to speak, along with them; being to all intents and purposes separated from their "hosts" only by a big glass wall which interfered neither with vision or conversation. [Philip Francis Nowlan, *Armageddon 2419 A.D.*, New York, New York: Ace Publishing Corporation, 1120 Avenue of the Americas, 1962.]*

Today, most of this seems familiar: television broadcasting technology, flat-panel viewing screens, real-time streaming communications (think Skype and equivalents), and intracontinental

and intercontinental transmissions. In 1963–64, there were no personal computers. Television images were formed on evacuated cathode-ray tubes of limited size. Data rates were very limited by today's standards. Some, but not all, of the technology in the description was possible. I'm sure you will think of other examples.

Which makes it all the more impressive that the three-paragraph description above was published in 1928. The first name of the novel's main character was later shortened from Anthony to "Buck." Yes, this was the original Buck Rogers novel. When it was written, motion pictures were a novelty and most were silent. The first synchronized talking motion picture (*The Jazz Singer*) was first shown to an American audience in October 1927, just slightly before the book was published. Radio was known, although commercial AM radio broadcasting in the United States was in its infancy. Electricity was available in cities, although many rural areas in America would wait another 5–15 years for electrical lines, and much of the world would wait longer than that. There were no computers. Transistors hadn't been invented; there were only vacuum tubes. Respected publications of roughly this vintage observed the electromagnetic spectrum above 10 MHz was of little concern because the frequencies were so high as to be of little use.

So, hats off to Mr. Nowlan, the author who provided such a remarkable picture of 25th century technology which actually would be realized in the late 20th and early 21st centuries. Yet, there are clues in one sentence that you may not have noticed: "... an elaborate system of public television and projectoscope broadcasts." A brief internet search (which would have stunned Mr. Nowlan) tells me a Russian, Constantin Perskyi, made the first known use of the word "television" at the first International Congress of Electricity held at the Paris World's Fair in 1900, and the Edison Company developed the Projectoscope, its own version of an earlier film projector called a Vitascope. The first motion picture presented to an American audience was shown in New York City in April of 1896. Use of the word "broadcast" as we understand the meaning today was clearly in common use to describe radio transmissions in 1928.

Was the author Philip Francis Nowlan familiar with broadcasting? Almost certainly he was. Was he familiar with work to develop television and Projectoscopes? I have no idea. Would the notion of a viewplate have been in common use? I strongly doubt it. So, what does this interesting piece have to do with instrumentation and measurement? As engineers, we are concerned with details. As instrumentation and measurement engineers, metrologists, and academics, we are almost exclusively concerned with the details needed to extend precision, to expand the measurement's dynamic range, to make the measurement more quickly and more accurately, to reduce the noise, and to reduce the cost. We need to stop what we do every now and then and give free reign to our imaginations, as Mr. Philip Nowlan did. We need to stop always asking "How can ...?" or "Why ...?" and every occasionally ask "What if ...?" Details are easy for us, and we deal with them all the time. They are a natural part of our everyday work life. Turn loose your inner novelist, and consider what could exist two centuries down the road. It might not come true, but it might make a darn good novel.

And, as for me, I need to read the book again and figure out where Lo-Tan is (or, will be). Meanwhile, back in the real world, we invite you to enjoy the present issue of the Magazine. Those with hardware interests will find articles about resistor selection, planar eddy current sensing coils, a test facility to investigate the fault response of large wind turbines, and flow field techniques for the study of vortex generation. Tutorials discuss the use of random noise to enhance bearing vibration monitoring and details of delay measurements in data networks. It is a rich and varied mix. Happy reading. More later,

Mike

Editor's note: The title of this piece is a pun on Mr. Rogers' Neighborhood, a children's television program that will be very familiar to North American readers. According to the book's front matter, "Armageddon 2419 A.D. was originally the title of a long novelette that appeared in Amazing Stories in 1928. A sequel, entitled The Airlords of Han, appeared in that magazine a year later. Both works have been integrated to make the book you hold here."

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President's Perspectives

Jorge Daher

Overview of a Positive Year

This is the end of my first year as president of our society. I have to tell you that it has been a very interesting experience. The reasons are the good group of people in our Administrative Committee (AdCom) and the response from our members from all over the world. The members of the Ad-Com have been working all year on a series of activities. Some of them are well known by you, the publication of the IEEE Transactions on Instrumentation and Measurement and the IEEE Instrumentation and Measurement Magazine. However, this year both editors-in-chief of these publications have changed so there are changes in the AdCom. Both Alessandro Ferrero (*Transactions*) and Mike Gard (*I&M Magazine*) made the transition very smoothly. There are also new ideas for the Magazine, so you will soon see some changes.

