

The IEEE Instrumentation & Measurement Magazine
February 2016 Issue

Instrumentation and Measurements in the World of Food

Editorial

2016 Is Born

Wendy Van Moer

Let me open this first issue of 2016 by wishing you all a marvelous scientific 2016! That all your dreams may come true! What will 2016 bring us? A lot of interesting magazine issues! Let's start with this issue on... food!

Belgian people, they have something with food. They like to eat good food and enjoy the good things in life. So when I started my term as the EIC of our magazine, I was already convinced that we definitely needed to spend an issue of our magazine on food. Here it is!

You will see that a lot of instrumentation and measurement related research is going on in the food industry. All application fields are present in the world of food: sensors, cameras, light, electronic noses... Enjoy it and don't get hungry!

What else will 2016 show us? Some special issues! From now on, we will have one special issue a year showing us what is going on in the different IEEE regions. So this year, the issue for April will be fully dedicated to Region 10 under the leadership of our guest editor Prof. Ruqiang Yan. Something to look forward to!

But there is more... June 2016 will be all about women! (What else did you expect with a female EIC... ;-) Women showing their research, providing some testimonies, getting rid of some stereotypes and much more under the guidance of our guest editor Prof. Ferdinandi Ponci. 2016

is a year full of changes. Also our submission process is changing. From now on submitting your articles to our magazine will become very easy by using the automatic AllentTrack submission system: <http://imm.allentrack.net/>.

2016 and still not on Facebook??!! Let's change this! Your favorite magazine now has its own Facebook page. Look for 'IEEE Instrumentation and Measurement Society Magazine' on Facebook! What will you find there? The latest news, upcoming issue items. But what is more important: you as a reader will have a voice! You can ask us all questions and post your comments and suggestions. Be the first to "Like" us! If we have 1000 likes before the 1st of April 2016, we will draw a lucky winner who will get a box full of nice Belgian chocolates!

Enjoy!

Groetjes,
Wendy

President's Message

Introduction to 2016

Ruth Dyer

The beginning of the New Year is always a great time for self-reflection and to take stock of where we currently are, where we want to be, how we get to where we want to be, and what resolutions to make that will help us achieve our goals.

The same is true for the organizations of which we are members and volunteers. This is a particularly important time to look at the current status of our IEEE Instrumentation and Measurement (I&M) Society, to consider the paths we want the I&M Society to follow, and to identify strategies that promise to help us make progress toward reaching our goals. In early 2017, the I&M Society will undergo both its five-year Society review and its Publications review.

Though 2017 still seems like quite some time away, we will need to begin gathering information and writing our report during 2016. Thus, we need to start now to assess the progress we have

made since our most recent 2012 review, identify successful strategies we have developed and implemented during the past five years, highlight best practices we are using, and look toward what we want to accomplish in the future.

We will begin this work with our officers and editors at our annual Strategic Planning Meeting in late February of this year, and the work will continue throughout the 2016 year. During the February meeting we will spend time reflecting collectively on where we are, reviewing and possibly revising our I&M Society Strategic Plan, and developing new initiatives for 2016 to continue to enhance the professional benefits our Society provides to its members.

We have a great mix of new and continuing members on our I&M Society Administrative Committee (AdCom), and we have a number of new people stepping into leadership positions in the I&M Society this year. I am looking forward to working with and hearing the perspectives and ideas of our leadership team, our AdCom members, our Society members who serve in various volunteer roles, and our many other I&M Society members.

To begin to acquaint you with them, here is a list of our 2016 I&M Society Officers and Editors by name, position and email address:

Ruth Dyer, President, rdyer@ksu.edu

Max Cortner, Executive Vice President, Max.Cortner@bsci.com

Mark Yeary, Vice President, Conferences, yeary@ou.edu

Salvo Baglio, Vice President, Education, Salvatore.baglio@unict.it

Dario Petri, Vice President, Finance; dario.petri@unitn.it

Shervin Shirmohammadi, Vice President, Membership; shervin@site.uottawa.ca

Zheng Liu, Vice President, Publications; zheng.liu@ieee.org

Ruqiang Yan, Vice President, Technical Committees; ruqiang@seu.edu.cn

Juan Manuel Ramirez-Cortes, Treasurer, jmram@inaoep.mx

Reza Zoughi, Junior Past President, zoughi@mst.edu

Jorge Daher, Senior Past President, j.daher@ieee.org

Wendy Van Moer, Editor-in-Chief, *I&M Magazine*, wendy.w.vanmoer@ieee.org

Alessandro Ferrero, Editor-in-Chief, *I&M Transactions*; alessandro.ferrero@polimi.it

Please feel free to contact any of the officers, editors, and AdCom members throughout the year to share your ideas and thoughts. You also can provide input through our I&M website and social-media venues, such as Facebook and Twitter. Your input helps ensure we are focusing our efforts on enhancing the benefit of the I&M Society to you.

