

*The IEEE Instrumentation & Measurement Magazine*  
*June 2018 Issue*

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*The Role of I&M in STEM Education*

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*Editorial*

**STEM Education**

Wendy Van Moer

Science-Technology-Engineering-Mathematics... Children from 2 to 99 love it! Even without realizing it. A lot of children hate mathematics, but they do not realize that they are using it all of the time when they are flying a drone, remotely operating a toy, using their cellphones, playing games on game consoles...

Since 2014, I have been part of the STEM Academies in Belgium with the goal to make children from 2 to 18 years old get passionate for STEM. A STEM Academy is an alternative to the music academy, sport clubs, etc.

In a STEM Academy we learn to solder and play with electronics, electricity, physics and mathematics in a pleasant and entertaining way. For example, we work with the children to make our own drone, a rocket, a windmill, car alarms...

It is very important to let children taste from STEM if we want to have great technically-skilled people in the future. You will never become a music virtuoso if you never get in contact with music. It is all about passion, and you cannot get the passion if you never tasted it! The younger you start with an activity, the more you will get passionate about it.

Another topic that needs our attention is the number of girls participating in the STEM Academies. How many times do we hear the girls say: "That's for boys and boys only!" Forget

it! Girls love to make things, but they need to be ‘girly’ things, such as light-giving flowers, laser cut jewel cases, 3D printed jewelry... Girls also love STEM in their world.

A lot of people nowadays put tons of passion into STEM and the STEM Academies. This issue of our magazine contains several testimonies of deeply passionate STEM educators from all around the world. They will show you a lot of creativity that make children warm for STEM!

Our children and STEM are the future if we want to go to Mars soon!

Have fun reading this issue!

Groetjes,

Wendy

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## *Guest Editorial*

### **STEM Education and Its Impact on Instrumentation and Measurement**

Ruth Dyer

This theme of the June 2018 *I&M Magazine* is Science, Technology, Engineering and Mathematics (STEM) Education, and the articles in this issue are focused on both significant social contexts related to encouraging broader participation of underrepresented groups in STEM and innovative efforts to engage students from K-12 through college levels by providing more hands-on approaches to conveying important foundational concepts in STEM. However, we also recognize STEM education is not limited to just the time period of the formal educational process. We all must remain life-long learners to keep abreast of the many, rapid changes that constantly occur in STEM fields.

Although the IEEE Instrumentation and Measurement Society (IMS) is obviously focused primarily on the *engineering* component of STEM, and in particular on the *instrumentation and measurement* aspects of engineering, we also understand how critical science, technology and mathematics are as foundational elements to engineering and integral to all we do as scientists and engineers. Thus, some of the articles present the more inclusive nature of STEM education and others concentrate more on the engineering component of STEM.

One of the essential features of many of these educational programs is the participation of practicing scientists and engineers. Incorporating the perspectives and experience of those who are engaged daily in the design, development and implementation of engineering projects truly brings to life the concepts educators are communicating to students. We hope the information in this issue will spark your own thinking and discussions with your colleagues about ways to interact with educational communities where you live. We encourage you to inquire at your local primary or secondary schools or a nearby university about opportunities available to participate and share your experiences with students.

We also have opportunities within the IMS for all of our members to engage with undergraduate and graduate students, through our IMS Student Branch Chapters, and with our young professionals who are recent graduates, through our Young Professionals (YP) activities. Another opportunity is to provide a video tutorial about a topic in instrumentation and measurement. Check out information on the IMS website (<http://ieee-ims.org/evts/tutorials>) for how to submit an Expert Series Tutorial. Providing tutorials or industry track papers at our conferences is another excellent way to share important educational information with our student attendees. Sergio Rapuano, the IMS Vice President of Membership, Kristen Donnell, the IMS Vice President of Education, and Chi-Hung Hwang, the IMS Vice President for Conferences, also can provide more information on other opportunities to engage in our society's educational efforts and with our student and YP members. Part of our legacy is to inspire the next generation to pursue the exciting and rewarding careers associated with science and engineering. I look forward to hearing how our many IMS members contribute to these efforts.

