

The IEEE Instrumentation & Measurement Magazine
April 2018 Issue

I&M around the World: Africa

Editorial

I&M around the World

Wendy Van Moer

Travelling around the world... it definitely opens up your eyes and broadens your mind! And that's why each April issue of our magazine is dedicated to a different region. This allows all regions to show to the rest of the world their work in the field of instrumentation and measurement. What kind of I&M research is going on in that particular region? What are the difficulties? Where do they put the focus?

In this April 2018 issue of our magazine we travel to... Africa!

This time we have two guest editors: Prof. Aime Lay-Ekuakille and Dr. Mohamed Khalil. They both have strong connections with the scientific community in Africa and are experts in the field. As such they are the perfect ones to show us what is going on in the field of instrumentation and measurement in Africa.

I would like to take the opportunity to thank them both for the valuable time they spent on this issue.

Let's start our journey to Africa!

Groetjes,

Wendy

Guest Editorial

I&M in Ultrasound Technology

Aimé Lay-Ekuakille and Mohamed Khalil

We are pleased to introduce this section regarding applications of ultrasound in measurements. Two papers are considered important and included in the section. Ultrasound remains one of the most well-known radiations used for active and passive detection. It is often used for distance measurement and obstacle ranging. The aforementioned papers deal with acoustic sensing on a mobile robot and invasive grinding, respectively. Acoustic sensing is used in many automotive applications because of its simplicity. It is an asset for radar systems including ground penetrating radar. The paper aims at allowing the mobile robot to follow line in an autonomous way employing an array of sensors instructed by a fuzzy logic system. The second paper is related to the use of ultrasound as guide for minimally invasive grinding in order to clear blood clots. Blood clots can be processed by means of medicine but it takes a long time; especially for urgent and concerned cases, a grinding by means of ultrasound could be necessary. In this case ultrasound is used to guide surgeons during their intervention by trying to help in clear blood clots but also by detecting indirectly the type of physiological material.

We do hope the readers will enjoy both papers even with two different applications.

Article Summaries

Advanced Acoustic Sensing System on a Mobile Robot: Design, Construction and Measurements

(Summary)

*Patrick Kapita Mvemba, Simon Kidiamboko Guwa Gua Band,
Aime Lay-Ekuakille, and Nicola Ivan Giannoccaro*

In this paper, the authors describe the construction and characterization of a low-cost ultrasonic sensing system for obstacle avoidance on a mobile robot. In some locations and in certain

conditions where electronic components are not readily available and not affordable, it is more advantageous to design an obstacle sensing system with a single sensor (e.g., HC-SR04) to reduce the construction cost. They use only one sensor, mounted on a servo on the front of a mobile robot that scans and detects obstacles within the interval from 15° to 165° according to our design, to allow the estimation of the distance of currently detected obstacles with the help of a fuzzy rules set. The embedded fuzzy algorithm will select what obstacles should be avoided to perform collision-free navigation. A microcontroller with an Arduino bootloader was used to perform calculations and control the sensor (HC-SR04) and actuator (SG90 mini gear). The robot has two independent wheels, driven by geared PM dc motors, via the H driver L928N. The ultrasonic sensing system accuracy can be improved by considering ambient temperature in sound speed computation.

This text is from introduction of the article.

Ultrasound-Guided Minimally Invasive Grinding for Clearing Blood Clots: Promises and Challenges

(Summary)

Dalia Mahdy, Ramez Reda, Nabila Hamdi, and Islam S. M. Khalil

Mechanical removal of blood clots is a promising approach towards the treatment of vascular diseases caused by pathological clot formation in the circulatory system. These clots can form and travel to deep seated regions in the circulatory system and result in significant problems as blood flow past the clot is obstructed. A microscopically small helical microrobot offers great promise in the minimally-invasive removal of these clots. The system integrates several modules to control the motion of the helical microrobots, localize the microrobot using ultrasound feedback, and analyze the volume and composition of the clot during interaction with the microrobot.

This text is from the introduction of the article.

Experimentally Driven Demystification of System Identification for Nonlinear Mechanical Systems

(Summary)

Mark Vaes, Yves Rolain, Johan Pattyn and Gerd Vandersteen

The goal of this work is to develop a low cost hardware-based system identification (SI) demonstrator. It targets the students and practicing engineers with an illustration of the threads for model extraction caused by nonlinear distortion. The focus lies on hands-on training with a high return on effort. The training starts from real experiments that are performed on the demonstrator hardware, which is a real system that is introduced here. It can easily be used at home by the trainee without the need for external support or expensive equipment. The steep learning curve that often scares potential users of advanced SI methods is hereby flattened, and the practical applicability of these methods is demonstrated simultaneously. The joint use of practical, clear and simple teaching materials and hardware-based illustration can provide enough knowledge, understanding and confidence for the end users to apply the methods on industrial scale systems.