In closing, I want to share one of my own personal reflections for the coming year. I like the words used in the title of the fundraising campaign recently announced by my employer, Kansas State University. The effort is known as the *Innovation and Inspiration* Campaign, and I think those two words also capture important aspects of the work we do as volunteers to advance our IEEE Instrumentation and Measurement Society. As we look to the future of the I&M Society, I hope we will continue to seek inspiration as well as inspire others, and use that inspiration to work toward innovations that will advance not only our profession but our global society as well. Best wishes for an inspirational and innovative 2016!

Ruth

Article Summaries

You Are What You Eat: So Measure What You Eat!

(Summary)

Parisa Pouladzadeh, Shervin Shirmohammadi, and Abdulsalam Yassine

Measuring food calorie and nutrition intake on a daily basis is one of the main tools that allows dieticians, doctors, and their patients to control and treat obesity, overweightness, or other food-related health problems. Yet doing this measurement correctly and on a daily basis is challenging and one of the main reasons why diet programs fail. In this article, the authors look at calorie-intake measurement techniques and cover both traditional and newer methods with emphasis on the latter. Among the newly proposed methods, Vision Based Measurement (VBM) has gained a lot of attention, because it makes it very easy for users to measure their food's calories and nutrition by simply taking a picture of their food with their smartphone.

This summary includes text from the introduction of the article.

Historical Development of Grain Moisture Measurement and Other Food Quality Sensing Through Electrical Properties

(Summary)

Stuart O. Nelson and Samir Trabelsi

Research has been conducted seeking useful correlations between quality attributes of other food materials and their electrical properties, but they have generally been less successful than the determination of moisture content. In this article, an overview of the historical development of such measurement methods and techniques is presented with respect to grain and seed and other agricultural products and food materials. The article covers use of electrical resistance or conductance of grain samples, radio-frequency capacitance measurements, and microwave measurements of dielectric properties for sensing the moisture content of grain and seed. It deals with the principles involved rather than descriptions of specific instruments that have been developed for rapid measurement of grain and seed moisture content.

This summary includes text from introduction of the article.

E-Nose Application to Food Industry Production

(Summary)

José Chilo, José Pelegri-Sebastia, Maria Cupane and Tomás Sogorb

Food product research is required to convert the initial product idea into a formulation for upscaling production with ensured significant results. Sensory evaluation is an effective component of the whole process. It is especially important in the last step in the development of new products to ensure product acceptance. In that stage, measurements of product aroma play an important role in ensuring that consumer expectations are satisfied. The e-nose is a combination of various sensors used to detect gases by generating signals for an analysis system. The authors' research group has investigated the scent factor in some foodstuff and attempted to develop e-noses based on low-cost technology and compact size. In this paper, they present a summary of our research to date on applications of the e-nose in the food industry.

This summary includes text from introduction of the article.

Microwave Sensing of Quality Attributes of Agricultural and Food Products

(Summary)

Samir Trabelsi and Stuart O. Nelson

Highly automated and computerized processes in agricultural and food industries require the development of sensors for continuous measurement and monitoring of quality attributes of agricultural and food products. Recent advances in calibration methods and availability of reliable and inexpensive microwave components offer an opportunity for the development of a new generation of low-cost microwave sensors for process monitoring and control that will result in significant labor and cost savings in addition to maintaining the desired quality and complying with safety regulations. This paper discusses both the development of calibration methods for indirect determination of bulk density and moisture content from measurement of the dielectric properties at a single microwave frequency and development of inexpensive microwave meters for routine characterization of grain, seed, and in-shell peanuts in static and dynamic situations.

This summary includes text from introduction of the article.

