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MARCH / APRIL 2019



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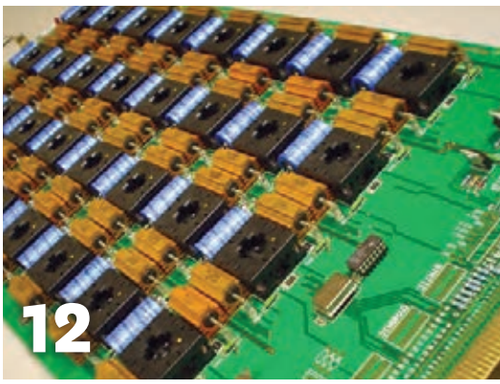





Cover photo: Boreas Technologies
Photos (this page, from top): Boreas Technologies; Getty Images; Genesis Robotics

# Hannover Messe has automation covered

## *Industry is in a process of rapid and radical change, while topics like AI and machine learning continue to make inroads*

Hannover Messe — the world's largest exhibition and professional gathering related to automation is set to roll this spring. Hosted every other year in Hannover, Germany, the trade fair runs April 1 to 5, with an anticipated 6,500 companies from 75 nations exhibiting the latest automation technologies relating to manufacturing environments.

Global corporations, small and medium-sized enterprises and startups alike will all be showcasing their components and system solutions for tomorrow's industrial production and energy systems. This includes leading providers of automation, robotics, industrial software, drive systems and fluid power technology, energy technologies, subcontracting and research and development.

As an invited media guest to the Hannover Messe show preview in Hannover earlier this year, I learned that industry is indeed — in a process of rapid and radical change. Topics like artificial intelligence (AI) and machine learning continue to make inroads into the connected industry. Running under the lead theme of 'Industrial Intelligence', this spring's gathering intends to zero-in on this trend, with a simultaneous focus on the role of human beings — the decisive idea generators for the factory of the future.

"Hannover Messe is the world's only platform to highlight the way mechanical and electrical engineering components and systems mesh with the digital technologies offered by software and IT companies," says Dr. Jochen Köckler, chairman of the Deutsche Messe managing board. "It is the only place where visitors from the production and energy industries can get a panorama view of the future of industry."

### *User examples of machine learning*

"Artificial intelligence (AI) has the potential to revolutionize industry," Köckler adds. "In the future, AI technologies will be used to control connected production plants and continuously improve systems, all the while increasing quality standards, as manufacturing processes become increasingly flexible and cost-efficient."

Industrial companies are increasingly taking advantage of innovative digital technologies, employing data analysis to gain relevant insights into optimization potential, to enhance existing products by adding new digital services or launch completely new business models on the market.

Machine learning and artificial intelligence play a key role here by linking data from different sources, predicting errors and solving problems. As Köckler sees it: "More than 100 concrete application examples for machine learning will be displayed at Hannover Messe — something you can't find anywhere else in the world."

### *5G for industry*

From 2020 onward, the new 5G mobile communications standard is set to lay the cornerstone for the sweeping digitization around the globe. Leading-edge technologies like machine learning in production and autonomous driving will then become ready for application. As Köckler explains: "5G is going to enable industry to realize the full potential of Industry 4.0."

But the lead theme of 'Industrial Intelligence' means more than just smart technology: i.e. the digital networking of people and machines in the AI age.

"When we talk about the advantages of artificial intelligence, this doesn't mean we can do without human intelligence — on the contrary," says Köckler. "Responsibility, creativity and leadership — with these qualities, people will continue to play the most important role in tomorrow's industry."

Which is why cooperation between people and machines will be one of the central themes at this year's Hannover Messe. The new 'Future of Work in Industry' conference will make a significant contribution to this. On April 3, some 300 experts, thought leaders and industry leaders will meet to discuss the impact of digitization on labor skills and organization.

Looking into the future also includes the question of what will come after Industry 4.0. Specialists in digitization, AI, human-machine collaboration and platform economics will address these issues at the first Industrial Pioneers Summit. The aim here is to develop a vision for the year 2025.

So, to experience all of the outstanding innovations and exceptional products impacting the world of automation, be sure to book your trip to Hannover. EP&T

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# NEWSWATCH

*Dorigo Systems recently broke ground on its new EMS facility in Burnaby BC.*

**EMS SERVICES**

## DORIGO BREAKS GROUND ON WORLD-CLASS EMS FACILITY

The Pillon Holdings Group of Companies has broken ground on a custom-designed corporate campus for Dorigo Systems in Glenlyon Business Park, a new suburban business park located in Burnaby BC.

The 106,000-square-foot state-of-the-art Electronics Manufacturing Services (EMS) facility has been designed by architect Christopher Bozyk and is being developed and constructed by Beedie.

The building's optimized layout and cutting-edge equipment will increase Dorigo's operational efficiency and production capacity — which will translate into even greater speed, quality assurance and on-time-delivery for its customers, according to company president Mark Pillon, P. Eng.

"Dorigo has deep roots in Burnaby. We are proud of the fact that all Dorigo's products are manufactured here, which supports the provincial economy and creates many jobs for local residents. In constructing our company headquarters in Glenlyon, we are reaffirming our commitment to BC's manufacturing and high-tech industries," Pillon says. "Our new building will rank among the most sophisticated electronics manufacturing facilities in the Pacific Northwest."

**FLEXIBLE HYBRID ELECTRONICS**

## QUEBEC TO HOST SPRING EVENT FOR FLEXIBLE & HYBRID ELECTRONICS

intelliFLEX PRESENTS

CPES 2019

PRINTABLEFLEXIBLEWEARABLE ELECTRONICSSYMPOSIUM

Canada's premier conference and trade show exhibition for flexible and hybrid electronics (FHE) is coming this spring to Bromont, Quebec — a hotbed of the Canadian semiconductor industry, where significant investment is ongoing.

The fifth annual CPES2019 Symposium, an educational and networking focused event will be held May 16-17 at Domaine Chateau-Bromont hotel/resort, in the heart of the Eastern Townships, 85km east of Montreal. The conference will feature industry leading Canadian and international speakers, exploring all facets of FHE, including flexible, stretchable, and 2D/3D printable electronics; smart textiles and wearables; and flex-integrated circuit technologies, software and applications.

30-year industry veteran Mark Majewski takes the helm as CEO of intelliFLEX

"Flexible and hybrid electronics (FHE) enable hundreds of new applications in various verticals by adding intelligence to ordinary objects with unique form factors," says Mark Majewski, who recently took over as CEO of the intelliFLEX Innovation Alliance, organizers of the event.

Majewski, a 30-year veteran of the Canadian technology industry and former geographic director at a major semiconductor company, has extensive experience in the electronics and technology industries in Canada. He's also been a key leader at several start-ups, volunteers as a mentor at the RIC Centre and Haltech, and most recently was the technology lead for business development at Ontario Centres of Excellence (OCE).

"I've taken this role because I believe in FHE and its future," says Majewski. "All electronics players in Canada who want to expand their capabilities should be looking at this technology as it goes mainstream. Not only does FHE open the doors to new products and applications, it also has incredible value in augmenting and improving everyday electronics products that already exist."

His goal as CEO is to unite the growing critical mass of Canadian printable, flexible and hybrid electronics (FHE) companies and research with the country's electronics and semiconductor industries. Majewski seeks to leverage the breadth of his contacts, experience and knowledge to successfully position intelliFLEX and its members within the massive industry. A not-for-profit industry alliance, intelliFLEX is moving its head office from Ottawa to the Greater Toronto Area, bringing it physically closer to the heart of Canada's electronics industry.

*For more information on CPES2019 visit: https://intelliflex.org/cpes2019*

**OPTOELECTRONICS**

## OSRAM AND GAN SYSTEMS INTRODUCE ULTRAFAST LASER DRIVER

Global optoelectronics firm Osram Opto Semiconductors has partnered with GaN Systems, Ottawa -based developer of GaN power semiconductors, to develop an ultrafast laser driver with a high-power, multi-channel Surface Mount (SMT) laser for LiDAR (Light detection and ranging) systems.

Both firms aim to develop the breakthrough in laser driver technology that enables longer range and higher resolution LiDAR architectures.

One of the issues with LiDAR technology has been its inability to transmit lasers at short pulses, while maintaining high peak power, which is necessary to ensure that the LiDAR is eye safe with a long range and high resolution.