This text is from the introduction of the article.

A New Low Cost Power Line Communication Solution for Smart Grid Monitoring and Management

(Summary)

Giovanni Artale, Antonio Cataliotti, Valentina Cosentino, Dario Di Cara, Riccardo Fiorelli, Salvatore Guaina, Nicola Panzavecchia, and Giovanni Tine

Modern smart grids require the improvement of measurement and communication infrastructures of distribution networks, at both medium voltage (MV) and low voltage (LV) levels. Acquired network data include typical electrical network quantities and status variables and also environmental and other parameters. Such data must be exchanged between the different players of the smart grid. The authors have patented an innovative power line communication (PLC) coupler solution, which is based on the exploitation of capacitive dividers of voltage detecting systems (VDS). The developed solution includes a proper interface circuit between the PLC transceiver and the VDS socket to transmit/ receive the PLC signal to/from the MV network. The proposed PLC coupling solution and some experimental on-field tests are described in the paper.

Columns

Life After Graduation

(Summary)

Africa- Where Metrology Began

Erik Timpson

In this installment, the columnist briefly introduces three academic papers from African authors to highlight their effective use of magnets, smartphones, and optical measures. He encourages readers to take a break from their traditional areas of expertise to examine the body of research and development taking place in different geographic areas.

Basic Metrology

(Summary)

The Last Measurement of the Speed of Light

Richard Davis

Measuring the speed of light, and ultimately using this speed to define the meter per second in the International System of Units (SI), has much to teach us about basic metrology. These lessons will gain new relevance later this year if the revised (SI) gains final approval, as expected. The history culminating in the last measurement of the speed of light is reviewed.

This text is from the introduction of the column.

Future Trends in I&M

(Summary)

The Need for Standardization in Instrumentation and Measurement

Irina Florea

Without any standards to compare, any innovative process will terminate with no results. Imagine what life without same standards would mean: no safety standards, no reliable traceability, our work would not be judged by the same standard, everybody could sell and buy anything (it would be just a matter of the lowest price and no quality standards), and there would be no standard to evaluate one's capabilities. Chaos? Yes, that is the correct word to describe life without standards.

This text is from the body of the column.

Society News

TC-39 Measurements in Power Systems

Ruqiang Yan

Technical Committee 39 (TC-39) of the IEEE Instrumentation and Measurement Society was founded in 2009 to create a reference for many members of the society working in the field of definition and characterization of measurement systems, devices, components and methods for modern power grids.

The current roster of the TC includes nineteen members from eight countries. Since the beginning, the main activity of TC-39 has been the organization and sponsorship of the IEEE International Workshop on Applied Measurements for Power Systems (AMPS), whose first seven editions were held in Aachen, Germany yearly from 2010 to 2016, while the eighth edition was in Liverpool, UK September 20-22, 2017. The workshop provides a forum where qualified people can deeply discuss the different aspects related to instrumentation and measurement in power system applications and bring up critical opinions and innovative solutions to the challenges facing the new generation of measurement equipment. Over the years, AMPS, which also offers the opportunity for TC-39 to act as a bridge between academia and practitioners, has continuously grown in terms of both numbers of contributions and attendees and gained a high reputation in the scientific community. Furthermore, the *Transactions on Instrumentation and*

Measurement hosts, in a dedicated Special Section, the technically extended versions of some of the papers presented at AMPS, selected after a careful peer review process.

TC-39 also organizes special sessions in larger conferences, such as the Special Session on “Measurements for Emerging Power Systems” at I2MTC 2016, held May 23-26, 2016 in Taipei, Taiwan, and the Special Session on “New Power Quality Measurement Issues in Modern Power Systems” proposed for I2MTC 2018, to be held this year in Houston, Texas, USA. The other main activity of TC-39 is represented by standards development. In particular, in the last years, a joint project with TC-38 of IEC (Instrument Transformers) has been promoted to define a new Dual Logo Standard (IEEE-IEC). The Project Authorization Request P61869-105 “Recommended Practice for Uncertainty Evaluation in the Calibration of Instrument Transformers” was approved in May 2017 by the IEEE Standards Association. The kick-off meeting of the Joint Working Group, which also includes several IEEE members from other societies, was held November 7-8, 2017 in Bologna, Italy.