Ruth A. Dyer,  
Junior Past President, IEEE IMS  
IEEE Fellow

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### *Article Summaries*

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*Male-Dominated STEM Disciplines: How Do We Make Them More Attractive to Women?*

(Summary)

Chardie L. Baird

Why does the male-domination of engineering persist? And, why do some fields within engineering remain more male-dominated than others? In this article, the author discusses a few of the underlying assumptions that make up the masculinized culture that excludes women. She focuses her review on scholarship focusing on beliefs about women's competence, commitment, and leadership. The author illustrates how individuals enact masculinized cultures in their everyday interactions and practices as well as how underlying assumptions of masculinized cultures are embedded in policies and procedures. She discusses strategies for making changes to masculinized cultures and concludes by providing examples of policy changes that facilitate culture changes and equitable work outcomes.

*This text is from introduction of the article.*

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## *Integrating the Engineering Design Process into K-12 Schools: The Kansas Experience*

(Summary)

Jacqueline Spears

Engineering has not been a part of K-12 science education until relatively recently. Teachers have been free to include engineering design lessons as relevant to their content, lesson plans and modules have been developed, and the research base on the impact of engineering design on student engagement and learning in science classrooms has been growing. The inclusion of engineering design as a specific part of the Next Generation Science Standards (NGSS) released in 2013, however, is a significant step forward. This paper briefly describes the history of U.S. science education as part of the K-12 curriculum, the way in which engineering is currently being integrated into the U.S. science curriculum, and ways in which electrical engineering faculty members can provide support to ongoing efforts.

*This text is from the introduction of the article.*

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## *Instrumentation and Measurement in a First-Year Engineering Program*

(Summary)

Janet K. Lumpp, Whitney C. Blackburn-Lynch, Doug L. Klein, Laura M. Letellier, Jennifer L. Lovely, Neil F. Moore, and Julie G. Whitney

This article describes a first year engineering experience that has been designed around multidisciplinary, creative and hands-on learning opportunities that allow for exploration and discovery of the different fields of engineering and computer science. Simultaneously, students gain experience and skill sets, both technical and academic, which will increase the probability that they will complete their degrees and be satisfied with their choice of majors. Sensors, electronics, and programming enable students to gain insights into the many different problems engineers and computer scientists face in our complex and rapidly changing world. Record retention of students as well as positive feedback for the program are indications that this process is meeting its goals.

*This text is from the conclusion of the article.*

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## *Discovering the Real World Hands-On in the Classroom*

(Summary)

Lieven Philips

Many people would agree that most—if not all—young children as well are fascinated by the world that surrounds them. Yet, when they grow up, during their teenage years other interests might replace this excitement quite rapidly. So, how could we make sure that they do not lose this precious fascination? And, at which age should we focus our efforts in order to keep the sparks of wondering burning? And, how can we give them a more or less realistic idea about what it means to be a scientist, a programmer, or an engineer working on solutions for the challenges in our society? In this article, the author provides a summary of a particular Science, Technology, Engineering, Mathematics (STEM) approach that has been developed and rolled out in schools in Belgium.

*This text is from the introduction of the article.*

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## *Igniting STEM in Kansas City*

(Summary)

Erik Timpson

In this article, the author describes a community involvement program that allows corporate employees to volunteer with young people in local schools to increase interest in STEM areas. The author describes what they do, how they do it (that is with what instruments), and how they measure success. He hopes to inspire readers to reach out to their local areas and start teaching and inspiring young people to pursue careers in instrumentation and measurement. This specific program reached out to a local organization called PREP KC whose mission is to create and implement strategies to improve college and career preparation for Kansas City's urban students. PREP KC was able to work with the schools and get the gymnasium full of students ready for a message.