***Osram and GaN Systems announce an ultrafast, 4-channel 480W laser driver to enable long range, high accuracy LiDAR.***

To address this need, Osram worked with GaN Systems to develop a laser driver with a one nanosecond pulse rise time, while driving all four channels at 40 A each to deliver 480 W peak power. This peak power then can be modulated at

Photo: Top: Dorigo; Middle: intlliFlex Right: Osram

low-duty cycles to produce high resolution 3D cloud points at long range for new LiDAR designs.

"Operating at the elevated current levels and nanosecond rise times necessary for long-distance LiDAR requires the high power, high frequency and robust thermal performance that are the hallmarks of GaN Systems' products," says Jim Witham, CEO of GaN Systems.

"It is great to see the industry recognize these performance attributes and leverage them for its systems."

**30 JOBS**
in engineering will be created. Another 30 jobs will follow in phase 2.

**CYBERSECURITY**

## SIEMENS CANADA JOINS CYBERSECURITY INSTITUTE

**SIEMENS**

Siemens Canada has announced its corporate membership with the Canadian Institute for Cybersecurity (CIC) housed at the University of Fredericton NB.

The CIC focuses on research and development, consulting and managed services, and creating potential for global exports of locally developed cybersecurity solutions. Up to 30 highly skilled jobs in engineering, cyber analysis and consulting will be created in Phase 1 by 2020, with another 30 jobs expected in Phase 2.

As an important part of these activities, Siemens Canada is joining CIC as a corporate member to partner on research projects and the training of cybersecurity talent.

"Cybersecurity is one of the most important and complex challenges facing businesses and public institutions today," says Faisal Kazi, president and CEO, Siemens Canada. The Canadian Institute for Cybersecurity at UNB will work in partnership with Siemens' team of technical staff and researchers to develop robust and practical cutting-edge cyber security and privacy technologies.

"Partnerships like these will propel New Brunswick as a global leader in cybersecurity," adds Dr. Ali Ghorbani, CIC director.

**POWER**

## DIVERSE BECOMES AUTHORIZED DISTY OF MEAN WELL POWER SUPPLIES

Diverse Electronics Inc., *Saint-Laurent QC,* has been appointed as an authorized distributor of Mean Well, a global leader in standard power supplies. Mean Well manufactures more than 10,000 models of ac-dc power supplies, dc-dc converters and dc-ac inverters, as well as a comprehensive lineup of LED drivers.

"Mean Well is a well-known and highly respected brand in the industry," says Rick Masciotra, president of Diverse. "They are world leaders in terms of quality and value, and have solutions for every major industry and price point."

With this new partnership, Diverse becomes the only franchised distributor with stock in Canada. **EP&T**

*Visit **ept.ca** for the latest new products, news and industry events.*

# Genesis Robotic's builds teamwork between man & machine

What began as a research and design company about four years ago, Genesis Robotics of Langley BC has its sites firmly focused on creating parts that will change how machines are built and how they move.

Founded in 2015 by Michael Gibney and James Klassen, Genesis Robotics took a significant developmental step forward in April 2018, as the firm entered into a strategic venture with Koch Industries. Koch is the second largest privately held company in the United States with annual revenue of $115 billion. This level of investment interest is further demonstrated by Koch's support in helping commercialize Genesis' LiveDrive electric motor and Reflex gearing technology.

***The movement for robots is based on technology that hasn't changed much in 50-years. We set out to change that with a novel approach to motor and gearbox designs***

West Coast Report sat down with Genesis Robotic's CEO, Justin Currie, to learn how their technology aids the world of manufacturing and how the partnership with Koch widens their audience.

"Our co-founder, James Klassen spent decades tackling complex problems. Four years ago, he and a small team decided to take on big obstacles in the robotics," says Currie, adding that Genesis saw an opportunity in mechanical actuation. "The movement for robots is based on technology that hasn't changed much in 50-years. We set out to change that with a novel approach to motor and gearbox designs. The fact that we are one of the few companies that design critical tools for problems faced by OEMs has allowed us to stand out."

Genesis' purpose as a company is to enrich lives through ever-increasing freedom and mobility. This helps to keep their team focused on bringing technology to market that facilitates development. The convergence of AI, sensors and improved robotics actuation will bring down production costs and provide greater value to customers, and Genesis wants to help bring these improvements to the world.

Genesis employs more than 60 staff, which does not include the president of Koch Chemical Technology Group, who helps oversee operations. Gaining the support of Koch Industries has been vital in Genesis' growth and long-term sustainability, according to Currie.

"We have the ability to add the necessary pieces, whether that is more engineers or updating our facilities. On top of the obvious financial aspect of their investment, we have been able to leverage their expertise and their expansive network of resources across the globe," notes Currie.

Koch's global reach in marketing and commercialization, as well as its history of successfully growing businesses, has helped provide Genesis with exposure to companies which will incorporate the firm's technologies in the future.

Genesis, like many R&D organizations, has had its share of challenges as well. The company's ideas originated from a highly collaborative and creative environment. So, as its grows, the firm is working to ensure its culture of innovation, risk-taking and embracing failures will allow new ideas to be cultivated.

"Bringing in people who have a huge depth of experience with these types of transitions has helped. I would suggest that while technology breakthroughs and funding may seem to be the biggest challenge as a business, it is usually the people. Hiring for fit and establishing the values that embody the organization is essential to enable growth," suggests Currie.


***Genesis Robotics CEO, Justin Currie.***

When asked about how Genesis will improve productivity and safety, Currie says "the high torque and low inertia in our direct-drive motors enable abrupt stopping and the ability to reverse directions instantaneously if it makes contact with an object." In the future, he sees combining LiveDrive with the low ratio and highly backdriveable gearboxes — which will enable high-performance actuators, leading to robots that are more human-like. This will ramp-up productivity and workplace flexibility because workers and robots will be able to work more closely together.

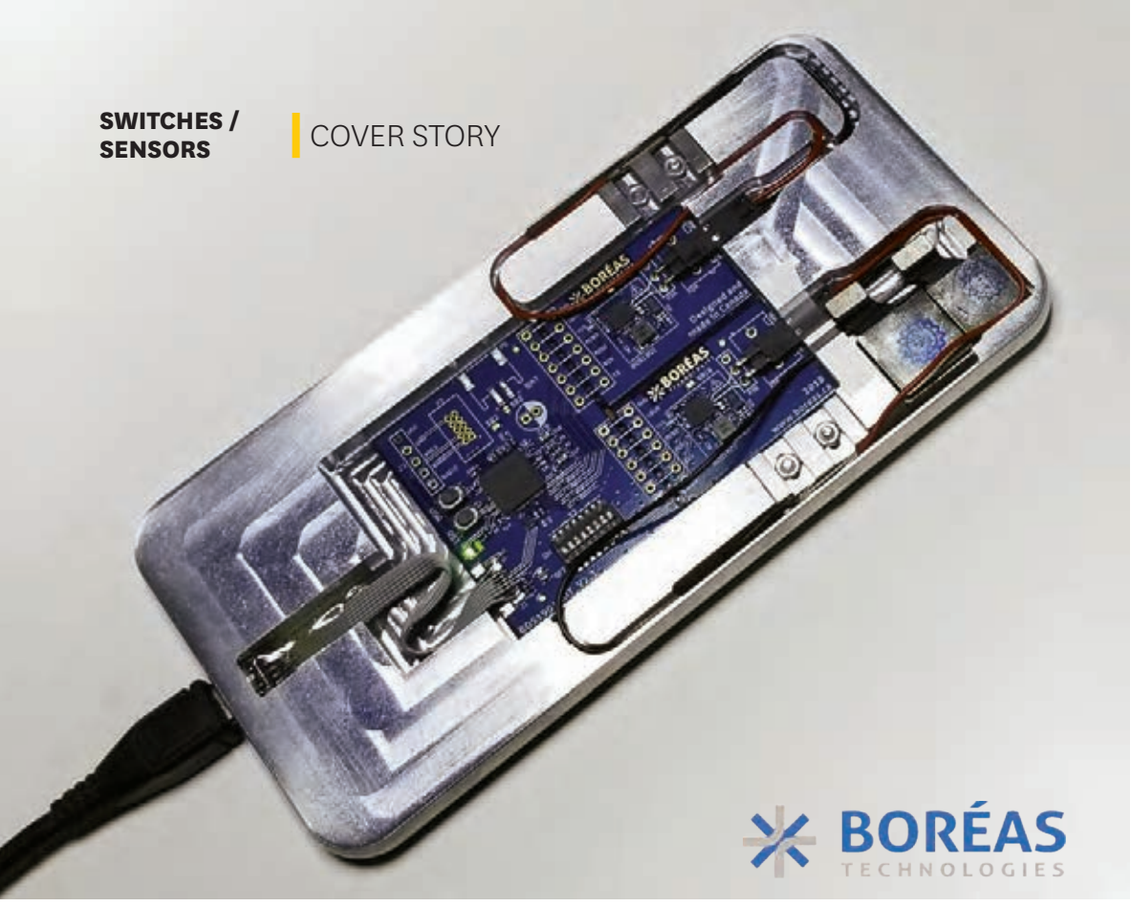
Genesis also has compelling technology that solves pain points.