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.

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.

Departments

New Products

Robert Goldberg

Please send all “New Products” information to:

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Portable Single-Channel Wireless Oscilloscope Probe Operates to 30 MHz

The IkaScope ultra-portable, 30 MHz, wireless oscilloscope probe weighs less than 60 grams and is designed to fit in your hand. With a WiFi connection to a smartphone, tablet or a computer, signals can be displayed and measurements can be easily made. Patented ProbeClick[®] technology transforms the probe tip into an intelligent part of the oscilloscope. The probe detects when pressure is applied or released, allowing measurements to be automatically started and stopped without the need of a traditional RUN/STOP button.

The IkaScope is utilized as a wireless oscilloscope probe that displays measured signals and is configured via remote screen (tablet, smartphone or computer). Technically speaking, the IkaScope WS200 integrates a full-featured analog front end, a digital processing stage and a WiFi module. First, measured signals are conditioned, then converted to digital values via a high speed 8-bit ADC. Finally, a digital processing stage streams the captured signal frames over a high speed WiFi link.

IkaScope incorporates an intelligent probe tip (called ProbeClick[®]) that detects when pressure is applied. This allows important power saving since all power consuming circuitry is in stand-by when a measurement is not in progress. That same intelligent probe tip is used to turn the IkaScope ON, which then turns OFF after 10 minutes of non-activity. During that period IkaScope keeps WiFi connection active for optimal responsiveness when quick measurements need to be made.

IkaScope may connect as well to your office or home WiFi network or it may create its own WiFi access point to which another display device may connect. IkaScope relies on a free application available on their website for display, analysis and configuration.

IkaScope is highly portable. Therefore, applications that require quick, on-the-field measurements are a good match for this technology. Some examples are:

- Onsite maintenance and inspection
- Isolated measurements
- Design troubleshooting
- Education and research
- Manufacturing industry
- Aerospace industry
- Automotive industry

For more detailed information, please visit www.ikalogic.com.

5G Network Emulation Solutions are Now 5G NR (New Radio) Ready

Keysight Technologies has announced that their 5G network emulation solutions are now ready for 5G NR and will continue to support the new 3GPP NR standards. Keysight claims to be the first to launch network emulation solutions (5G Protocol R&D Toolset and 5G RF DVT Toolset) that enable device and chipset manufacturers to prototype and develop 5GTF chipsets and devices.

Keysight's 5G network emulation solutions enable the device ecosystem to simplify workflows, share insights, and speed time to market. The workflow based solution portfolio uses a common and scalable software platform across a unified 5G development toolset that streamlines 5G modem and device R&D workflow.

Keysight offers its users the ability to address 5G NR challenges and will support advanced channel bandwidth, beamforming, 8CC aggregation and multi-gigabit end-to-end IP data rates.

Highlights:

- Keysight's 5G New Radio (NR) network emulation solutions allow users to prototype and develop 5G NR chipsets and devices
- Keysight's solutions allow users to verify advanced 5G NR features (e.g., beamforming) across global spectrum requirements
- Keysight's solutions allow users to validate new 5G NR waveforms and complex 5G numerology with test automation tools

More information about the 5G RF DVT toolset is available at www.keysight.com/find/5G-RF. A video demonstration of Keysight's 5G network emulation solutions is available on YouTube.

Extended Sampling Oscilloscope Range

Pico Technology has added three 15 GHz models including a 25 GHz model to its professional, portable and low-cost PicoScope 9300 Series of Sampling Oscilloscopes. The new 15 GHz models replace the preceding 9200 Series 12 GHz models, adding significantly upgraded specifications at lower prices, with the result that all Pico Sampling Oscilloscopes now operate under the PicoSample 3 software. These instruments combine Pico's cost-effective sampling technology with the convenience of USB and LAN control ports.

The 9301-15 provides the benefits of two channels at 15 GHz bandwidth and prescaled trigger to 14 GHz. It delivers market-leading 16-bit sampling rate of 1 MS/s in support of fast-update eye diagrams, persisted traces, histogramming and statistical analysis. Equivalent sampling rate tops out at 15 TS/s—that is a time resolution of just 64 fs—along with an unusually long maximum trace length for sampling oscilloscopes of up to 32 kilosamples.