Improving Calibration Accuracy of a Vibration Sensor through a Closed Loop Measurement System

(Summary)

Ruqiang Yan, Xiang Li, Zhangwei Chen, Qi Xu, and Xuefeng Chen

The calibration for vibration sensors, which need to ascertain sensitivity, frequency response characteristics, amplitude linearity, etc., are required before the measurement is made [3], [4]. Traditionally, an open loop device (in which the excitation signal is adjusted manually and the parameters are recorded manually) is used for sensor calibration. This type of manual calibration generates a large amount of work and active jamming, which results in errors. In this article, the authors introduce such a closed loop calibration system for vibration sensors. If a closed loop calibration system can be designed (i.e., the excitation signals are adjusted automatically by devices, and the real time data are sampled and analyzed), it will offer abundant measurement information and analysis methods which can help improve calibration accuracy and efficiency.

This summary includes text from conclusion of the article.

Columns

Letter to the Editor

Wendy Van Moer

Dear Readers,

I was very happy to receive a “Letter to the Editor” from Harvey A. Buckmaster, Ph.D., P. Phys., P. Eng. Life Senior Member IEEE. In it, he responds to the Basic Metrology column by Bryan Kibble from the October 2015 issue of *I&M Magazine* titled “Where has all our Helium Gone?” Thank you for writing to us Dr. Buckmaster!

All the best,

Wendy Van Moer,

IEEE *I&M Magazine* EIC

This text introduces the column. The print article contains the full letter.

Basic Metrology

AC and DC Quantum Hall Resistance – Simple and Beautiful

Jürgen Schurr

Dear Readers,

Jürgen Schurr is a metrologist who relishes the elegance of the methods employed to produce useable standards from the quantum effects on which the SI units are now based and the insight into these effects which accurate measurements provide.

This text introduces the column and was written by Bryan Kibble.

Future Trends in I&M

Research and Industry: Towards a Non-Existing Gap

Mohamed Khalil

Dear readers,

This month, the guest author for the Future Trends in Instrumentation and Measurement column, dedicated to a young and brilliant engineer, is Mohamed Khalil. Mohamed is a young, brilliant and brave engineer. In fact, after having worked for a few years outside the academic world, he decided to take a step backward and to begin to study again to follow his dreams... So, presently, he is a Ph.D. student at the Politecnico di Milano, Italy, where he is distinguishing himself for his tenacity, his willpower and his talent. Because of his experience, his nice contribution can really be a bridge between the two “separate” worlds of industry and research.

This text introduces the column and was written by Simona Salicone.

Departments

Society News

Recognizing & Celebrating our Members' Innovations

Reza Zoughi

Dear I&M Society members:

Recognizing and celebrating our members' technical achievements is very important to us in the I&M Society. As a Society we actively try to nominate, recognize and celebrate our most accomplished members (in several different categories within the Society and the IEEE) with various Society awards and elevation to the level of IEEE Fellow and Senior Member, to name a few. We also have many members whose technical innovations and achievements are rewarded by issuance of patents. This is considered the ultimate level of achieved technical innovation where important developed intellectual properties (IP) are legally protected for many years and for proper use. Most patents may be applied for and issued to companies. However, many other institutions, in particular universities, have for some time recognized the value and importance of protecting their IP through filing for patents. A significant amount of resources is devoted and spent annually on filing for patents in the filing country and also internationally.

Consequently, in 2016 we will start publishing a new column in the *Magazine* devoted to issued patents whose authors (inventors) are our Society members. Although the exact process has not yet been established, we envision publishing patent abstracts with authorship information highlighting our members' technical achievements in this respect. We will be in contact with you in the next few months as we develop and streamline this process. We are also considering a "Members' Patents" page to be included on the Society web site (<http://iee-ims.org>).

Thank you, and I look forward getting this exciting initiative off the ground soon where we will regularly celebrate our members' accomplishments.

Cheers!

Reza

New Products

Robert Goldberg

Please send all "New Products" information to:

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New Power Supplies, Function Generator, Added to Bench Instrument Line

Tektronix, Inc. introduces additions to a family of Keithley power supplies and a new 60 MHz Arbitrary Function Generator that together give engineers an expanded range of options for adding essential instruments to their test bench.