*This summary includes text from the introduction of the article.*

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## *STEM Education in Flanders: How STEM@school Aims to Foster STEM Literacy and a Positive Attitude towards STEM*

(Summary)

Heidi Knipprath, Lieve Thibaut, Marie-Paule Buyse, Stijn Ceuppens, Haydée De Loof, Jolien De Meester, Leen Goovaerts, Annemie Struyf, Jelle Boeve-De Pauw, Fien Depaepe, Johan Deprez, Mieke De Cock, Luc Hellinckx, Greet Langie, Katrien Struyven, Didier Van de Velde, Peter Van Petegem, and Wim Dehaene

Many initiatives have been taken during the last five to ten years in Flanders to increase the interest of children and adolescents in STEM. STEM academies providing extra-curricular activities with a focus on technology have been established, and many schools began to offer small-scale STEM projects. However, until recently, guidelines to develop learning materials for well-defined and sustainable STEM projects were lacking. In addition, STEM projects mainly targeted students in elementary schools and the first two grades in secondary education (grade 7 and grade 8) with a focus on technology, undervaluing the need to integrate technology with other STEM disciplines. Therefore, the authors started a project, called STEM@school, to develop research-based learning materials for large and sustainable integrated STEM projects in secondary education from the 9th grade on. The main goals of our STEM@school project,

funded by the Flemish Government, are to increase STEM literacy and to show students the relevance of STEM for everyone's life.

*This text is from the introduction of the article.*

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## *Columns*

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### *Basic Metrology*

(Summary)

#### **Analog Computers**

**Richard Davis**

The terms “analog” and “digital” as applied to computing both date from the 1940s. People were doing analog computations (*e.g.*, using slide rules) well before there was a generic name for the devices they used. The generic names came with the advent of digital technology and analog-digital hybrids. Although analog computers have been mostly relegated to museums, new technologies may yet revive analog computing in many areas of study.

*This summary was provided by the author.*

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### *Future Trends in I&M*

(Summary)

#### **Future Trends in Early Diagnosis for Cognition Impairments in Children Based on Eye Measurements**

**Laura Florea**

There is a saying that the eyes are the gate to one's soul and the witnesses for various internal cognitive or emotional processes. In this column, the author introduces several types of measurement tools involving eye measures and gaze tracking. She discusses how these measurements have begun to be used in early identification of autism spectrum disorder and dyslexia. Both applications show the need for affordable yet precise devices for eye area measurements and gaze tracking in order to enable computer vision applications research to help with early diagnosis support.

*This text is from the body of the column.*

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## *I&M Society Awards*

### **I&M Society Awards Call for Nominations**

The IEEE Instrumentation & Measurement Society (IMS) is soliciting nominations for its society and other awards. To view the full detailed listing of each award please visit our Awards page on the IMS website: <http://ieee-ims.org/awards>.

Nominations are due on varying dates, so please carefully refer to each specific award listing. Nominators should utilize the forms associated with each award description found on the website.

For more information, please contact the Society Awards Chair, Reza Zoughi: [zoughi@mst.edu](mailto:zoughi@mst.edu).

### *Award Nominations due by 1 August 2018*

#### **J. Barry Oakes Award**

Prize: \$3,000 USD which may be used to attend a technical workshop or I2MTC or AUTOTESTCON; Registration at I2MTC or AUTOTESTCON for year in which lecture is presented; Plaque designating the individual as the recipient of the IEEE J. Barry Oakes Advancement Award.

Eligibility: 35 years of age or younger at the time of the nomination. Other qualifications of the nominee include one or more of the following: Nominee actively engaged in engineering work in the field of I&M; Nominee may hold a position in academia, government, or industry.

Qualifications include one or more of the following: Demonstrated contributions to I&M science and engineering; potential leadership/project management skills; potential to serve as role model for other engineers. Nominees must exhibit actions that reflect positively on and enhance the reputation of the IMS.

The IEEE J. Barry Oakes Advancement Award will be used to provide a question and answer lecture during the annual I2MTC or AUTOTESTCON. Exceptionally, and upon motivated request by the recipient, the presentation will be given to another event fully sponsored by the IEEE IMS.

#### **Outstanding Young Engineer Award**

Prize: The Award consists of \$2,000 and a plaque. Also, up to \$1,000 will be paid to the recipient for transportation to the place of the presentation.