"From an original technology standpoint, the LiveDrive has higher torque-to-weight than existing direct-drive motors, which is extremely rare in our industry," states Currie. "Our actuators can be inserted easily in arm joints because our direct-drive technology simplifies the integration since no belts or pulleys are required. Because of the smaller form factor and larger through hole, they allow more design flexibility for robotics engineers."

Making new motors fit a robotics company's design specifications can be a challenge. Genesis works closely with its customer's product specifications in order to deliver custom solutions. **EP&T**

***Sohail Kamal*** *is EP&T's West Coast correspondent. sohail@nextgear.ca*

Photo: Genesis Robotics




***To promote its ultra-low power piezo drivers Boréas Tech demonstrates a buttonless smartphone. This design replaces the mechanical volume and power buttons with two piezo actuators next to the frame.***

# SWITCH UP

## *Bromont's Boreas Technologies Inc. targets disruption of haptics sector.* BY STEPHEN LAW

*After a long period of relative inactivity where haptics research was confined to a fairly tight group of companies and academics, the industry is about to be significantly disrupted and transformed by newer technology options. Leading the way is Boréas Technologies of Bromont Quebec, one of many new players to emerge by developing new advanced haptics solutions.*

*In this article, EP&T poses a few questions to Boréas Technologies' founder and CEO Simon Chaput. He quickly recognized the opportunity to strike in the haptics space, particularly after he discovered there are limited manufacturers of drivers suitable for piezoelectric actuators in the global market.*

**Provide us with a brief overview to your education and how you uncovered these elements of design.**

I did my undergraduate degree and master`s at Université de Sherbrooke in Québec. During my master`s, instead of pure academic research, I did an industrial research project with Teledyne DALSA in Bromont, QC. The objective of the project was to design a 3V to 300V boost converter to enable the use of MEMS micromirror in portable devices. Toward the end of my master's, I wanted to do a few more years of research before jumping into the job market. That`s when I was accepted at Harvard University. While looking for a research topic at Harvard, I met with people from GE who were looking for a better piezo actuator driver for a cooling fan application. I decided to work on that problem and after reviewing, I came up with a new piezo driver architecture that enabled us to create drivers that are low power, miniature, low cost and have very low output distortion. While the architecture was designed for a piezo fan at the beginning, these four attributes made the architecture perfect for haptic applications.

**Outline your research and how you intend to disrupt the haptic driver market.**

Piezoelectric actuators are well-known in the haptics industry and they are the actuator type offering the best haptics performance compared to other type of vibrotactile actuators such as Eccentric Rotating Mass (ERM) and Linear Resonant Actuator (LRA). However, piezo require a high voltage to achieve meaningful force or displacement. Depending on the specific actuator, this voltage can be anywhere between a few tens of Volts to multiple hundreds of Volts. While piezo actuators are extremely efficient at transforming electrical energy into mechanical energy, miniature electronics for piezo actuators is very inefficient at transforming a battery voltage (e.g. 3.6V) into the high voltage required. Consequently, piezo actuators for haptics never reached the mass market.

Our CapDrive technology sets the new standard in terms of piezo drivers. First, it reduces power consumption by 10X compared to our leading competitor which not only reduce the energy requirement of a piezo haptic solution, but it also makes piezo the most energy efficient haptic technology on the market. Energy efficiency is a big thing for our battery powered devices. Second, it takes advantage of the unique ability of piezo actuators to act as a sensor and actuator. So far, on the market, you can find ICs that are able to sense or drive an actuator, but our CapDrive technology enables to do both which reduces significantly the size and cost of the system. Third, our first product has the smallest footprint which enables our customers to implement piezo haptic within a very small footprint.

We believe that by providing a piezo driver technology that is small, low-power and that has the capability of sensing, we will enable many systems to move from R&D to product.


BOS1901 piezo driver is a single-chip piezo actuator driver with energy recovery, based on a patent pending CapDrive technology.

**Describe your SmartClik piezo actuator technology, unveiled at CES this January, as proof of concept for future buttonless smartphone designs.**

Our SmartClik technology unveiled at CES is embodied in a phone that has no traditional button. Instead, it is made of an aluminum frame with no holes. Where traditional buttons are, we placed piezo actuators inside the frame. Since our CapDrive technology can sense and drive, when the user press at the correct place on the frame, we detect the action and send a feedback that feels like a mechanical switch. While imitating the feeling of a mechanical switch is a very basic haptic effect, piezo buttons offer a wide range of advantage to phone OEMs. Like localized haptics, dust and waterproofness and different types of feedback from the same button depending on the application.

SmartClik is the first concept we did, but we plan to create other devices using our chip. The plan was to put into engineers hands a device that proves the

Photo: Boreas Technologies

concept. Haptics isn't something you can easily understand with charts and spec sheets, you need to hold it and feel it to really understand the difference between crude vibrations and HD haptics.

A lot of people tried our SmartClik phone at CES and we still enjoy seeing the reaction on the user's face when we unplug the phone and they understand that what they thought was a button was, in fact, a pretty stiff aluminum frame that doesn't move.

**Boréas aims to lower the bar for replacing physical buttons with virtual ones. How important will haptics become in future electronic designs?**
Haptics will become increasingly important in electronic devices because most form factors are either moving to a a customizable interface to increase the device functionality and improve the user interface (e.g. Lenovo Yoga notebook display keyboard) or they are removing buttons to achieve a more robust and aesthetic design (Vivo Apex 2019 phone).While physical buttons are easy to use, they are limited to a single function and they are often a weak point of the device. However, as humans, we don't like to interact with a solid surface that doesn't provide any kind of feedback when you press on it. Consequently, as computers, mobile devices and cars start to implement solid state interfaces to meet different functionality objectives, haptics will become more important to offer a satisfying experience to the user.

**Which design application sectors do you anticipate being the most impacted by Boréas' innovations?**
It is hard to answer which sector will be most impacted as we see a lot of interest from mobile devices, laptop/tablets, wearables and automotive for our technology. However, we believe that the first sector to adopt our technology will be mobile devices.

Among its pending innovations, Boréas has developed high-definition haptics that imitate the texture of a sweater's fabric so that people shopping on their devices can feel before they buy.

**How close are you to making this a reality?**
We didn't develop this technology. We are using it as an example of what haptics will be in 5 to 10 years so that people understand easily the potential of haptics. There are already companies who have prototypes of texture-based haptics, however a common problem for these prototypes is the size of the electronics as well as the energy required. Boréas expertise in miniature low-power haptic drivers will enable these companies to reduce the size and cost of their solution as well as make their solution viable in a greater range of applications.

**10X**
**LESS POWER**
With the patented CapDrive architecture Boreas can drive the same piezo actuators, but consume up to 10X less power.

**Boréas recently introduced its SmartClik technology, a proof of concept for future buttonless smartphone designs, using ultra-low-power haptic semiconductor technologies. How will this development evolve smartphone design?**
This design helps OEMs manufacture more reliable devices. Mechanical buttons are subject to failure, create a breach in the device that can let water and dust get in and they have only one function.

Haptic buttons allow the device to be completely closed, improving the devices' dust and waterproofness. Since they don't move, they're also less prone to failure. They can also be programmed to trigger different actions. For example, on our SmartClik phone we can program multi-level pressure sensing. You could control volume with one single button: a light press could decrease volume and a hard press could increase it. Open another application and this button could trigger the camera. You can program the button to do whatever you need with the phone software.