With a 15 GHz sampling bandwidth, Pico's entry-level Sampling Oscilloscope aligns with today's popular gigabit data rates. 15 GHz bandwidth will support third harmonic characterization of serial data out to 10 Gb/s and fifth harmonic out to 6 Gb/s. Full touch screen control, menus that configure to the application at hand, comprehensive PRBS pattern lock, and eye-line step and scan, all add up to a powerful, low-cost instrument available for visualization, measurement and characterization of high-speed serial data.

The third of the new 15 GHz models, the 9311-15 addresses single-ended Time Domain Transmission and Time Domain Reflection measurements. It is a significant upgrade to the predecessor 9211 in cable, component, backplane and PCB impedance and transmission characterizations and network analysis. In this model, system transition time (65 ps) halves distance resolution, and adjustable pulse width extends reflected fault detection range from around 4 mm typically out to 400 meters (1350 ft.). At 20 GHz, the 9311-20 continues to support fully differential and de-skewable TDR/TDT capability, and all 9300 models can be paired with the PG900 standalone fast pulse generators to achieve similar TDR/TDT capability.

At 25 GHz, Pico has created the model 9302-25 to add 11.3 Gb/s clock recovery to the higher bandwidth models.

Full details of all nine models at bandwidths of 15 GHz, 20 GHz and 25 GHz can be found at www.picotech.com/rf-products.

Release of ATEasy 10 with New Features and Performance

Marvin Test Solutions, Inc. has announced the latest version of ATEasy®, its evolutionary test software suite, first released in 1991 and currently deployed in test and measurement applications worldwide.

ATEasy provides test engineers with all of the necessary tools to efficiently develop, debug, document, maintain, and execute test applications. Building on nearly 3 decades of hardware, software and system design expertise, MTS has continually invested in ATEasy with the goal to provide an ATE software product that is easy to use and maintain, offers unrivaled long-term supportability, and meets the demanding test requirements of today's complex systems.

The latest version, ATEasy 10, delivers faster run-times (up to 10x faster in benchmarked tests), new integrated user collaboration tools such as ATEasy Merge. Net Controls support the ability to embed ATEasy run-time executables, a test log template that provides the ability to analyze test results, and backward compatibility with all previous versions.

Developed from the ground up as ATE software for test and measurement applications, ATEasy is the only commercially-available test development / test executive software with an integrated hardware abstraction layer (HAL) and full simulation capabilities. Preserving test program development investment, ATEasy offers backward source and execution compatibility with all previous versions.

ATEasy is ideal for companies with large and/or complex automated test applications, as well as system builders and/or integrators of multiple systems who require the flexibility, customizability and complete set of tools included with ATEasy.

Find more information at www.MarvinTest.com.

Vector Signal Generator Achieves Extremely High Pulse Rates in PDW (Pulse Descriptor Word) Streaming Applications

Rohde & Schwarz introduces a new realtime control interface software option for simulated radar scenarios based on pulse descriptor word (PDW) streaming. The radar scenario simulator streams the PDWs to the R&S SMW200A vector signal generator directly via LAN. Equipped with the new software option, the vector signal generator processes these signals to simulate highly agile and dense radar signal environments. The R&S SMW200 acts as an agile signal source that generates the highest pulse rates with superior RF performance. It supports both classical pulsed signals and any I/Q modulated signals. This solution is especially well-suited for extremely long-duration tests of radar receivers.

To cope with today's demanding radar signal simulations, ultralong playtimes are needed in order to simulate realistic radar environments. Pulse sequences are calculated pulse by pulse and streamed as PDWs to an RF signal source. This avoids long calculation times and saves memory space in the signal generator. The R&S SMW200A is able to generate extremely high pulse rates (up to 1 Mpulse/s), as required for simulating dense signal scenarios and complex radar environments.

Users can connect their PDW-based radar scenario simulators directly to the vector signal generator via LAN. The R&S SMW-K503 software option allows easy, fast and cost-effective integration of the R&S SMW200A as a signal source in state-of-the-art radar simulation environments.

With its extremely high processing speed of up to 1 MPDW/s, the R&S SMW200A enables testing of radar receivers at extremely high pulse rates. Customers additionally benefit from the signal generator's excellent RF performance.

With an optional integrated second signal path, frequently needed additional interfering signals, such as adjacent communications signals, can be implemented quickly and easily in the single-box solution. The R&S SMW200A with two independent paths is the ideal solution for testing DUTs with several channels or generating radar signals in two different frequency bands. Each path can receive PDWs independently via LAN and output them on the same frequency or different frequencies. Multiple channels can be coupled phase-coherent for simulating different angles of arrival (AoA).