Eligibility: The I&M Outstanding Young Engineer Award recognizes an outstanding young IMS member who has distinguished him/herself through achievements, which are technical, of exemplary service to the IMS, or a combination of both early in his/her career. The nominee



must not have reached their 39th birthday and must be an IMS member at the time of nomination.

### **Distinguished Service Award**

Prize: The Award consists of \$2,000 and a plaque. Also, up to \$1,000 will be paid to the recipient for transportation to the place of the presentation.

Eligibility: The IMS Distinguished Service Award is presented each year to an individual who has given outstanding service to the IMS and to the I&M profession. All nominees must be, or have been, members of the IMS. Secondary considerations are service to the IEEE, IRE or AIEE, service to the engineering profession in general, technical accomplishments and outstanding technical leadership.

### **Technical Award**

Prize: The Award consists of \$2,000 and a certificate. Also, up to \$1,000 will be paid to the recipient for transportation to the place of the presentation.

Eligibility: Any person with demonstrative and substantive achievement in the field of I&M may be nominated for the IMS Award. Membership in the IEEE is NOT a prerequisite.

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

### **Career Excellence Award**

Prize: The prize is \$5,000 and a plaque. In addition, the recipient may be reimbursed for travel expenses, not exceeding \$1,000, to attend the ceremony during which the award is presented.

Eligibility: A lifetime career in the field of instrumentation and measurement.

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

### **Outstanding Chapter Award**

Prize: \$1,000 USD and a certificate.

Pre-requisite: a minimum of two L31 forms have to be submitted to the IEEE database for the application year and the previous one. This award will be given to the best chapter in a given calendar year based on activity.

*Award Nominations due by 1 October 2018*

### **Best Application in Instrumentation & Measurement**

Prize: \$500 USD and a certificate.

Candidate must be a Member (or higher-grade Member) or a Student Member of the IEEE and of the IMS at the time of accepting the Award.

The purpose of the award is to recognize an individual whose idea applies measurement concepts or instrumentation technology in a novel way to benefit society. The application must be a working solution to an engineering need or problem.

*Award Nominations due by 31 December 2018*

**Outstanding Technical Committee Award**

Prize: \$1,500 USD to the TC and a certificate.

All active technical committees of the IMS are eligible for this award.

This award is given annually to the best technical committee of the IMS: one that best participates in I&M activities in an innovative way and delivers impact for the society.

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*Departments*

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*New Products*

Robert Goldberg

Please send all "New Products" information to:

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E-mail: [r.goldberg@ieee.org](mailto:r.goldberg@ieee.org)

**Moveable Over-the-Air Test Chamber for 5G**

Rohde & Schwarz offers the first moveable over-the-air test chamber for 5G antennas and transceivers. With the new R&S ATS1000 all-in-one antenna test system, active and passive antennas as well as transceivers for future fifth generation (5G) mobile networks can be tested in a compact, moveable shielded RF test chamber. This enables far-field antenna characterizations and initial RF measurements for 3GPP 5G NR in the millimeter wavelength range.

The new R&S ATS1000 antenna test chamber allows developers and production engineers to perform over-the-air (OTA) measurements for 5G on their antenna modules, transceivers, chipsets and wireless devices. Antenna and transceiver measurements are possible in the

frequency range from 18 GHz to 87 GHz. The system therefore supports all millimeter-wave frequency bands currently considered for 5G. The compact test chamber makes it possible to measure mobile devices in the far field.

The R&S ATS1000 consists of a rack-sized shielded RF test chamber on castors, suitable mounts for test objects and sensors, and a wideband measurement antenna, which covers the whole frequency range. Using the associated test and measurement equipment and the R&S AMS32 antenna measurement software, radiation patterns of 5G antenna arrays can be measured with extreme precision in just a few minutes. A positioning laser supports precise orientation of the test object.

By combining the R&S ATS1000 with an R&S TS8980 5G RF test system, users can determine relevant RF parameters (e.g. power, ACLR and EVM) from OTA measurements. This is crucial because many 5G components do not have any connectors and therefore cannot be tested in conducted setups. The system enables comprehensive 3D characterization, verification measurements and functional testing of 5G components. Rohde & Schwarz conformation test solutions use the well-established R&S CONTEST software to output results in the form of 3D graphics.