Tektronix introduces eight new programmable DC power supplies. These additions to the Keithley Series 2260B power supply family include six new 250V and 800V high voltage models, a new 108A high current model and a new 80V/40A 1080W high power model.

Regardless of the configuration selected, Series 2260B power supplies feature programmable rise and fall time control for both the voltage and the current waveforms. An embedded programmable output resistance feature allows users to simulate the output of a battery for testing higher power portable battery products.

Compared to scope-based signal generators or standalone AFGs (Audio Function Generators) in this price class, the Tektronix AFG1000 series of instruments offer better performance and greater flexibility. The AFG1062 expands the series with impressive specifications for its price class including two equally capable channels, 60 MHz bandwidth with 1 mV pp to 10 V pp output amplitude, 14-bit vertical resolution and 1 μ Hz frequency resolution. It provides a 300 MS/s sample rate along with a record length of 1 M points and USB memory expansion for user-defined waveforms.

The AFG1062 includes 50 built-in standard functions and arbitrary waveforms with continuous, modulation, sweep and burst modes to cover a broad range of applications. The instrument is easy to use with a 3.95 inch TFT color display, shortcut buttons and a rotary knob for quick setting adjustments. Its compact form factor saves valuable bench space.

Find more information at www.tektronix.com.

PXI Fault Insertion Switch for Serial Interfaces

Pickering Interfaces PXI Fault Insertion switching with the introduction of two new modules (models 40-200 and 40-201) designed for use with differential serial interfaces. The new modules include the Differential PXI Fault Insertion Switch (model 40-200) which is designed for lower data rate serial interfaces such as CAN and FlexRay, and the High Bandwidth Differential PXI Fault Insertion Switch (model 40-201) which is designed for higher data rate serial interfaces such as AFDX and 1000BaseT Ethernet.

Each module allows the introduction of fault connections that include data paths open, data paths shorted together, and data paths shorted to externally applied faults such as power supplies and ground. The software driver defaults to a protective mode where conflicting faults are prevented

to avoid accidentally shorting unintended paths, such as power to ground. A separate mode allows complete freedom in setting fault patterns.

Both modules are supported by Pickering's new eBIRST switching system test tool. These tools simplify switching system fault-finding by quickly testing the system and identifying the faulty relays. Once identified, the tools then display a graphical representation of the switching system's PCB assembly, highlighting the relays that need to be replaced.

Connections are available on an easy to use 78-way D connector and are supported by Pickering's range of general purpose (non-differential) cable and connector options. In addition, Pickering Interfaces can design and supply differential interface adaptors to application specific connectors.

More information is supplied at www.pickeringtest.com.

Ethernet Fiber Optic Test Links Now with Differential Mode Delay and Chromatic Dispersion Test Results

Delaire USA's 8800 Family of Fiber Optic Test Links for Multi-Channel Bidirectional Testing single-channel testing provide approximations of worst-case fiber links to verify the ability of high-speed optical network equipment to operate at the limits of cables defined by the 802.3 Ethernet standard.

The multi-mode fiber in the test links is now independently characterized for Differential Mode Delay (DMD) and Chromatic Dispersion (CD) to give transceiver developers and system engineers greater insight into their products' performance. Until now, only the Effective Modal Bandwidth (EMB) provided by the fiber manufacturer, was generally available.

In the 8800 Bidirectional Fiber Optic Test Link, each channel is composed of a pair of fiber links, one transmit and one receive. This bidirectional test link architecture supports simultaneous multi-channel testing of both transmit and receive physical layer functions of a device (router, switch, server, etc.), while operating under worst-case fiber bandwidth conditions.

The 8800 can be used to test performance (e.g., BER) and/ or functionality (e.g., link configuration) of a single device's transmitter and receiver or to test the interoperability of two devices - all while operating under worst-case fiber EMB conditions and now further interpreted with DMD and CD test results. With DMD and CD test results, engineers are now able to better evaluate transmit and receive launch condition variability and to better characterize how changes in wavelength affect product performance.

As a multi-mode example, the IEEE 802.3ba specification defines a maximum operating distance of 150 m for 40GBASESR4 over OM4 fiber with an EMB of 4700 MHz*km (at 850nm). To meet this requirement, the full duplex 8800 contains four bidirectional channels (eight links) of identical fiber cut to the same length (spooled to within an accuracy of +/- 0.06%) terminated with MTP/MPO connectors. The actual length of each link is selected to provide the worst-case link bandwidth specified in the standard. The DMD and CD independent test data on each fiber is available as an option.