For more information, visit: www.rohde-schwarz.com/ad/press/smw200a.

Next Generation of 16-Bit Digitizers

Spectrum Instrumentation announces the first products of a completely new designed digitizer card series. It consists of the new platform-board M2p, which will be the PCIe base for all upcoming products for the coming years. The other element is the new 59xx module, which will be available in many variations. M2p platform and 59xx module form 13 different new digitizer cards with lots of options regarding speed and channels.

The M2p.59xx series is initially available with three different speed grades of 20 MS/s, 40 MS/s and 80 MS/s and from one to eight channels per card. Based on Spectrum's unique modular design philosophy, 13 different models can be ordered, ensuring a perfect match against the required specifications of customers. More models will be released in 2018.

Although the size of the product has been reduced into a half-length PCIe card by the design team, it still offers even more features than predecessor families. Each channel has a separate ADC and a fully individual programmable input amplifier with ranges between ± 200 mV and ± 10 V, programmable input offset for unipolar measurements, programmable input termination of 50 Ohms and 1 Mega Ohms and an integrated calibration circuit. Models are available with up to 8 single-ended and up to 4 differential channels.

The reduced card length of 167 mm allows the 16-bit digitizers to fit into much smaller PC systems than before—ideal for compact OEM solutions.

Up to 16 cards in one system can be synchronized using Spectrum's proven star-hub technology. That allows systems to be created with up to 128 channels, all sharing a common clock and trigger, in one single chassis. For synchronization with external equipment, clock and trigger inputs and outputs are standard. For additional flexibility, 4 individually programmable connectors are available directly on the front-plate that offer additional trigger inputs, status outputs, synchronous digital input lines, asynchronous I/O or a reference clock input for an integrated time stamping unit.

All units include a base version of Spectrum's SBench 6 software for first tests and simple measurement tasks.

More information about Spectrum can be found at www.spectrum-instrumentation.com.

Inertial-Grade MEMS Capacitive Accelerometers

Silicon Designs, Inc. has announced the availability of its Model 1525 Series, a family of commercial and inertial-grade MEMS capacitive accelerometers, offering low-noise performance.

Design of the Model 1525 Series incorporates Silicon Designs' own high-performance MEMS variable capacitive sense element, along with a ± 4.0 V differential analog output stage, internal temperature sensor and integral sense amplifier—all housed within a miniature, nitrogen

damped, hermetically sealed, surface mounted J-lead LCC-20 ceramic package. The 1525 Series features low-power (+5 VDC, 5 mA) operation, excellent in-run bias stability, and zero cross-coupling. Five unique full-scale ranges, of ± 2 g, ± 5 g, ± 10 g, ± 25 g, and ± 50 g are currently in production. Each MEMS accelerometer offers reliable performance over a standard operating temperature range of -40 °C to $+85$ °C. Units are also relatively insensitive to wide temperature changes and gradients. Each device is marked with a serial number on its top and bottom surfaces for traceability. A calibration test sheet is supplied with each unit, showing measured bias, scale factor, linearity, operating current, and frequency response.

Carefully regulated manufacturing processes ensure that each sensor is made to be virtually identical, allowing users to swap out parts in the same G range with few-to-no testing modifications, further saving time and resources. This provides test engineers with a quick plug-and-play solution for almost any application, with total trust in sensor accuracy when used within published specifications. As the OEM of its own MEMS capacitive accelerometer chips and modules, Silicon Designs further provides full in-house customization capabilities to customer standards. The Silicon Designs Model 1525 Series tactical grade MEMS inertial accelerometer family is ideal for zero-to-medium frequency instrumentation applications that require high-repeatability, low noise, and maximum stability, including tactical guidance systems, navigation and control systems (GN&C), AHRS, unmanned aerial vehicles (UAVs), unmanned ground vehicles (UGVs), remotely operated vehicles (ROVs), robotic controllers, flight control systems, and marine and land-based navigational systems.

For additional information on the Model 1525 Series or other MEMS capacitive sensing technologies offered by Silicon Designs, visit www.silicondesigns.com.

Broadband 26GHz SMT Module for 5G

Plextek RFI has announced the development of a multi-chip module (MCM) to cover the recently-designated European ‘Pioneer Band’ for millimeter-wave (mmWave) 5G around 26 GHz. The development of the Front-End Module (FEM) was carried out in collaboration with Filtronic Broadband.

The band 24.25 to 27.5 GHz was designated last year by the EU Radio Spectrum Policy Group (RSPG) as the preferred band, or 'Pioneer Band,' for mmWave 5G.