Mihaela Albu and her team have been working hard in the Technical and Standards Committee. She is trying to reactivate some of the Technical Committees which have been inactive for some time. Some responses have been very good, and we are sure in some cases we will be successful. If you would like to be part of a Technical Committee because of your knowledge about a certain topic, contact Mihaela or me. We will put you in contact with the key people in the relevant committee.

In the Education Committee, we continued developing new products for the enhancement of our members' careers. We have video tutorials which can be seen on our web site. We also had many tutorials during our most important conferences. Ferdinanda Ponci and her team worked on two awards, the Graduate Fellowship and the Faculty Course Development awards. Our society regards education as one of the most important topics to pursue, so we are always thinking of new ideas.

Our Membership Development team led by Georg Brasseur has also been very active trying to increase and improve our membership all over the world. We have new chapters, and we also have supported students' activities.

Dario Petri has been working on improving our processes when dealing with the organization of conferences, and that will surely help us make them more efficient. We are also exploring the interaction with other organizations to see how we can be involved in new conferences.

One important action is the incorporation of Max Cortner as our Industry Liaison. He is introducing new ideas and plans to attract industry members to our society. It would be good if you let us know in which ways our society can help you develop your career.

When talking about the finances of our society, both Ruth Dyer and Frank Reyes from our Finance Committee have been working very hard to improve the management of the money of our society. After learning every detail of our finances, Ruth and Frank have improved the way we use the money for our members.

During this year, our Society went through two internal reviews from IEEE to help us to improve our procedures. One was the Periodicals Review and the other one was the Society's Five Year Review. All members of the AdCom had to work very hard to prepare both reports. I think it was very useful for us since it helped us gain a better knowledge of our internal processes, and of course, we could find out certain issues that we have to work on to make improvements. We are very proud of the results.

In summary, I think this has been a very positive year and I am satisfied. This does not mean that we can stop improving. It's just the opposite. This work can be used to motivate us toward future improvements. See you next year.

Jorge

Please contact Jorge at j.daher@ieee.org. His bio is available at <http://www.ieee-ims.org/contacts/officers>.

Article Summaries

Visualization of the Flow Field Around a Flat Plate

(Summary)

Ethirajan Rathakrishnan

Vortex dynamics play an important role in the transport of mass, momentum, and energy of a flow field. Thus, vortex manipulation is the key for controlling the efficiency of any device involving flow mixing. For example, the fuel-air mixing in a combustion chamber is the primary process governing the combustion efficiency. In this study the author visualizes and measures the size of vortices behind a flat plate to address vortex formation, size manipulation, distance of the origin of reverse flow from the plate, and response to the change of the Reynolds (Re) number. This study also investigates the physics behind the generation and size manipulation of twin vortices behind a flat plate and the functional dependence of reverse flow location with the Re number.

This summary includes text from the article.

Eddy Current Sensing Using Planar Coils

(Summary)

Lourdes Abdilla, Louis Zammit Mangion, and Charles V. Sammut

Planar coil designs are a possible solution to satisfy fabrication requirements for miniaturization and to maintain compatibility with conventional integrated circuit applications. Planar coils have

several advantages over their conventional (bobbin-wound) counterparts, including lower profile, better heat removal, ease of manufacturing, smaller leakage inductance, good repeatability, and low manufacturing cost. This paper presents a new planar coil design which exhibits improved performance over an existing conventional bobbin coil currently used in the automotive industry.

This summary includes text from the article.

A Doubly-Fed Induction Generator Test Facility for Grid Fault Ride-Through Analysis

(Summary)

David Atkinson, Graham Pannell, Wenping Cao, Bashar Zahawi,
Tusitha Abeyasekera, and Milutin Jovanovic

Regardless of the fault ride-through technique in use, it is experimentally difficult and costly to test standard large wind turbine generators under genuine fault conditions. This kind of testing on a full-scale wind turbine may expose equipment to the risk of failures. Thus, a small 7.5 kW DFIG test facility with the ability to apply flexible grid fault conditions in a safe, controllable, and repeatable manner is explained in this paper. The test rig includes a DFIG system, wind turbine emulator, grid fault emulation equipment, and a flexible control hardware installation. This paper includes two examples of DFIG fault behavior for 0% and 50% grid fault levels as defined in the Great Britain (GB) grid code.