For further information, visit www.delawareusa.com.

Measurement Devices for Optical Fibers

Flexible test solutions are required to quickly qualify optical fiber installations and identify disturbances. LASER COMPONENTS provides the new SmartOTDR (optical time-domain reflectometer) from Viavi: an inexpensive and easy-to-operate handheld unit that is also suited for inexperienced technicians.

The SmartOTDR combines all important test options for optical fibers into one unit, including OTDR measurements, connector surface analyses, attenuation measurements, and visual fault locators. Cloud-based connection functions make it easier to store and manage measurement results and facilitate quick access to said results, no matter where you are in the network.

The light, ultra-compact design and extended battery life of up to 20 hours increase the SmartOTDR's efficiency in field applications. The SmartOTDR is available in versions with one, two, or three wavelengths (1310 nm, 1310/1550 nm, or 1310/1550/1625 nm).

Find more information at www.lasercomponents.com/us/.

New Microphone Measures Entire Human Audible Range And Beyond

An exclusive new ½" (6 mm) random incidence microphone, model 377A21 from PCB Piezotronics, Inc. provides accurate response in diffuse field applications where high frequencies, above the human audible range, need to be measured precisely.

In a diffuse field, multiple sound pressure waves arrive from various directions simultaneously, from different sources and reflections. The random incidence microphone averages this acoustic input to give an accurate measurement. Common applications for this microphone include environmental monitoring, room acoustics, reverberation room testing and general high pressure and high frequency diffuse field analysis.

The 377A21 frequency range, 3 Hz to 25 kHz, not only exceeds the audible range it also avoids overload that can be experienced when a standard high sensitivity (50 mV/Pa) microphones measure pressure over 136 dB. The 377A21 measures up to 160 dB (147 dB with a standard preamplifier) in a ½" package, while maintaining a 19 dBA noise floor. This microphone is a cost effective alternative to a ¼" microphone and preamplifier combination and has a much lower inherent noise.

PCB® carries a full complement of prepolarized and externally polarized condenser microphones and preamplifiers. Prepolarized microphones use standard coaxial cables and are ICP® compliant, allowing power supplies to be shared with other ICP® compliant products such as accelerometers, pressure and force sensors. This interchangeability can result in a significant per-channel cost savings as well as reduce test set-up time.

For additional information, please visit www.pcb.com/acoustics.

Controller Demonstration/Evaluation Kit

This CNPT-DEMO PID (proportional-integral-derivative) controller from OMEGA® offers a fully integrated temperature control system suitable as a platform to investigate the use of closed loop (PID) and simple on/off temperature control in heating and cooling applications—ideal for PID control theory education in universities and laboratories. The CNPT-DEMO is very easy to setup and use with intuitive “smart” menu flow, panel mounted USB and Ethernet connectivity, an alarm indicator, a 4 to 20 mA remote set-point potentiometer, a pushbutton digital input, and an aluminum plate allowing the user to feel the temperature response.

The demo unit includes a CN8DPT-144-C24-EIP-DC controller, powered by 12 Vdc, 2-A universal AC to DC adaptor. It has a thermoelectric heating/ cooling element capable of 5 to 50 °C setpoints and a Type K thermocouple for temperature readings.

A powerful 32-bit, 120 MHz ARM processor provides a full PID control process with auto-tuning and a fuzzy logic based adaptive control algorithm that automatically adjusts and optimizes the control loop parameters based on external environmental or control system deviations.

A comprehensive set of alarm functions may be used to trigger output signals and/or modify the display colors for above, below, in-band and out-of-band conditions. Physical outputs may be assigned to Alarm, PID, ON-OFF control or auxiliary output functions.

An advance multi-stage ramp and soak sequencer supports up to 99 profiles of 8 segment ramp/soak sequences. Profiles may be linked to provide extended sequences and auxiliary outputs may be triggered based on individual Ramp or Soak states to provide external control over blowers, mixers or other auxiliary control functions.

The CN8DPT features a large, 3-color (RED, GREEN, and AMBER) programmable LED display with the capability to change color and/or change the state of designated outputs when an alarm is triggered.

Find more information at www.omega.com.