A couple of OEMs are already moving that way, but with legacy haptic technologies (LRA). Those technologies make the whole device vibrate when you click on the haptic button, which doesn`t provide a realistic effect. Piezoelectric actuators have the advantage of giving a very localized feedback. Only the pressing finger will feel the button.

This design also helps engineers create better localized HD haptic feedback. By replacing buttons around the phone, you end up with piezoelectric actuators all around the frame. You can trigger localized feedback on the device depending on the application. This will enable OEMs and app developers to create more engaging user experiences, while using the same generic hardware that will be in all devices in the future.

**While Boréas is not the only chip vendor working on piezoelectric-based HD haptic feedback, how do you stay ahead of the competition?**
I stated earlier, the main challenge for piezoelectric haptic technologies was power consumption. Other piezo drivers consume too much power because they're based on miniaturized designs of audio amplifier architectures. They were not designed from the ground up with battery powered mobile devices constraints in mind.

With our patented CapDrive architecture we can drive the same piezo actuators but consuming up to 10X less power. This argument alone is a major differentiator over our competitors. We keep an eye on the market to be aware of new developments, but we haven't seen something come close to our unique technology.

**Have the developer kits, focused on piezoelectric actuators, generated interest from a wider designer community?**
The response to our development kit has been very good. We sold many of them even if the kit was not available at any distributors. There are companies who did repeat purchase for different projects. While we are a small company, we already shipped kits to all our key markets: United States, Europe and Asia.

**How important is it for you to keep Boréas in Quebec, versus being tempted to relocate to Silicon Valley?**
People in the USA thought I was crazy to start a semiconductor company in Canada. Like I said earlier, I did my masters project at Teledyne Dalsa, based in Bromont. There are a couple big companies specializing in electronics based in Bromont. I knew that I could easily find a highly qualified workforce there. After a few phone calls and meetings, my past colleagues from Teledyne Dalsa decided to join the company. Our team has an average of 20 years of experience. This allows us to move fast compared to traditional new semiconductor design teams. When I visit customers in Silicon Valley, they are impressed by our speed and quality of products.

On the financing side, development costs are also much lower in Québec than what it would have been in Silicon Valley. We developed our BOS1901 chip for a fraction of what it would have cost us in Silicon Valley. Our office is based in the C2MI building in Bromont. C2MI is a state-of-the-art collaborative R&D lab for microelectronic development where multiple companies, such as IBM and NXP, work on specific projects. Our location enables us to rent all the specialized equipment we needed instead of buying it. Consequently, we were able to test our devices during development at our office instead of shipping our prototypes all over the world to subcontractors for testing.

While it doesn`t have the hype of Silicon Valley, I firmly believe it is the best location for our company to grow. EP&T

# How to choose the right sensor

BY MARTIN KEENAN, TECHNICAL DIRECTOR, AVNET ABACUS

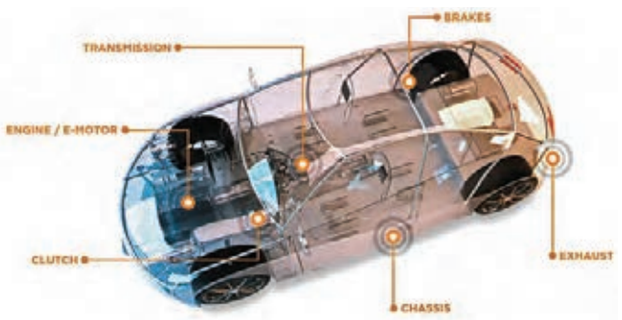
As any engineer knows, working at scale brings a special set of additional development challenges. One key area to consider is what to do when a sensor fails in the field, and more importantly, how to minimize that risk in the first place.

There are a number of common pitfalls that can be behind sensor failure and in this article we'll explore some of the most common issues that can be encountered, as well as broadly-applicable ways in which a standardized testing process can be undertaken.

### *Sensor characteristics*

As the famous truism goes, sometimes component failures are actually down to a good component operating in a bad environment, which is perhaps the most obvious — and common — reason for failure. Modern components and sensors have to operate in a huge range of conditions, which in some cases can vary from one extreme to another rapidly, or intensify over a long period of use. A sensor mounted to a modern car in Europe, for example, might experience ambient temperatures of more than 40C with high dust levels and low humidity, and within months temperatures below zero, coupled with highly corrosive road salt.

In such harsh environments, sensors become both the chief enablers as well as the weakest links in the control system, they are the most important, yet most exposed part of the system. Therefore, making the correct choice by identifying all the significant characteristics required is an essential step. Characteristics to consider include: Range of measurement, environmental conditions of operation, repeatability, form factor, resolution, control interface, and any special requirements inherent in your particular application. It's important to remember that sensors are just one part of the system, so connectors and cables like Class 1 Division 1 must also be considered and allowed for.




***Sensors are just one part of the system.***

While this might seem an onerous task, there are a vast range of standards and compliance documentation to help narrow your options down quickly. Standards such as IP68 / NEMA 6P for waterproofing and certifications such as HazLoc for explosive environments can save a lot of time browsing datasheets.

An increasingly key issue to consider is power optimization and how vital that is in your intended application. Ultra-low-power consumption rates are often desirable in extreme environments, and this applies right through the technology stack. While unexpectedly power-hungry sensors might not 'fail' in the field, they may well push up maintenance costs to similar levels as full-blown failure. Traits such as short wake-up times and long stabilization intervals will also help to maximize effectiveness.

Finally, and arguably most importantly, sensors must be optimized for price! While that might seem obvious, ensuring that financial scope is part of the selection process is vital. Rejecting over-speced and overpriced components at a late stage in a project will inevitably cause unwanted delays, and potentially supply chain issues to boot.

### *Sensor modelling*

One technique that can be used here is sensor modelling, which uses a mathematical model to characterize the sensor behaviour in a wide range of circumstances. Determining the transfer function of a sensor is an important step and requires observing the standard signal response of the sensor under a variety of conditions. Once determined, the transfer function of the sensor can be used as a reference model by the Data Analysis module, which compares the sensor readings to the predicted readings using the reference model obtained.

IoT

Determining the transfer function of a sensor is an important step

The principles of this modelling technique are being adopted more widely — scaled up as it were — by the advent of digital twinning and IoT technologies. Digital twinning involves creating a highly accurate digital model — usually in 3D — of an industrial system or process, then using IoT sensors to link the real life version with the model. The result is a relatively intuitive visual indication of any developing issues — for example, increased vibration in a motor assembly that indicates maintenance or replacement will be needed imminently before the part fails. The ability to predict failure points based on real-world feedback and modelled data is of significant value in a vast range of industrial scenarios.

Field-failures of any component, whether a pressure sensor or a capacitor in a dedicated circuit tend to be less common for one major reason, the burn-in period. This simple strategy lowers failure rates significantly, and therefore is a vital part of the testing process. The logic behind it is that components that have packaging, soldering or manufacturing defects regularly fail within minutes or hours of first powering on the device. After this initial few hours of burn-in, component failures typically bottom out and happen at random intervals, until component age begins to take a hand.

Another classic generator of component failures is change, and not just environmental change, but most commonly cost-saving-generated change. Cost reduction is often introduced once a well-designed product is in production, which can mean that verification plans to quantify the changes are incomplete, which generally leads to disaster. Although a better strategy would be to iterate a new, Next-Gen design rather than change the existing one, it is vital that a full verification plan for any changes be constructed, especially taking account of downstream assembly and test operations. **EP&T**

***Avnet Abacus*** *assists and informs design engineers in the latest technological advances and provides guidance through the challenges of bringing new products to life.*

Photo: Top – TE Connectivity, Bottom – Abrel Products

## 'TRACE IN AIR' CHIP FUSE WITHSTANDS HIGH DEMANDS

**SCHURTER**

UAI 1206 chip fuse withstands pulse and temperature demands, together with time-lag characteristics. Device is suitable for applications where durability and maximum reliability are required in the smallest possible footprint. Made using firm's 'trace in air' construction, device's ability to resist current pulses smaller than the melting integral (I2t) is thereby increased exponentially. Product is impermeable to potting compound.