This summary includes text from the article.

Foil Current Sense Resistors and Their Applications

(Summary)

Yuval Hernik and Tony Troianello

Many instrumentation circuits depend upon current sense resistors for precision measurements and system controls. This article describes a few such systems, from relatively low power to very high power, and relates aspects of the sense resistor to circuit and system success. The physics of foil resistor technology are reviewed to show how these devices deliver key characteristics required for reliable performance.

This summary includes text from the introduction to the article.

Noise-Assisted Data Processing in Measurement Science: Part Two: Tutorial 41

(Summary)

Ruqiang Yan, Rui Zhao, and Robert X. Gao

In Part One of this tutorial, the authors introduced stochastic resonance-based data processing, where a weak signal can be amplified and detected by deliberately adding a small amount of noise to a nonlinear bi-stable or multi-stable system. In this part of the tutorial, another noise-assisted data processing technique, ensemble empirical mode decomposition, is introduced. This technique uses added noise to solve mode mixing problems existing in original empirical mode decomposition and reveals local characteristics of a signal by decomposing it into a set of intrinsic mode functions.

This summary includes text from the article.

Packet Delay Measurements in Reactive IP Networks: Tutorial 42

(Summary)

Philipp Svoboda, Markus Laner, Joachim Fabini,
Markus Rupp, and Fabio Ricciato

The authors provide a detailed introduction of how delay can be measured in a network, especially considering the so-called stateful, reactive and non-symmetric network setups found in mobile cellular networks today. Varying definitions of delay found in literature and standards are presented, and the authors highlight the different parameters impacting the delay of a network packet and help the reader begin by selecting the right definition of his/her problem. Active and passive measurements and the best setup for delay measurements are offered, including the need for time synchronized network measurement nodes to obtain one-way delay results. The authors then combine the concepts and present a methodology accompanied by real world measurement examples.

This summary includes text from the article.

Columns

Instrumentation Notes

Measurement Technologies to Sense “Users in the Environment” for Ambient Assisted Living

(Summary)

Bruno Andò

The author presents the types of sensor-based systems that exist to improve the mobility of people with visual impairments and new technologies that are being developed to better integrate environmental data. The benefits and limitations of optical, ultrasound, inertial and GPS-based systems are introduced, and discussion includes possible solutions that will provide obstacle avoidance and navigational information for the user.

Summary written by K. Virostek,

Instrumentation Notes

An Introduction to Dither

(Summary)

Shlomo Engelberg

When it is important that the noise at the output of a quantizer be uncorrelated to the signal at its input, it may be wise to dither the input signal – to add a bit of random noise to it. If the added noise is uniformly distributed over one quantization step, then the noise at the quantizer output is not correlated to the input signal. Even after a uniform dither is used, however, the power of the quantization noise may be correlated to the input signal. To avoid this problem, rather than using a uniform dither, the author presents how one can use a triangularly distributed dither where the values of the dither signal are distributed over two quantization steps.

This summary includes text from the article.

A History of Physical Standards

An Old Chapter and a New Chapter

(Summary)

James F. Schooley, Sr.

The metrology community can evaluate fundamental constants that enter the definitions of various units in the International System of Units, devising experiments to minimize the uncertainty that must be attached to each constant. Then, after suitable deliberation, the General Conference on Weights and Measures can assign an exact value to the constant, removing from the appropriate unit of physical measurement the precision problem caused by its uncertainty. The value chosen for a given constant must be conservatively chosen, so that future experimentation doesn't discover that the assigned value was way off base; and second, scientists must understand the difference between the definition of a unit of measurement and its experimental realization.

This summary includes text from the article.

Departments

New Products

Robert Goldberg

Boundary-Scan Controller

JTAG Technologies announces a further extension to its line of high-performance boundary-scan IEEE Std. 1149.1 controllers. Known as the DataBlaster JT 37x7/PXIe, the new unit offers support for the increasingly popular PXIe/Compact PCI-express slot format that now features in some of the latest Automatic Test Equipment based on the PXI(e) standards.

Keeping pace with industry demands, JTAG Technologies has developed the new boundary-scan controller to satisfy the growing requirements for high-speed, In-System Programming (ISP) of flash memories, serial memories and CPLDs, as well as complex digital circuit testing. The new DataBlaster JT 37x7/ PXIe offers users sustained test clock speeds of up to 40 MHz by use of JTAG Technologies' proprietary ETT™ (Enhanced Throughput Technology) system and features an on-board flash image buffer memory.