100 V Solid-State Multiplexer for Flexible, High Speed Switching Requirements

VTI Instruments recently announced the release of its EX1200-3824, a high speed solid-state multiplexer designed to provide flexible switching with 8 banks of 1 x 24 one-wire multiplexers. This module is capable of accommodating over 3,000 1-wire switching channels in a 3U EX1208A mainframe. System integrators can also mix and match this module with other EX1200 plug-ins for even greater flexibility in switching and instrumentation subsystem design. The solid-state design of the module delivers extremely fast switching speed and a near infinite life, making the EX1200-3824 ideal for test and automation applications in which relays are continuously being energized.

Since this module typically interfaces with data acquisition instruments that are limited to 10 V input ranges, the EX1200-3824 offers the option of an on-board 10:1 attenuator to eliminate the need for external circuitry while ensuring maximum signal integrity.

The EX1200-3824 can be controlled programmatically using the supplied API which is compliant to the industry standard IVI Switch class definition. Both path level programming and individual relay control are available to simplify integration into test systems. On-board configuration relays are provided to connect the individual banks together, giving the system designer the flexibility to create test programs utilizing discrete 1 x 24s or configurations as large as 1 x 192 without external wiring.

To find out more about the EX1200-3824, please visit www.vtiinstruments.com/Products-Services.aspx/.

Nanopositioning Actuators Deliver Sub-Nanometer Repeatability

Queensgate Instruments' latest Digital Piezo Translator (DPT) series of actuators incorporate capacitive sensors in order to deliver precise positioning and rapid settling. These highly advanced actuators can be implemented in a wide variety of applications, including

interferometry, semiconductor mask-wafer chuck alignment, beam alignment, cavity tuning, adaptive optics, scanning probe microscopy and a multitude of different metrology tasks.

There are two new series of DPT, the DPT-D with the best positioning performance and the more compact DPT-E, which is a low voltage replacement for the previous generation DPT-C series. Air and Ultra High Vacuum variants are available as standard. Their Super-Invar construction gives superior thermal properties (with a thermal expansion coefficient of 0.25 nm/Kelvin) which enhances position stability.

Position resolutions down to 0.09 nm (RMS) are offered as each unit delivers <2 ms response time, 0.5 nm (RMS) repeatability. They are able move loads of up to 60 kg across their entire closed loop range, with closed loop ranges from 20 um to 110 µm.

DPT devices benefit from a built-in calibration function, derived from the Queensgate ID chip arrangement. These ID chips store calibration data on the actuator itself and thereby facilitate plug-and-play operation with the digital controller. Controllers and actuators can be interchanged as required, avoiding the need for recalibration, important when the actuator is incorporated into a mechanism or is inaccessible.

An operational temperature range of -30 °C to 80 °C is supported as standard, but higher temperature variants can be offered. For more information, visit: www.nanopositioning.com.

New BenchVue Software Release Eliminates Instrument Programming for Custom Creation of Automated Tests

Keysight Technologies, Inc. announces the release of the latest version of its BenchVue software. BenchVue is an intuitive, easy-to-use PC software application that provides multiple-instrument measurement visibility and data capture that eliminates the need for instrument programming. The 3.0 version of BenchVue introduces a new capability that allows for custom creation of simple automated tests.

The new BenchVue Test Flow app features an intuitive drag-and-drop interface that allows for rapid prototyping of test sequences. The app combines the power of a sequencer with the data capture and analysis tools of BenchVue. The new 3.0 release also features the addition of a Network Analyzer app along with additional model support. This brings the total number of supported instruments to over 300. BenchVue 3.0's internal architecture allows for independent updates and downloads of individual applications. With BenchVue 3.0, downloads are smaller, updates are faster, and application software releases are no longer tied to BenchVue platform releases.

BenchVue advances the way engineers interact with their instruments and their entire bench from initial connection to completing their analysis. Users simply plug an instrument into their PC over LAN, GPIB or USB and the instrument is automatically configured for use in BenchVue. No programming or separate instrument drivers are required, greatly accelerating common testing tasks for engineers and technicians. Data capture and export are accomplished with just a few clicks, keeping engineers focused on the measurement task at hand.