**us.schurter.com/en/datasheet/UAI_1206**

## SURFACE MOUNT PTC RESETTABLE FUSE SPEEDS TRIP TIMES

**HEILIND ELECTRONICS**

Bel Fuse-Circuit Protection oZCN Series surface mount resettable positive temperature coefficient (PTC) fuses use polymeric materials containing conductive filler bonded between two conductive, planar terminations. When a tripped resistance is reached, device will reset only after power to the circuit is removed, the fault is cleared and power is reapplied to the circuit. This reset ability protects electronic equipment from overload, thus eliminating the need for service personnel to physically replace a fuse.

**www.heilind.com**

## PCB ROCKER SWITCH IS IP67 SEALED

**X TRONICS**

APEM Rockermec solution consists of two Multimec 5E switches, a sealing that also provides functionality and a rocker cap called 10A. Device provides small dimensions, aesthetic design and is sealed to iP67. It measures 10.6 x 28mm with height of 12.15mm and delivers a lifetime (sealing) of 100,000 cycles. Comes in standard cap colors of black and frosted white.

**sales@xtronics.ca**

## MULTI-AXIS HALL EFFECT JOYSTICK DELIVERS PRECISION

**APEM**

JC series multi-axis Hall effect joystick is suitable for keyboard integration and measures 26mm below panel, assisting where space is limited and precision control is required. Device provides up to 5-million lifecycles of control.

Product series provides more than a dozen handle options and may be configured with up to three axes and two pushbuttons.

**www.apem.com**

*Visit **ept.ca** for the latest new products, news and industry events.*

# Top 2019 Trends Impacting the World's Escalating Demand for Data and Power

*An explosion in data-intensive technologies such as IoT, AI, Machine Learning, and Blockchain will mean significant new pressures to meet escalating demand for more power* **BY GAN SYSTEMS INC., OTTAWA**

For the past several decades, the topic of 'power' has been consistently viewed as a challenge focused primarily on incremental improvement in making devices run more efficiently and less expensively. Today, the conversation is changing as energy efficiency has grown into a strategic initiative in increasingly power-reliant industries such as data centers, electric vehicles, renewable energy systems, industrial motors, and consumer electronics.

Those industries rely on the ability to efficiently store, move, process, and analyze vast quantities of data. This requires 90,000 megawatts of energy. With the beginnings of the explosion in other data-intensive technologies such as blockchain, AI, IoT, and robotic autonomy — the pressures on power demand and energy-efficiency technologies will notably increase.

How businesses choose to generate, store, deliver and use power will be an important impetus for global change in 2019. Over the past year, in conversations with corporate leaders, we at GaN Systems are more certain than ever before that yesterday's silicon has reached its limits in solving critical power systems challenges. GaN technology is the clear and undisputed solution for driving more robust growth and product innovation, as well as enabling companies to elevate the conversation and engage more deeply in sustainability initiatives.

GaN Systems, a global leader of GaN (gallium nitride) power semiconductors, has unveiled the four trends for 2019 which we believe will have a major impact on the world's power and energy footprint.


*It has become increasingly clear that the future of transportation revolves around electric, autonomous cars.*

### *TREND 1*
### *Electric Vehicles and Autonomous-Driving Vehicles*

In 2018, it became increasingly clear that the future of transportation revolves around electric and autonomous vehicles. There are on the road today 4 million electric vehicles, with more than half of global sales in China. New entrants challenged entrenched leaders and global governments mandated low to zero emission protocols.

- In the UK, the government launches Road to Zero Strategy to lead the world in zero-emission vehicle technology.
- In China, the new blue electric taxis from BYD cost less than the old red internal combustion engine vehicles.
- New manufacturers, like NIO, enter into the marketplace with impending IPOs challenging established global car brands.

*In 2019, GaN Systems predicts:*

- The increase in fuel efficiency regulations and demand for eco-friendly automotive will continue to drive demand for electric vehicle alternatives.
- Mobility as a Service (MaaS) will gain more mindshare. Change in the social relationship between individuals and vehicles will continue to move from individual ownership to convenient on-demand use. On-demand itself will start to evolve to increasingly include fleets of autonomous vehicles, rather than be dominated by vehicles shared from individuals.

As a result;

- Research and design work in autonomy will move beyond just driving and into the recharging process for vehicles — that will pave the way to a fully autonomous vehicle experience in urban markets.
- Considerations into new cost and business models will need to be made in response to the move to more autonomous fleets of vehicles. Fleet vehicles are required to run 20 hours a day; not the 2 hours of private use vehicles. Not only will a low initial cost be important, but lower operating cost per kilometer and

Photo:Getty Images

longer vehicle lifetimes in order to maximize ROI.

- New business and social behaviors, including autonomous fleets, will drive evolution towards new vehicle design requirements. Vehicle designs will evolve to be smaller, lighter, and more utilitarian, with a focus on maximizing passenger capacity. These new designs will require GaN technology and the smaller, lighter, more efficient power systems that it brings to vehicles.

### TREND 2
### Data Centers — The Impact of IoT, AI, Blockchain and 5G Services

In 2018, we saw autonomous robots powered by AI transforming factories, and our environment, including the remote-controlled, floating, trash-collecting robots that eliminate trash from Chicago's rivers. IoT-enabled smart cities, such as Barcelona, Singapore and Denver, are already saving millions in energy and labor efficiency while improving citizen services and public safety. 5G services will be available in U.S. cities in 2019, ushering in new augmented reality mobility applications that will make Pokémon Go seem like a relic of the past.

The ever-increasing influx of massive amounts of data and the explosive demand for energy will continue to be deeply linked — and will become even more so demanding with the rise of 5G, AI, and blockchain technologies.

### In 2019, GaN Systems predicts:

*In Data Centers, in 2019 we will see:*

- A continued push for energy efficiency and density — as computationally heavy demands grow and tech such as AI, electric vehicle, 5G and blockchain begin to be integrated across the infrastructure and operations of key industries.
- Operators will need to evolve from today's server rack designs — and embrace technology to increase data and power density.
- IoT devices will require the data center industry to continue to reinvent itself — not only incrementally adding more security and robustness, but also evolving the edge with new kinds of edge/locally-focused data centers.
- Highly-efficient power supplies are key to the necessary evolution of the data center, tackling the challenge of increased energy conversion efficiency and enabling greater server rack density.

*For AI and Blockchain, in 2019 we will see:*

- Using GaN technology in power supplies to create smaller and more energy efficient hardware. This will enable blockchain to scale for business needs by processing more transactions per second without significantly increasing energy costs.
- When it comes to the integration of blockchain and the impact of artificial intelligence, faster traceability will improve companies' business operations and accelerate delivery of their products to market — while enabling them to do so at lower power costs.

*For 5G, in 2019 we will see:*

- 5G equipment will be everywhere in the world, requiring more bandwidth and power in smaller packages. GaN technology will play an important part on the rollout of 5G because of power density, energy efficiency and device size.
- 5G microcell base stations require very high efficiency and power density. Low cost power electronics using GaN technology will be needed so these can be installed economically.
- More local data centers will be built, leveraging the telco central office footprint, requiring the same focus on energy efficiency as in today's mega data centers.

### TREND 3
### Renewables and Energy Storage

In 2018, we saw technology, business economics, and social imperatives merge as the world's need to address climate change and pollution has transformed the need for renewables from a secondary to a 24/7 constant source of power. New products are being developed that reflect a focus on connecting into the sometimes-unreliable energy grid in areas prone to catastrophic storms. A growing number of home energy storage projects are underway in several cities around the world. One such project highlighted was Mandalay Homes, a new housing development in Prescott Valley, AZ where 2,900 residences will be outfitted with solar and 8 kilowatt-hour energy storage systems.


***Wireless charging remains one of the most significant trends in power electronics, as consumers continue to accumulate devices.***

*In 2019, GaN Systems predicts:*

- Highly efficient residential and commercial energy storage systems using GaN technology finally enabling high efficiency distribution, storage and on-demand access to renewable energy.
- Development of mainstream ways to supply portable power to residents and businesses in the aftermath of natural disasters such as storms and fires.

### TREND 4
### Wireless charging becomes commonplace

One of the most significant trends in power electronics is wireless charging. As consumers continue to accumulate laptops, smart phones, wearables, e-bikes and e-scooters, the need for the convenience of wireless charging will take precedence. And, as industrial markets integrate more drones and robots into the supply chain and delivery processes, the charging of those devices needs to become more efficient, effective and long-lasting.