For automated, final functional testing, the R&S AMS32 software allows users to control the R&S ATS1000 remotely. It also generates configurable reports for documentation. The solution additionally offers near-field/far-field transformation for larger test objects.

For more information, visit: [www.rohde-schwarz.com/ad/press/ats1000](http://www.rohde-schwarz.com/ad/press/ats1000).

### **Full Color 3D Printing Platform**

HP Inc. has expanded its 3D printing portfolio with the introduction of its new Jet Fusion 300 / 500 series of 3D printers, the industry's first 3D printing technology to enable manufacturers to produce engineering-grade, functional parts in full color, black or white – with voxel control – in a fraction of the time<sup>1</sup> of other solutions. Depending on configuration and color preference, the Jet Fusion 300 / 500 series is available starting in the \$50,000s, enabling small- to medium-sized product development teams and design businesses, entrepreneurs, and universities and research institutions to access HP's industry Multi Jet Fusion printing technology.

The new Jet Fusion 300 / 500 series complements HP's existing industrial-grade Jet Fusion 3200/4200/4210 3D solutions which deliver low cost per part and are designed for manufacturing environments. With this portfolio expansion, HP is providing users of its Multi Jet Fusion solutions the ability to prototype and produce new designs and applications on the same platform and stay ahead with a future-ready technology for voxel control beyond color.

HP's unique ability to control part properties at the individual voxel level enables the design and production of previously unconceivable parts and is now available, for the first time, in full color.

The HP Jet Fusion 300 / 500 series offerings include:

- HP Jet Fusion 340 (Black and White) / 380 (Color): for customers who have smaller part-size needs or who commonly print fewer parts per build.
- HP Jet Fusion 540 (Black and White) / 580 (Color): with a bigger build size than the 300 series for customers who have larger part-size needs or heavier production demands.

The HP Jet Fusion 300 / 500 3D printers will launch with a new material, HP 3D High Reusability CB PA 12. Parts using this material will have mechanical properties similar to the HP 3D High Reusability PA 12 material from HP's industrial solutions.

For complete details and technical specifications please visit [www.HP.com/go/Color3DPrint](http://www.HP.com/go/Color3DPrint).

### **Multi-device Synchronization for Lock-in Amplifiers and Arbitrary Wave Generators**

Zurich Instruments Lock-in Amplifiers and Arbitrary Wave Generators (AWG) can now be synchronized thanks to the new Multi-Device Synchronization function (MDS). This allows multiple instruments to be connected together and controlled on one user-friendly interface. The MDS takes care of the synchronization of both the 10 MHz clock and the sampling rates of each connected instrument. Instead of using one multi-channel instrument, single instruments can be added as required and subsequently synchronized as one. This increases the flexibility and scalability of existing measurement systems.

The included LabOne software allows measurements to be taken simultaneously on multiple instruments. Datapoints taken at the same time are labelled with the corresponding timestamp, allowing the datapoints to be clearly assigned and analyzed. Furthermore, LabOne offers a wide range of integrated tools for signal analysis, reducing the complexity of the experimental setup (Lock-in Amplifier, Sweeper, Signal Generator, Oscilloscope, FFT-Spectrum Analyzer, Spectroscope, Digitizer). Existing customers of Zurich Instruments can also add MDS functionality free of charge by updating LabOne to version 17.12.

Multi-device Synchronization is especially interesting when building prototype quantum computing setups, as the number of signal channels can be easily and reliably scaled up. Further applications include quantum transport measurements where, for example, Hall resistance and electrical resistance are measured simultaneously. In synchrotron applications such as beam position monitoring, MDS facilitates multi-axis measurements.

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

### **Platform Enables Users to Accelerate Innovation and Product Development**

Keysight Technologies has unveiled PathWave, claiming it to be the industry's first software platform that integrates design, test, measurement and analysis. As a result, PathWave enables customers to accelerate innovation and product development from concept through manufacturing and deployment.