Supplied with the complementary QuadPOD™ system, the new DataBlaster/PXIe offers four synchronized Test Access Ports (TAP) able to support multi-TAP test targets (UUTs) or gang programming of four single TAP targets. Quad-POD™ can also house the full range of JTAG Technologies' SCIL modules, allowing the user to deploy custom test interfaces (BDM, I2C, etc.) or the mixed signal Digital, Analog Frequency (DAF) measurement module.

JTAG/Boundary-scan capability is finding its way into many industrial sectors from Automotive to Particle Physics, many of which have demanding functional test requirements. Matching JTAG's digital and mixed-signal hardware to their preferred environment is also priority for JTAG Technologies.

The scalable DataBlaster JT 37x7/PXIe range starts with the low-cost entry model JT 3707/PXIe, ideal for high-speed test applications and in-system PLD programming. Companion models JT 3717/PXIe and JT 3727/PXIe, optionally fitted with an ETT™ module for flash ISP, support high-throughput flash programming as well as test and PLD programming.

DataBlaster/PXIe units are fully compatible with all revisions of JTAG Technologies' test and ISP tools, such as JTAG ProVision and the former 'Classic' family of development and factory run-time packages. For further details on JTAG products and services, please visit www.jtag.com.

High Performance Signal Generation

Tektronix announces the AFG2021 arbitrary/function generator which offers performance signal generation capabilities with entry level pricing. This new compact, easy-to-use signal generator is ideal for cost-sensitive education and manufacturing applications while offering the versatility to meet many R&D requirements.

In the past, entry-level signal generation equaled limited functionality and flexibility. The AFG2021 changes that equation with performance features including 20 MHz bandwidth, 14-bit resolution, 250 MS/s sample rate performance and an intuitive user interface at a low starting price. Included is Tektronix ArbExpress software that lets users quickly create and import waveforms into the AFG2021 to meet custom stimulus requirements.

As a result of this blend of performance and lower cost, educators are no longer forced to choose a signal generator that can only be used in entry level classes. The AFG2021's performance

supports development of advanced course material involving more complex concepts such as serial data streams and modulated waveforms.

For manufacturing applications, the AFG2021 provides the same ease of use, functionality, computer connectivity and continued support software available with the Tektronix AFG3000 series but in a smaller form factor ideal for rack mounting.

The innovative ease-of-use features first offered on the AFG3000 Series arbitrary/function generators are incorporated into the AFG2021, providing quick access to setup and operational features. A 3.5-inch color TFT screen shows relevant parameters in both graphic and text formats. It includes 12 standard waveforms, modulation capability, and a built-in noise generator to thoroughly exercise designs.

The AFG2021 offers a range of connectivity options for saving or downloading customized waveforms or instrument settings, including both a USB Host Port on the Front Panel and a USB Device Port on Rear Panel plus the optional GPIB and LAN ports. The 2U height and half-rack width form factor allow the AFG2021 to be stacked on other bench instruments. Please visit www.tek.com for more information.

Delay Lines Enable Radar Target Simulation in a Lab

Eastern OptX announces two new delay lines for radar testing. The E-501 fixed delay line and the E-3001 variable delay line are designed to lower the cost of testing a radar system's accuracy and receiver sensitivity. The E-501 and E-3001 delay lines allow engineers to create repeatable range accuracy by replicating the target distance and propagation loss with a benchtop system in a lab.

EOX delay lines employ fiber optic technology to overcome the shortcomings of conventional schemes including acoustic, digital, and coaxial transmission delay lines. EOX uses actual system signals with no analog-to-digital (A/D) or digital-to-analog (D/A) conversions, thus allowing "real world" testing of the entire radar system. With a wide dynamic range of >100 dB and frequency range to 18 GHz, EOX delay lines are universal target simulators that can be used right out of the box.

The E-501 fixed delay line is an economical, high-performance turnkey product for radar testing as well as WiMAX, wireless communications, and altimeter applications. It features ultra-wide bandwidth, low loss, high isolation, low noise, and high dynamic range. It is available with a delay time of up to 100 µsec and a frequency range of 0.1 to 6 GHz.

The E-3001 variable delay line is a high performance, turnkey product for the radar test industry. It has multiple delay cells with front panel or computer control having up to eight switchable delays. The E-3001 features ultrawide bandwidth, low loss, high isolation, high dynamic range, and a frequency range of 0.1 to 6 GHz. The E-3001 is available with time delays of up to 100 µsec, with longer delays possible upon request. Visit <http://eastern-optx.com> for more information.