BenchVue's key features include:

- Data logging for digital multimeters, oscilloscopes, data acquisition units, spectrum and network analyzers, power supplies and power sensors;
- Plug and play functionality for instrument control of all supported instruments, including waveform select and output control for function generators;
- A mobile application to free engineers from their bench, enabling them to remotely monitor and respond to tests; and
- One-click screen capture with annotation for fast, professional documentation.

More information about BenchVue software is available at www.keysight.com/find/benchvue.

Wide Temperature Range Infrared Emitter

Opto Diode Corporation introduces a wide temperature range infrared (IR) emitter designed for demanding military and industrial markets. The gallium aluminum arsenide (GaAlAs) OD-850WHT IR light-emitting diode features typical optical power output ranges from 24 to 28 mW, a wide emission angle, and operates at extended temperature ranges

from -65 to +150 degrees C. The emitter has peak emission of 850 nm and an optical half intensity beam angle of 80 degrees. With no internal coatings, the device can operate without heat sinking and without derating to 80 degrees C.

For military applications, the extended temperature range of the OD-850WHT allows simplified thermal design for night vision, aircraft, and vehicle light markers for covert operations. The device is available in a hermetically-sealed, standard two-lead TO-46 package. All surfaces on Opto Diode's high-temperature infrared emitter are gold-plated for added durability. For more information on Opto Diode's OD-850WHT high-power, wide-angle infrared emitter, please visit www.optodiode.com.

Highly Sensitive Cameras Provide Exceptional Imaging Quality and High Light Sensitivity

The Imaging Source has announced the availability of new industrial cameras with the Sony Full HD WDR Sensor IMX174. These cameras stand out with their exceptional imaging quality and high light sensitivity with which images of even weak fluorescing substances can be captured. Cameras are delivered in compact, robust industrial housing with C/CS- or S-Mount and are available as GigE (PoE) and USB 3 versions in monochrome and color. At full HD, these cameras achieve a maximum frame rate of 54 fps; at VGA resolution up to 120 fps.

Included in the purchase of the camera is a barcode SDK and software for onscreen measurement and image capture. With integrated HDR/WDR (High/ Wide Dynamic Range) and a resolution from VGA to full HD, the cameras are especially suited to demanding applications in microscopy, production automation, quality assurance, logistics, medicine, science and security.

Comprehensive software support for Windows and Linux leaves nothing to be desired: Both programmers and end-users immediately feel at home. Getting started with the cameras takes only a matter of minutes and integrating them into existing applications takes only a few lines of code. All cameras are shipped with drivers for LabView, HALCON, MERLIC, VisionPro, DirectX, Twain, and NeuroCheck. All camera parameters and settings can be set via the shipped software.

End-user applications, an SDK consisting of .NET and ActiveX components and a C++ class library for W7/8, Vista and XP, and drivers for third party software are included with the cameras.

Visit www.theimagingsource.com/en_US/ for more information.

Threshold Detectors Covering Microwave and Millimeter Wave Frequencies from 2 to 40 GHz

Pasternack introduces a new line of coaxial threshold detectors designed for microwave and millimeter wave applications from 2 to 40 GHz. These threshold detectors are commonly used for analyzing radar performance, leveling pulsed signal sources, AM noise measurements, system monitoring and pulsed RF measurements in ultra-broadband applications.

Pasternack's latest release of threshold detectors consists of 3 unique models covering broadband frequency bands from 2 to 40 GHz. Designs incorporate gain stages for higher dynamic range that cover input power levels ranging from -45 dBm to 0 dBm with a typical threshold variation over frequency of ± 0.5 dB. One model supports a fixed threshold while the other 2 models support an adjustable threshold setting.

All models feature a TTL compatible video output response which is "1" when the RF signal is above the threshold setting and "0" when it's below the threshold setting. Additional features of the new threshold detectors from Pasternack include rugged construction utilizing compact packages with field replaceable SMA or 2.92 mm connectors.

These models are designed to meet MIL-STD-202F environmental conditions for temperature cycle, humidity, shock, vibration and altitude. The threshold detectors also boast extremely fast response times ranging from 45 to 100 nanoseconds, maximum input power handling ranging from +10 to +17 dBm, and have an operating temperature range of -55 to +85 degrees Celsius.

For detailed information on these products, please visit www.pasternack.com/pages/RF-Microwave-and-Millimeter-Wave-Products/threshold-detectors.html.