PathWave is based on Keysight's expertise to ensure consistency, accuracy and measurement integrity. The software platform provides customers with flexible and immediate access to the

design and test tools they need, when they need them. The interoperability of the design and test tools and advanced data management significantly speeds the product development cycle, eliminating the need to re-create individual measurements and test plans at each discrete stage of the process.

PathWave is an open, scalable, and predictive software platform that integrates hardware and software at every stage in the product development workflow. It combines design software, instrument control, and application-specific test software in an open development environment allowing users to create high-performance solutions fast.

PathWave offers a set of integrated software products for the entire design, test and verification workflow. These products are connected, interoperable, and rapidly reconfigurable, delivering efficient workflow that enables customers to:

- Allocate the right computing resources where and when needed
- Evaluate collected data to optimize workflow
- Ensure new hardware and software works with existing hardware to maximize ROI
- Predict bottlenecks and rapidly correct to ensure efficient workflow process
- Review project status from anywhere to maintain completion commitments

More information is available at [www.keysight.com](http://www.keysight.com).

### **EMC (Electromagnetic Compatibility) Tester**

The new Electromagnetic Interference (EMI) receiver TDEMI® ULTRA from GAUSS INSTRUMENTS® provides unique features, such as 685 MHz real-time bandwidth, ultra-fast receiver scanning as well as multi GHz real-time scanning up to 40 GHz. GAUSS claims it is the fastest EMI receiver in the market. It is a multi-purpose instrument for a wide range of applications and due to its compact design, a 12V supply, and a weight of less than 10 kg, it is a great tool for field testing or on-board testing applications.

With its strong capabilities, the TDEMI® ULTRA is well suited for use in conducted and radiated measurements and much more. By providing the lowest noise floor and the high dynamic of today's receivers in the market, the TDEMI® ULTRA offers highest performance for all challenging applications.

Also, a time-saving and highly efficient full automation of your EMC and communication testing needs according to all EMC or ETSI standards is available with the EMI64k software suite.

For more information, visit [www.gauss-instruments.com](http://www.gauss-instruments.com).

### **High-Performance Infrared Array Sensors**

Panasonic Grid-EYE High-Performance Infrared Array Sensors are surface mountable and feature 64 thermopile elements in an 8x8 grid format that detect absolute temperatures by

infrared radiation. Grid-EYE is able to provide thermal images by measuring actual temperature and temperature gradients. Grid-EYE enables detection of multiple persons, identification of positions and direction of movement, almost independent of ambient light conditions without disturbing privacy as with conventional cameras.

The built-in silicon lens provides a viewing angle of 60°. Measurement values are viewable through an I<sup>2</sup>C interface in 1 or 10 frames per second. The interrupt signal output delivers a quick response to time-critical events for a high degree of flexibility.

AMGU4241 Infrared Array Sensors Grid-EYE Unit combines four Grid-EYE sensors to increase the detection area up to 3.8 m<sup>2</sup>. This AMG4241 sensor transmits information via RS485 using Modbus protocol.

Features:

- Dimensions: 11.6 x 4.3 x 8.0 mm (L x H x W)
- Operating voltage: 3.3 V or 5.0 V (depends on P/N)
- Current consumption: Typ. 4.5 mA (normal mode); 0.8 mA (stand-by mode), 0.2 mA (sleep mode)
- Temperature range of measuring object: With amplification factor high gain: 0 °C to 80°C, with low gain: -20 °C to 100 °C
- Field of view: 60° (vertical and horizontal)
- Number of pixels: 64 (vertical 8 x horizontal 8)
- External interface: I<sup>2</sup>C (fast mode)
- Frame rate: 1 or 10 frames/s
- Typical absolute temperature accuracy: Typ. ±2.5 °C (depends on P/N)

Find more information at [na.industrial.panasonic.com/products/sensors](http://na.industrial.panasonic.com/products/sensors).

### **All-In-One Solution for EMI/EMC Compliance Testing**

Tektronix has introduced EMCVu, a new all-in-one solution for EMI/EMC pre-compliance testing and troubleshooting. In today's electronic design environment, about 50 percent of products fail electromagnetic compatibility (EMC) testing the first time. EMCVu gives engineers an accurate, convenient and cost-effective approach to determine if their product designs will pass EMC emission compliance testing on the first try.