Dual Range Power Supply Provides Power up to 350 W

B&K Precision announces the addition of the model 1747, its latest dual range DC power source. delivering up to 350 W of power with constant voltage (CV) and constant current (CC) modes, model 1747 can output either higher voltage at a lower current range (0–60 V, 5 A) or higher current at a lower voltage range (0–35 V, 10 A). This new DC power supply is suitable for a wide variety of uses in electronics manufacturing, service and repair, and engineering labs.

The design of dual range power supplies gives users operational flexibility within voltage and current ranges depending on their application needs. This helps save both bench space and cost by eliminating the need for multiple power supplies on the bench or purchasing more power than necessary.

Providing nearly three times more power than its close relative, the model 1737, the 1747 offers a sufficient increase in current range yet maintains the excellent regulation and low ripple characteristics available in the 1737. Both voltage and current are adjustable with coarse and fine control knobs, while two bright 4-digit LED displays show the voltage and current.

Other features include automatic recall of the supply's last settings on power up, overload and reverse polarity protection, and the addition of a convenient output On/Off button. An RS-232 interface on the rear enables remote control of the instrument via PC using software or remote commands. Application software can be downloaded from B&K Precision's website. For additional information, please visit www.bkprecision.com/search/1747.

Digital Radio Test System for the Land Mobile Radio Market

Aeroflex announces the 3550 Digital Radio Test System featuring color touch-screen and enhanced specifications to provide users with a lightweight, easy to use, and reliable digital radio test system. Designed for Professional Mobile Radio (PMR), public safety, and other land mobile radio applications, the Aeroflex 3550 test system quickly isolates problems and assesses performance in AM/FM radios, with options for P25, DMR, NXDN™, and dPMR radio systems.

Weighing just 8.3 lbs. including its internal battery, the 3550 test system is lightweight for field-testing of analog, DMR, P25, NXDN, and dPMR systems and features 4.5 hours of continuous operation. Uniquely, the 3550 test system allows the user to test all aspects of the radio system—the transmitter, receiver, cables, and antennas—with powerful features typically found only in bench top equipment. It also meets MIL-PRF-28800 A specifications for humidity, shock, and vibration, with an operating range of 0 °C to +50 °C.

The 3550 Digital Radio Test System features accuracy and specifications normally reserved for more expensive bench top instruments. Typical specifications include:

- Phase noise of -95 dBc/Hz
- RF signal generator level accuracy of +/-1.5 dB
- FM deviation meter accuracy of 4%, and
- -140 dBm spectrum analyzer.

Find more information at www.aeroflex.com/ats.

Semiconductor Test System for Production Testing

Geotest has expanded the capabilities of the TS-900 platform with the addition of a new manipulator option and automated handler compatible receiver. The Reid-Ashman OM1069 manipulator is designed specifically for the TS-900 and allows precise positioning and flexibility for interfacing to automated probers and device handlers used for production testing of semiconductor

devices. The manipulator's spring loaded design allows for easy alignment and docking to handlers, eliminating the need for a complex receiver interface.

The TS-900 also features a new handler compatible receiver which offers the flexibility to interface to virtually any device handler. In addition, fixture compatibility is maintained with the

TS-900's current receiver, allowing users to interchange load boards between the screw down and slide receiver configurations. For more information, please visit www.geotestinc.com.

New Products for LXI and PXI Platforms

Pickering showcases the following new equipment:

- 40-727/728/729 Expandable RF Matrices – Building on Pickering's unique 40-726ARFMatrix, these new modules now allow Pickering to provide a family of expandable RF Matrices for a broad range of RF applications.
- 40-884 4×4 6 GHz RF Matrix – This is the first 4×4 RF Solid State matrix available in PXI. This product is an addition to Pickering's expanding family of 40-88X Solid State Switching.
- 40-567 BRIC Matrix – The latest addition to Pickering's established range of BRIC options, this part provides very high density matrix configurations for 2 A switching and maximized connection elegance for 1-pole applications.
- 40-611 Multiplexer – This product provides enhancement of Pickering's PXI Multiplexer offerings with high density 2 A multiplexers in PXI, featuring very low channel cost.