The FEM comprises a GaAs low-noise amplifier (LNA), power amplifier (PA) and transmit/receive switch housed in a custom laminate surface-mount (SMT) package measuring 10 mm x 10 mm. The receive path gain is 20 dB across the full band, with a noise figure of 3.5 dB. Transmit path gain is 19 dB, and the output referred third order intermodulation (IP3) is +36 dBm. Low-loss RF filtering has been integrated into the package structure, with a band-pass filter after the LNA and a harmonic rejection filter after the PA. Insertion loss figures are 0.7 dB for the band-pass filter and 0.2 dB for the harmonic rejection filter.

More information about Plextek RFI's work on developing 5G MMIC and components can be found on the Plextek RFI website at www.plextekrfi.com and also on Plextek's You Tube channel.

Faster Large-scale Laser Scanning

Hexagon Manufacturing Intelligence has announced the Leica Absolute Scanner LAS-XL, a new ultra-large scale portable laser scanner. Designed for industries and applications where both speed of measurement and metrology-level accuracy are indispensable, the expanded measurement field and point acquisition rate of the LAS-XL means large parts and surfaces can be fully digitized in far less time than ever before. Leica claims this product to be capable of a larger scanning field than any other laser scanner on the market.

Operating on the same flying-dot scanning technology as the Leica Absolute Scanner LAS, the LAS-XL benefits from a scan-line width of up to 600 millimeters (24 inches) and a measurement stand-off distance of up to a full meter. The extreme flexibility this delivers makes the LAS-XL as ideal for mapping large blade surfaces as it is for digitizing aircraft and rail carriage interiors. Accurate to within just 150 microns, the LAS-XL is suitable for the wide range of applications for which increased measurement speed is extremely valuable.

For more information, visit HexagonMI.com.

GaN Technology for Linear & Compressed Amplifier Circuits

Cree's CGHV40200PP is a unique, gallium nitride (GaN) high electron mobility transistor (HEMT). The CGHV40200PP, operating from a 50 Volt rail, offers a general purpose, broadband solution to a variety of RF and microwave applications. GaN HEMTs offer high efficiency, high gain and wide bandwidth capabilities making the CGHV40200PP ideal for linear and compressed amplifier circuits. The transistor is available in a 4-lead flange package.

Typical applications include 2-way radio, broadband amplifiers, radar amplifiers, and test instrumentation. It can also be used to develop Class A, AB, Linear amplifiers suitable for OFDM, W-CDMA, EDGE, CDMA waveforms.

Features:

- Up to 2.7 GHz operation
- 21 dB small signal gain at 1.8 GHz
- 250 W typical Psat (Saturated Output Power)
- 50 V operation

For more information, visit www.cree.com/rf.

New Direct-drive Linear Motor Stages Deliver Sub-nanometer Resolution

New from PI, these ultra-precise motor stages are now available with 0.2 nanometer resolution linear encoders, ideal for high-end alignment, scanning and automation applications, in fields such as photonics, biotechnology and laser optics.

PI has released a new precision feedback option for its linear stages equipped with direct-drive ironless 3-phase motors. Two types of position feedback systems are available: absolute-measuring encoders providing 2 nanometer resolution and incremental encoders providing 0.2

nanometer resolution with effective 0.5 nanometer minimum incremental motion at the stage platform.

Ironless linear motors are used when high dynamics needs to be combined with extremely smooth motion. They are ideal for applications where extremely constant velocity is required, such as in optics inspection, metrology, photonics, interferometry, and semiconductor test equipment. The frictionless, zero-wear motor drives are also popular in fast automation applications where reliability and maximum up-time are mission-critical.

For more information, please visit www.pi-usa.us.

Low Noise, 2-Stage Bypass Amplifier for Tower Mounting

RFMW has announced the design and support for the Qorvo QPL9065 Low Noise Amplifier (LNA). This ultra-low noise amplifier is specified with a 0.5 dB noise figure at 1.95 GHz.

Designed with two amplification stages and internal, 2nd stage bypass switch, gain is selectable at 17.5 dB or 37.5 dB. Operational bandwidth is 450 to 3800 MHz. DC power comes from a single positive supply of 3.3 to 5 V and control is via 1.8V CMOS TTL logic without external circuitry. Applications include Tower Mounted Amplifiers, base station receivers and repeaters. The QPL9065 is offered in a 3.5x3.5 mm package.

Samples are available for qualified applications through RFMW, Ltd. To learn more about RFMW, visit their website at www.rfmw.com.