*In 2019, GaN Systems predicts:*

- Widespread fast wireless charging tech will impact the future and speed of adoption of the autonomous world (vehicles and drones) for new and expanding consumer uses.
- Robots that not only operate, but can recharge, autonomously without human intervention will continue to the fuel the evolution of Industry 4.0.
- In wireless charging, providing high power for big loads or for fast charging small loads is the key and this is where GaN technology delivers high power with high efficiency

### In Conclusion: Meeting these challenges with GaN

At the center of these 2019 trends is the undeniable need for new ways of thinking about and addressing the power needs of the diverse technology that surrounds us. If we are to evolve globally, power cannot be taken for granted and simply viewed as an endless resource that comes out of a plug in a wall. Our global power footprint cannot continue to grow at past historic rates — for both business reasons and the health of our planet. Power semiconductor companies must take the lead in providing the technology for new power system design approaches. Businesses must take responsibility for bringing attention to power expertise inside their own companies. Removing the limitations of yesterday's silicon- by using GaN power transistors will enable enterprise organizations to usher in entirely new energy efficient systems and products capable of transforming the future. **EP&T**

Photo:Getty Images

## 250W POWER SUPPLIES COMPLY WITH MEDICAL STANDARDS

**TDK-LAMBDA AMERICAS**

DTM250-D external ac-dc power supplies meets the stringent DoE Level VI and EU Tier 2 v5 standards for both average efficiency and off-load power. Devices are certified to the medical IEC 60601-1 and industrial IEC 60950-1 standards and are housed in a rugged, compact, vent-free enclosure measuring 90 x 200 x 45mm (W x L x H). Ac is applied through the standard IEC 60320-C14 (3-prong) socket and the output dc cable is fitted with a Molex Mini Fit output connector as standard, with other connector types available upon request.

**www.us.tdk-lambda.com/lp/products/dt-c-series.htm**

## POWER SUPPLIES BOOST ACCURACY, SPEED LOAD RECOVERY TIME

**ROHDE & SCHWARZ**

R&S NGL200 power supplies provide high accuracy and fast load recovery time, suitable for challenging applications in mobile communications and the internet of things (IoT). The single-channel R&S NGL201 and the two-channel R&S NGL202 deliver up to 60W of output power per channel. The output channels are floating, galvanically isolated and protected against overload and short circuits. The two-quadrant architecture allows devices to function both as a source and a sink. Product's short recovery times enable it to handle fast load changes that occur for example when a device switches from sleep mode to transmit mode.

**www.rohde-schwarz.com/product/ngl200**

## POWER ENTRY MODULE ADDS VERSATILITY

**SCHURTER**

DG12 series versatile power entry module (PEM) includes a mains filter, integrating with an IEC inlet and circuit breaker, with optional IP protection. Product's compact design provides many features and consolidates discrete power components into one space-saving unit. Device provides a recessed 2-pole ON/OFF rocker switch circuit breaker with 1- or 2-pole overcurrent protection. Various colors and markings for both illuminated and non-illuminated switches are available.

**www.schurter.com**

## SYNCHRONOUS SILENT SWITCHER 2 BUCK REGULATOR REDUCES HEAT, EMI

**ANALOG DEVICES**

Power by Linear LTC3310S 5V, 10A low EMI monolithic synchronous buck converter has a fixed frequency peak current mode architecture that is suitable for high step-down ratio applications that demand fast transient response. Device uses the Silent Switcher 2 architecture with integrated hot loop bypass capacitors to deliver an efficient, small footprint solution at frequencies up to 5MHz with improved EMI performance. Multiphase operation enables direct paralleling of multiple devices for higher current.

**www.analog.com**

## 150W AC-DC POWER SUPPLY HAS LOW PROFILE

**XP POWER**

EPL150 series of high density, low profile, open-frame ac-dc power supply produces 100W output with convection cooling and 150W with as little as 10CFM airflow. Product has a 101.6 x 50.8mm footprint and a low profile of 25.1mm serving space-constrained applications. Device's power density is supported by high efficiency, up to 95% typical at 150W with better than 85% achieved down to 10% load. No load losses are less than 0.5W giving reduced running costs and compliance with the latest environmental goals and legislation.

**www.xppower.com**

## iJA Series

35A Non-isolated SMT Point of Load with PMBus™
- Only 0.45 in² Board Space
- 8 to 14V Input
- 0.6 - 3.3V Output
- Digital Adaptive Control
- Configurable Sequence and Fault Management

http://us.tdk-lambda.com/lp/products/ijb-series.htm

## iJB Series

60A Non-isolated SMT Point of Load with PMBus™
- Only 1.0 in² Board Space
- 8 to 14V Input
- 0.6 - 2V Output
- Digital Adaptive Control
- Configurable Sequence and Fault Management

http://us.tdk-lambda.com/lp/products/ijb-series.htm

## iQG Series

300-504W Isolated 1/4 Brick Converters
- Quarter Brick Footprint
- 48V Nominal Input
- 9.6 and 12V Output
- Up to 95% Operating Efficiency
- High True Usable Power

http://us.tdk-lambda.com/lp/products/iqg-series.htm

## iAH Series

40A Non-isolated SMT Point of Load
- Only 0.69 in² Board Space
- 3.5 - 17V Input
- 0.7 - 5.5 Output
- No External Tuning Components Needed
- DOSA Compatible Footprint

http://us.tdk-lambda.com/lp/products/dosa2-series.htm

## iBH Series

20A Non-isolated SMT Point of Load
- Only 0.36 in² Board Space
- 3.5 - 14V Input
- 0.7 - 5.5 Output
- No External Tuning Components Needed
- DOSA Compatible Footprint

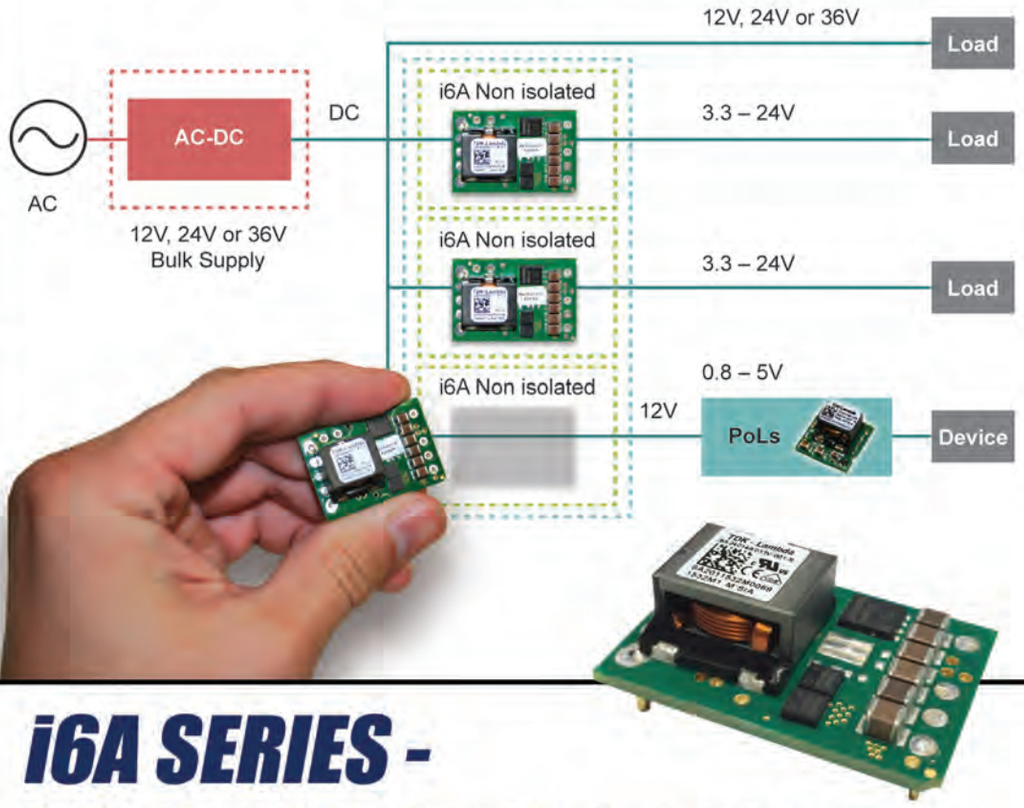
http://us.tdk-lambda.com/lp/products/dosa2-series.htm

## iCH Series

12A Non-isolated SMT Point of Load
- Only 0.23 in² Board Space
- 4.5 - 14V Input
- 0.7 - 8.5 Output
- No External Tuning Components Needed
- DOSA Compatible Footprint

http://us.tdk-lambda.com/lp/products/dosa2-series.htm

# Create your own!




# i6A SERIES -

## 250W, 3.3 to 24V 14A Output Non-Isolated Converters

The i6A is ideal for creating additional high power output voltages from a single output AC-DC supply. Rated at 250W, this 14A step-down converter can be adjusted across a 3.3V to 24V output, accepting a wide 9 to 40Vdc input.