PXI has proved very popular in many demanding military and commercial aerospace test applications, since PXI helps create smaller, faster test solutions and makes the job of specifying and integrating test stations easier. Pickering provides Avionics Bus interface cards, programmable power supplies, arbitrary waveform/function generators, 7½ digit DMMs, digitizers, signal conditioning, high current switching, sensor simulators, switching matrices, and a wide range of PXI Chassis.

The LXI platform has allowed Pickering to address new applications that could not be easily addressed by other platforms. The benefit to aerospace customers is a test solution that is often smaller, lower cost, and exhibits improved specifications. More information is available at www.pickeringtest.com.

High-Bandwidth Accessories for More Durable Oscilloscope Probing

Agilent Technologies introduces economical, semi-permanent solder-in probing solutions for its InfiniiMax III oscilloscope probing system. Engineers can use these accessories for high-speed digital system design, component design/characterization and differential serial bus measurements.

Agilent N2838A 25-GHz ZIF (zero insertion force) tips come with plastic sporks to aid in soldering the tips to the device under test. The tip uses a PC board substrate, making it a highly durable and convenient probing solution.

The Agilent N2836A InfiniiMax III 26-GHz solder-in head is an economical semi-permanent connection that provides up to 26 GHz of system bandwidth. The ZIF tip and solder-in head come pre-attached with a pair of damping resistors to eliminate the distortion and loading that affect probes with in-band resonances. They are user replaceable, so an engineer with a damaged resistor tip can simply solder a new damping resistor to the tip and quickly resume work.

InfiniiMax III differential active probes offer up to 30 GHz of high-bandwidth performance for measuring differential signals with superior signal integrity and flexible connectivity solutions for today's high-density integrated circuits and circuit boards. InfiniiMax III probes are compatible with Agilent's Infiniium 90000 X- and Q-Series oscilloscopes.

Additional information about the N2836A InfiniiMax III solder-in head is available at www.agilent.com/find/N2836A. Additional information about N2838A InfiniiMax III ZIF tips is available at www.agilent.com/find/N2838A.

Optical Strain Gage

Micron Optics announces the new os3610 Optical Strain Sensor. This new long-gage, rugged, optical strain sensor represents the latest in fiber Bragg grating (FBG) sensor technology and is optimized exclusively for surface mount applications.

The os360, released in 2004, was the first in Micron Optics' family of long gage, steel reinforced, optical strain sensors. It revolutionized fiber packaging and FBG anchoring technology at a time when most fiber optic sensors were very basic, even crude.

The os360 was replaced in 2008 by the even more rugged, waterproof os3600 optical strain gage. The os3600 continues to be very popular and is active in hundreds of locations around the world. Its 0.25 or 1.0 meter gage length is particularly useful for strain measurement in nonhomogeneous materials such as concrete.

While the os3600 performs best as an embedded sensor, the new os3610 is a purpose-built, surface mount gage. The os3600 and os3610 share key characteristics, as each type contains one FBG for strain measurement and a second FBG for active temperature compensation. The new os3610 also has the unique capability of visually presetting an ideal zero-strain point, and hard stops protect the gage from over travel. Moreover, the IP67-rated os3610 sensor has steel tubes which seal out the environment and provide a very low resistance connection between end brackets. The result is a stable, accurate, temper-ature-compensated sensor for long-term strain measurements.

Throughout the past decade, Micron Optics' thorough testing procedures have continued to evolve. Now, each sensor design is tested in harsh, controlled laboratory conditions where conditions mimic the day-to-day and season-to-season environmental changes seen in real optical sensing applications. For more information, please visit www.micronoptics.com.

High-Performance MEMS Accelerometer

Silicon Designs, Inc. has introduced the model 2276, a high-precision accelerometer with a simple four-wire threaded removable connector. Following the launch of its sister model, the 2266, the new SDI model 2276 offers reliable, continuous operation to +125 °C (+250 °F), when used with recommended 8–32 volt power supply, along with improved bias, bias TC, scale factor, scale factor TC, and lower noise floor and linearity specifications. The model 2276 is expressly tailored for zero-to-medium frequency applications, offering integral amplification and high-drive, low impedance buffering for precision measurements, and allows users the ability to completely exchange, move, reposition, and replace accelerometers within a given test setup for greater flexibility, convenience and cost savings.