With the arrival of Internet of Things (IoT) and a proliferation of electronic devices that can interfere with each other, designing products to meet EMC emission requirements is critical. For many engineers just starting work on new IoT devices, EMI/EMC testing can be intimidating, and failing compliance testing leads to significant cost overruns and schedule delays. Pre-compliance testing reduces failure rates, but introduces its own challenges including difficult & expensive equipment set up, testing accuracy, painful debugging, and a lack of reporting tools.

At the core of the new solution are the Tektronix real-time USB spectrum analyzers, including the affordable RSA306B, that offer the performance of traditional desktop instruments at a

fraction of the cost. Powered through the USB connection, the small size of Tektronix' real-time USB spectrum analyzers makes it easy to perform EMI/EMC testing outside the lab environment in relatively low-noise environments, such as basements or parking garages.

The instruments are controlled by SignalVu-PC software running on a laptop or tablet. For this application, SignalVu-PC has been enhanced with optional EMCVu software to provide pre-compliance and troubleshooting capability in the same user Interface.

The spectrum analyzer and software are complemented with a comprehensive set of accessories that have all been carefully selected and thoroughly evaluated to maximize test efficiency. To ensure accurate results and save time for users, the loss or gain of the various accessories has already been captured in the software and is accounted for during measurements.

For more information, go to: [www.tek.com/application/electromagnetic-interference-emi-and-electromagnetic-compatibility-emc](http://www.tek.com/application/electromagnetic-interference-emi-and-electromagnetic-compatibility-emc).

### **Test and Inspection Systems**

Seica introduces the new, fully automated, Pilot V8 next > series flying prober, featuring a renovated and stylish look, thanks to the premium materials of the chassis, and innovative electrical testing performance Seica claims this to be the most complete flying probing test platform on the market. In its most complete configuration, the Pilot V8 next > series tester will provide up to 20 mobile test resources for an electronic board, ranging from probes which can supply today up to 3 amperes, high-resolution cameras for automatic optical inspection, barcode reading, laser, capacitive probes, pyrometers, optical fiber sensors for LEDs, flying connectors for boundary scan and On-Board Programming, up to high-frequency probes for measurements over 1.5 GHz.

Highly oriented to medium and high-volume production, the Pilot V8 next > series will be available in a fully-automated version, making its vertical architecture perfectly suitable to be combined with board loading/unloading modules, capable of hosting from 1 to 12 board magazines (even of different types). The HR (high resolution) version of the Pilot V8 next > series allows the system to test very small sized objects, around 30 µm, while the XL version extends the work area from the standard 610 x 540 mm to 800 x 650 mm, providing unique solutions for testing “extra-large” boards.

Seica is also highlighting the DRAGONFLY next > series, an AOI system providing optical inspection capabilities for through-hole technology (THT) components of electronic boards, as well conformal coating (CC), increasingly used today to protect the products after manufacturing. Both the THT and CC versions of the DRAGONFLY feature the opportunity to inspect one or both sides of the board, which is conveyed on a standard SMEMA compliant rail conveyor, driven by an intuitive and streamlined management software which will allow commissioning and application program development in a few hours.

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

### **Miniature Shock Accelerometers**

PCB® has released two new miniature piezoelectric accelerometers. They are small, single axis ICP® voltage output with measurement ranges of +/- 5,000 g (model 352A91) and +/- 20,000 g (model 352A92). Both are in a similar package with low mass under 0.006 ounces (0.17 grams) and cover a broad frequency range of 1.2 to 10,000 Hz at +/- 5%. The accelerometer development concentrated on survivability under test in harsh environments. The hermetically sealed titanium housing and flexible cable design enable the sensor to survive high overload shock (+/- 20,000 g peak) under thermal load up to +325 °F (163 °C). These features make them ideal for small component testing, environmental stress screening, and impact testing of electronic board assemblies.

Built-in ICP® microelectronics provide a low noise, low impedance output signal for low transmission loss over long distances.

For additional information, visit [www.pcb.com/352A9x](http://www.pcb.com/352A9x).