Packaged in the industry standard 1/16th brick footprint, with an ultra high efficiency of 98%, the i6A can operate in even the most demanding thermal environments.

Contact TDK-Lambda for an evaluation board or check our website for distribution inventory

http://us.tdk-lambda.com/lp/products/i6A-series.htm

- Only 1.2 in² Board Space
- 9 to 40V Input
- 3.3 to 24V Output
- Up to 98% Efficiency
- Minimal External Components Required

For more information on how **TDK-Lambda** can help you power your unique applications, visit our web site at
**www.us.tdk-lambda.com**
or call **1-800-LAMBDA-4**

TDK

## SCHOTTKY RECTIFIERS SAVE SPACE, INCREASE POWER DENSITY

**VISHAY INTERTECHNOLOGY**

TMBS Trench MOS Barrier Schottky surface-mount rectifiers include 15 1A, 2A, and 3A devices in the Esmp series low profile SMF (DO-219AB) package. Providing space-saving alternatives to Schottky rectifiers in SMA package, devices provide reverse voltages from 45V to 150V, along with a 3A rating. Devices measure 3.7mm by 1.8mm with a low 0.98mm profile, and the package is 46 % thinner than the SMA and occupies 49 % less board space. Devices deliver a maximum operating junction temperature up to +175°C and an MSL moisture sensitivity level of 1, per J-STD-020, LF maximum peak of +260°C.

**www.vishay.com**

## MAGNETICALLY-SHIELDED DRUM-CORE SMD POWER INDUCTORS MEET AEC-Q200 STANDARDS

**SUMIDA**

CDRH50D28B/T150 Shielded Drum power inductor complies with AEC-Q200 automotive reliability standard and is based on firm's Ni-Zn ferrite core technology. Device is space-efficient and applicable to

ADAS and other automotive applications that require a small footprint and high-inductance value (max. 100µH). Devices come in 13 values, ranging from 1.0µH to 100µH, also with DCR as low as 18mW for the 1.0µH value. Full operating temperature range is -55°C to 150°C, and maximum size for all values is 5.3 x 5.0 x 2.8mm.

**www.sumida.com**

## DESKTOP POWER SUPPLIES DELIVER UP TO 300W PEAK POWER @ 120V INPUT

**GLOBTEK**

GTM96180OP 180W desktop power supply provides up to 300W surge handling capacity for up to a minute for applications with a 120V input option and up to 500W for 230V only applications. The single output units have nine basic model options of 12V 13.33A, 15V 11.33A, 18V 9.44A, 24V 7.5A, 30V 6A, 36V 5A, and 48V 3.75A and 54V 3.33A. Voltages in between are available in 0.1V increments. Units operate at up to 85-264Vac or 90-370Vdc input at 47-63Hz. Product family is rated -10°C to 40°C ambient temperature with full load and up to 80°C with derating. Units offer over-current, over-voltage, and over-temperature protection as standard.

**globtek.com**

## LITHIUM-ION SMART BATTERY PACK HAS 8MM THICKNESS

**RRC POWER SOLUTIONS**

RRC2130 FlatPAQ lithium-ion smart battery pack comes in an 8mm thickness and is suitable for very slim designs, such as the back of a PC display or on a PC board, to allow developers to make a tablet-like design possible for medical or industrial applications. Product has an optimized capacity of 3880mAh at a nominal voltage of 7.6V.

The overall energy density is 29.5Wh for extended power and runtime. Device complies with the SMBus communication standard version 1.1, as well as the JEITA standard, which uses optimized charging profiles based on temperatures.

**www.rrc-ps.com/en**

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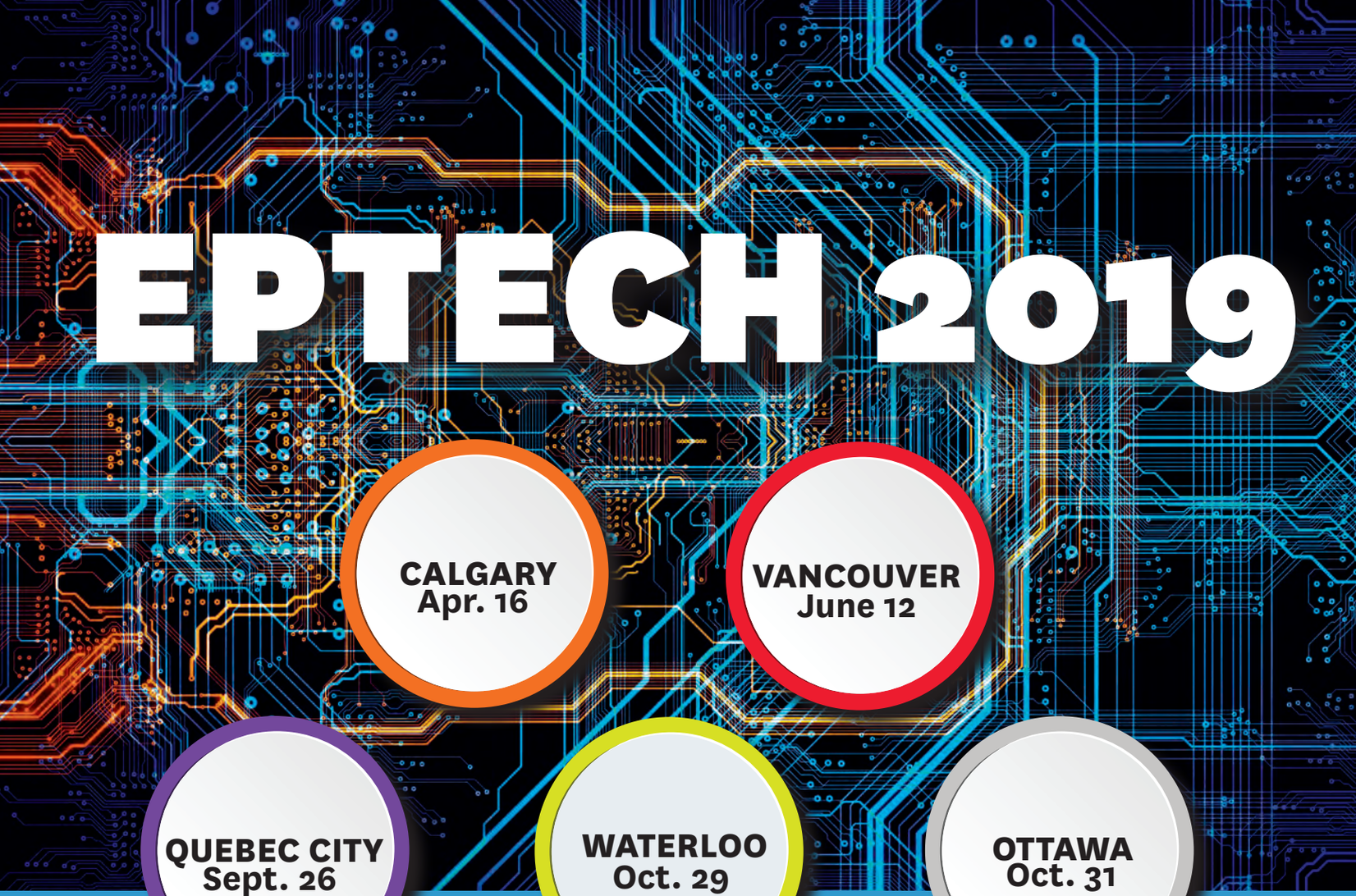


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# Battery-free bluetooth sticker sensor tag connects people with products

Semiconductor developer Wiliot has demonstrated what it is calling the first-ever sticker-sized Bluetooth sensor tag that incorporates an ARM processor powered solely by scavenging energy from ambient radio frequencies.