The accelerometer produces two analog voltage outputs and supports both single-ended and differential modes. Signal outputs are fully differential about a 2.5 V common mode voltage. Sensitivity is independent from the supply voltage of +8 to +32 V. At zero acceleration, the output differential voltage is nominally 0 VDC; at full scale acceleration, the output differential voltage is ±4 VDC. The sensors feature on-board voltage regulation and an internal voltage reference which eliminates precision power supply requirements. The sensor is relatively

insensitive to temperature changes and thermal gradients. Self-calibration is quick and easy. Within standard range (± 2 g to ± 400 g), most accelerometers continue to operate after sustained exposures of up to 10,000 g shock and with limited exposure to temperatures above +200 °C.

The low-impedance outputs of the Silicon Designs model 2276 will drive more than 100 meters of cable, with an overall flexibility that allows this accelerometer to be used within a wider variety of applications, particularly those in which testing requirements necessitate frequent cable replacement. For more information about the model 2276 or other products available from Silicon Designs, visit www.silicondesigns.com.

New Test System Platforms

Seica introduces ATE and functional test systems featuring flying probe and functional test platforms. The Pilot systems feature a line of automatic flying probe test equipment that offers a wide range of solutions and performance for flying probe test of electronic boards. Models range from 4 to 8 test probes, accessing simultaneously one or both sides of the board, which can be positioned either horizontally or vertically in the test system.

The Pilot systems are used not only to test new electronic boards of any type, but also to repair boards coming back from the field and even for reverse engineering operations, such as creating test programs and schematics for boards when the relevant technical documentation is incomplete or unavailable. Several options are available on Seica's VIP platform to enable program generation, which include net list learning techniques, net-orientated test methods, and software utilities helping the operator in the precise detection of a faulty component. These options are not common on traditional flying probers which simply operate as MDA testers in manufacturing.

The Valid line integrated functional test solution is capable of meeting and exceeding requirements for analog, digital and mixed-signal testing. Seica's functional line has a proven track record of successfully replacing obsolete functional test equipment, from GR179X to GR275X, from L200 to L300, from S720 to S790, and from custom STE for box level test and validation. Offering the best test-oriented stimulus and measurement dedicated hardware, the Valid line can readily be extended to incorporate GPIB, LXI, and VXI COTS solutions. Designed around a common hardware architecture, the Valid line is offered in several different configurations to address ergonomics, test strategy, and deployment from board depot to full production level test. Please visit www.seica.com for more information.

Data Logging for Raspberry Pi Computer

Pico Technology's DrDAQ compact single-board data logger adds 17 I/O channels to your Raspberry Pi Computer. Now your Linux application can have access to a 100 kHz oscilloscope, arbitrary waveform generator, four digital I/Os (two with pulse-counting input and PWM output), 24-bit RGB LED, built-in light sensor, temperature sensor, microphone and sound level sensor, resistance measuring input, and pH/redox sensor input. There are also three inputs for Pico's own sensors or for custom devices you build yourself. DrDAQ requires just a single USB connection for power and data.

When connected to the Raspberry Pi single-board computer, DrDAQ forms a powerful data logging system that can be integrated into your custom Linux application. Pico Technology has released a Debian OS driver and C++ example code for free download. The example code displays a simple text menu that allows you to capture data, control the digital I/O pins, set up the signal generator, and drive the LED.

Download the driver and example code and read the latest Raspberry Pi news, available on the Pico forum at www.picotech.com/support/. You can see the example code in action in a post by Andrew Back on the Design Spark blog (www.designspark.com).

Society News

What Can Involvement in the IEEE and IMS Bring to a Student? Graduate Student Panel Discussion at I²MTC 2012

The annual Graduate Student Panel Discussion at I²MTC examines topics relevant to graduate student conference attendees as they move forward with forming goals and pursuing their careers. Dr. Kristen Donnell of Missouri University of Science and Technology chaired this year's panel discussion which had 11 attendees. The panelists included Dr. Sarah Seguin of the University of Kansas, Mr. Erik Timpson of Honeywell, USA and a PhD student at the University of Missouri at Columbia, Mr. Jorge Fernandez Daher, President of the Instrumentation and Measurement Society (IMS), and Dr. Reza Zoughi, past Editor-in-Chief of the IEEE Transactions on Instrumentation and Measurement.

Dr. Donnell described the major benefits of being a member of a professional society as having the opportunity to experience professional networking, mentoring, publishing, and attending conferences. Mr. Daher explained the organizational structure of IEEE and also discussed the benefits of membership, including the fact that IEEE provides a useful venue to demonstrate technical skillsets. In addition, job opportunities may result from such involvement.