### **Advanced Terahertz Imaging Platform**

Reacting to the growing demand in non-destructive testing applications, TOPTICA has further extended its terahertz instrumentation portfolio. This year the company presents a new terahertz Imaging Extension for its successful time-domain spectroscopy platform TeraFlash. Owing to the unique spectral bandwidth of the TeraFlash (0.1 – 5 THz), researchers can exploit the full potential that the combination of imaging and spectroscopic methods has to offer.

The Imaging Extension uses two precise linear stages to scan a sample through the focus of the terahertz beam. The translational movement is synchronized with the delay-stage within the TeraFlash, speeding up the measurements significantly, allowing the system to acquire complete waveforms for up to 16 pixels per second. The positioning accuracy is better than 200 µm over a 15 x 15 cm field of view.

Co-developed with experts from Fraunhofer Heinrich Hertz Institute (Berlin, Germany), the Imaging Extension comes in two versions – a “basic” setup for researchers who wish to use their own optical components, and a “complete” version that includes parabolic mirrors for beam shaping and focusing.

The Complete Imaging Extension offers a unique flexibility: With the help of alignment pins, users can quickly reconfigure the optics from a transmission setup to a reflection geometry and vice versa.

Both versions feature a powerful software package that offers a choice of contrast parameters including amplitude, phase and layer thickness.

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



### **Advanced Motor Protection via Bluetooth**

The MP8000 series from Littelfuse are advanced motor protection electronic overload relays, fully programmable via Bluetooth® using an iPhone® or Android™ smartphone or tablet with the Littelfuse App. It is easy to use and arc-flash safety is increased because the app allows settings to be modified and real-time operational information viewed. Viewing operational information and faults on the app does not require the user to open the control panel. The MP8000 protects any motor drawing 0.5-1,000 full load Amps (external CTs are required above 100 Amps). It is designed for single or 3-phase systems with operating voltages of 90-690 VAC (use of external potential transformers can extend upper voltage range above 690 VAC). Protection is implemented by combining overload, voltage, phase loss and reversal, voltage and current unbalance, power monitoring, and underload in one package. For standalone applications, the Bluetooth® interface can be used when paired with a smartphone or tablet.

The units also feature an Ethernet communications port that can be used to form an Ethernet Modbus TCP/IP network. Units can be remotely monitored and controlled from a PC, or SCADA system, and data logging through a PC with the optional MP8000 software or other software program using the MP8000 memory map.

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

### **Coordinate Measuring Machine (CMM) Series Focuses on Productivity**

Hexagon Manufacturing Intelligence announce the latest evolution of its GLOBAL S coordinate measuring machine (CMM) series, customizable for specific inspection work and changing manufacturing objectives. The new CMM platform features four capability packages focused on customer productivity drivers: Throughput, Precision, Multi-Purpose and Shop-Floor. Built on Hexagon Manufacturing Intelligence's Enhanced Productivity Series (EPS) concept, the GLOBAL S utilizes Hexagon's smart technologies and sensor configurations to streamline the creation, execution and analysis of measurement routines. The EPS concept presents users with software and probe choices catering to their unique applications, as well as machine options such as the vibration-reduction system Compass, which enhances machine scanning throughput and performance, the PULSE environmental monitoring tool and machine messaging lights for highly visible notifications. The GLOBAL S's next-generation capabilities are conveyed in the machine's modern design by Pininfarina, a renowned international design firm.

The GLOBAL S Throughput capability package benefits mass production manufacturers that require reduced measuring cycle times to increase production volume. The Precision capability package caters to users who need confidence when measuring parts with tight tolerances and complex geometries. The Multi-Purpose capability package is a flexible solution for manufacturers measuring a variety of materials with different features and surface characteristics. Shop-Floor, the fourth GLOBAL S capability package, offers a solution for

customers who need to integrate measurements on the production floor, enabling process optimization.

GLOBAL S comes equipped with PC-DMIS or QUINDOS measuring software depending on the choice of capability package. Other options include Q-DAS statistical process analysis (SPC) software and the HxGN SMART Quality data and resource management system.

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