Dr. Seguin spoke about life as an assistant professor. For those in the audience considering an academic career, her descriptive experience as a tenure track professor was very insightful. She was very candid about the challenges facing a young professor (e.g., learning how to manage students, projects, project funding, and time), and also spoke of the rewarding parts of the job such as educating and discovery. She noted that the key to success is organization, and that the best part about being in academia is having the freedom to explore and research across many different disciplines.

Mr. Timpson brought a unique perspective resulting from his experiences in industry. He spoke on topics that ranged from management styles and the importance of communication between colleagues to cognitive neuroscience, and he discussed why learning from experience is so effective. He also talked about how earning a PhD is an important credential that is going to help him bring technical excellence to a high level of practicality in industry. In his experience, he said, "To truly be very successful, you must pool your resources and bring peoples' expertise together" to find a solution.

Whether in academia or in industry, Dr. Zoughi explained that publishing is important for building a career. "Publishing your work is the ultimate statement of saying you've done something novel," he said. He spoke about the mechanics of publishing including the peer review process, its importance, and how to get involved. He also offered his insights into publishing successfully.

The IMS is committed to supporting the involvement of students within the Society and our Conferences, and the next Graduate Student Panel discussion is already being planned for I2MTC 2013 in Minneapolis, MN. Please contact Sarah Hatfield at sarah.hatfield@mst.edu for more information or if you wish to get involved.

Sarah Hatfield

First Annual Women in Instrumentation and Measurement Panel Discussion

The Instrumentation and Measurement Society (IMS) strives to continually support the needs of our female members and conference attendees. This year, for the first time, at the 2012 International Instrumentation and Measurement Technology Conference (I²MTC), in Graz, Austria, the IMS was pleased to host the Women in Instrumentation and Measurement (WIM) Panel Discussion. The WIM Panel Discussion provided an opportunity for conference attendees to address and discuss issues, concerns, and professional topics that are not of a distinctly technical nature. All conference attendees were welcome to attend this special session of I²MTC 2012.

The WIM Panel was chaired by Dr. Kristen M. Donnell and featured panelists from different career and geographic areas. Dr. Sarah Seguin, an Assistant Professor at the University of Kansas, provided an academic perspective, as did Ms. Charna Parkey, a Sr. Signal Processing Engineer at Astronics DME Corporation and a PhD Student at the University of Central Florida. Dr. Jenny Wirandi, a System Engineer at the Oskarshamn Nuclear Power Plant in Oskarshamn, Sweden, provided an industry and managerial perspective. Dr. Marlene Fritz, a Process Engineer at EPCOS Company, also contributed to the industry perspective. The Panel was also able to compare and contrast life as a woman in engineering from European and American perspectives.

Over 20 conference attendees (both men and women) attended the WIM Panel, including a number of IMS Administrative Committee members. Throughout the panel discussion, the audience interacted with the panelists, discussing topics such as family leave, the influence of culture and career path (academia vs. industry) on the female experience in engineering, and challenges faced by women in positions of leadership. The perception of female managers and leaders by colleagues was also discussed as was the importance of professional validation.

Plans are already underway for the WIM Panel at I²MTC 2013 in Minneapolis, MN. Contact Kristen Donnell at kristen.donnell@mst.edu for more information, or if you wish to get involved.

Kristen Donnell

The International Instrumentation and Measurement Conference 2012 (I²MTC) Report from Graz, Austria

This year we met in the beautiful location of Graz, Austria. We share some of the photos here from the events. What an enjoyable and beneficial conference! We were busy in the days before the conference. Members of the I²MTC 2012 organizing committee and the management team members filled the bags for the attendees with conference materials and some gifts from the organizer and the city of Graz.

Jill Zubarev, representing the U.S. Department of Energy at the U.S. Mission to the International Organizations in Vienna, Austria, gave an exciting keynote presentation for the Industrial Track workshop Providing Sustainable Energy entitled “Measurement and Instrumentation Challenges and Opportunities in Renewable Energy Systems.” Lord Paul Drayson, the former UK Minister of State for Science and Innovation and Minister of State for Defense Acquisition Reform, gave a tantalizing keynote address for the Industrial Track workshop Enabling Alternative Vehicles entitled “Enabling alternative vehicles - from the race track to the street with the latest sustainable automotive technologies.” Ernst Fiala, emeritus Full Professor at the TU Berlin’s Institute for Automotive Engineering and former Board member of Volkswagen AG, Research and Development, gave an interesting keynote address for the Industrial Track workshop Protecting the Environment entitled “Future of energy and fuel.”

*The magazine includes photos from the conference.
Georg Brasseur*