A Wiliot chip glued to a simple antenna printed on plastic or paper can authenticate the proximity of a product by transmitting an encrypted serial number along with weight and temperature data from a device the size of a postage stamp. Eliminating most of the components associated with traditional Bluetooth, these tags lower sale and maintenance costs to previously unachievable levels. The tags use Wiliot's breakthrough in nanowatt computing to communicate with any device enabled by Bluetooth Low Energy, such as smartphones, Wi-Fi access points and Internet of Things devices that can connect to digital displays, Wi-Fi and LTE cellular networks.

"We believe that disposable electronics based on battery-free, low-cost systems are the foundation for future IoT systems. We are on the edge of dramatically changing the way products are made, how they are distributed, where and when they are sold, and how they are used and recycled," says Tal Tamir, Wiliot CEO and co-founder. "Re-cycling the radiation around us to power sticker-size sensors can enable new ways for consumers to interact with products that were previously not feasible. Products can share when they are picked up, their temperature, or when they need to be replenished. Without batteries or other high-cost components, tags have unlimited power and lifespan, so can be embedded inside of products that were previously unconnected to the Internet of Things."

Real-life applications for the Bluetooth tags are wide-ranging, including being embedded in the production phase of consumer goods, allowing real-time tracking through the manufacturing process, to the warehouse and from the store to the end consumer.

At the retail level, the Wiliot transponder can overcome the limits of human-readable product information on tags or packaging, unlocking interactive engagement through the consumer's own phone or displays.

At home, consumers can communicate with their products to get instructions and reminders of when and how to use them, and Wiliot-enabled containers can automatically reorder themselves when empty.

These devices are very relevant to Avery Dennison's intelligent label strategy.

"We believe in a future where every item will have a unique digital identity and a digital life, with relevant and contextual information," says Francisco Melo, VP/GM, Avery Dennison. **EP&T**

Photo: Wiliot


## DC-DC CONVERTERS COME IN AN INDUSTRIAL STANDARD DIP-16 PACKAGE

**FUTURE ELECTRONICS**

Minmax MDWI10 series of latest generation 10 watt dc-dc converters come in an industrial standard DIP-16 package. Devices provide improved power density of up to 63.5W/in3 for space-critical applications and very low no-load power consumption. Product series incorporates a host of high-grade features, such as no minimum load requirement, OCP, SCP, fast start-up time, and ultra-wide 4:1 input voltage range.

**www.FutureElectronics.com**

## SOLDER ADDRESSES RELIABILITY, QUALITY, PRODUCTION ISSUES

**AIM**

REL22 solder has been developed to address reliability and production quality issues common to similar multi-element alloys. Both internal and customer testing has proven that

it improves product survival in extreme thermal exposure operating environments, such as under-hood automotive, avionics/aerospace and LED lighting. Product's physical characteristics make it suitable for applications where thermal shock, vibration and g-forces as high 22,000g are experienced.

**www.aimsolder.com**

## COAXIAL CABLE STRIPPING MACHINE BOOSTS PRODUCTION

**SCHLEUNIGER**

CoaxStrip 6480 semi-automatic stripping machine increases production by an average of 15%, reduces operating costs and delivers high processing flexibility and quality. The ability to process coaxial cables with outer diameters of 1.2 to 12

millimeters makes it a suitable all-rounder for most production needs. Unit is equipped with 'cable end detection' and 'cable diameter verification' for high-precision processing.

**www.schleuniger.com**

## ULTRA-LOW MODULUS THERMAL INTERFACE MATERIALS CONTAIN ADVANCED RESIN

**HENKEL**

BERGQUIST GAP PAD thermal interface materials (TIMs) comes in two ultra-low modulus, including TGP 6000ULM and TGP 7000ULM, both formulated with an advanced resin platform to deliver ultra-low modulus capabilities and high thermal conductivity of 6.0 W/m-K and 7.0 W/m-K, respectively. Products provide improved performance combination in custom-sized pads

with easy handling to enhance process efficiency. Products provide very soft pads with high conformability to rough or irregular surfaces, effectively filling intricate gaps and allowing for thorough wet out at the interface for maximum thermal transfer. Product's advanced silicone-based resin formulation and filler package provide low assembly stress alongside high thermal control.

**www. henkel.com**

## ¼" WIDE MALE, QUICK-FIT PCB TABS COME ON CONTINUOUS REEL

**KEYSTONE**

Quick-Fit, PCB terminals is now available in new packaging. Cat. No: 1287-R for ¼"-wide male tabs with .312" height above the board, terminals are specifically designed on a continuous reel (strip) to be compatible with standard automated insertion equipment — reducing

assembly and processing time. Manufactured from brass with tin-plate, devices ensure easy installation and soldering to a pcb and are packaged on reels as a 'drop in' replacement for existing product.

**www.keyelco.com**

## AUDIO COMPONENTS ARE WATER-RESIRSTANT

**TRANSDUCERS USA**

Water-resistant input/output audio components are 6mm diameter and is 2.7mm high and accommodate wire

termination. Devices are IP-57, IP-65 and/or IP-67 rated to meet requirements for waterproof or dustproof applications. Product line includes both input microphones and output sounders. The input electret microphones are omni-directional, IP-57 rated, 2Vdc, with an operating frequency range of 100 to 20KHz and Signal-to-Noise ratio of 60dBA. Output impedance is 2.2KΩ and the operating voltage is 2.0Vdc @ 0.5mA within a temperature range from -20° to +70° C.

**www.tusainc.com**

## VECTOR NETWORK ANALYZER COMBINES RF PERFORMANCE, OPERATING CONCEPT

**ROHDE & SCHWARZ**

R&S ZNA new generation of high-end vector network analyzers provide improved RF performance and a hardware concept that simplifies measurement configuration. Unit's measurement stability and trace noise enable users to perform demanding measurements on active and passive components and modules. Using a DUT-centric approach, the purely touch-operated vector network analyzer reduces configuration times to a minimum. The two models R&S ZNA26 (10MHz to 26.5GHz) and R&S ZNA43 (10MHz to 43.5GHz) deliver a dynamic range of 146dB (typ.) and a trace noise as low as 0.001dB at 1kHz IF bandwidth. These two features are essential for measurements on high-rejection filters. With its hardware concept, units can perform mixer measurements for RF and IF in parallel, delivering measurement speed twice as fast as with the conventional approach. Amplifier characterization becomes easy with a 100 dB power

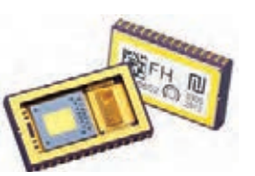
sweep range, a pulse generator and modulator per test port, versatile intermodulation measurement capabilities and spectrum analyzer functionality.

**www.rohde-schwarz.com/product/zna**

## MEMS INERTIAL GYROS SENSORS ENHANCE MEASURING ACCURACY

**NEWARK ELEMENT14**

Tronics Microsystems GYPRO closed-loop MEMS gyros provide improved performance, measuring accuracy and long-term stability in applications such as precision navigation, motion tracking & control, and optical stabilization. Product portfolio brings a tailored solution to support system manufacturers' transition to MEMS products, with huge benefits in terms of size, weight and power,



without compromising on performance and reliability. Devices combine several key benefits on a single chip and features bias instability of only 0.8 per hour and ultra-low noise (Angular Random Walk) of only 0.14° per √h. Devices enhance linearity, increased signal to noise ratio and improved behavior in harsh vibration, shock and temperature environments.

**canada.newark.com**

## NANOSILICA FILLED LED CURABLE ADHESIVE IS BIOCOMPATIBLE

**MASTER BOND**

LED405Med is a one component, LED curing adhesive system that meets

ISO 10993-5 cytotoxicity requirements for use in medical device assembly. Product has a nanosilica filler resulting in both lower shrinkage upon cure, as well as improved dimensional stability with a coefficient of thermal expansion of 35-40 in/in x 10-6/°C. Product cures to a hardness of 65-75 Shore D, indicating that it is not too stiff, thereby offering good toughness. Product is optically clear, with a refractive index of 1.50, and boosts light transmission properties.

**www.masterbond.com/products/led-light-curable-adhesives**

## LED CONNECTOR IS CONFIGURABLE

**LEMO**

Halo B series LED connectors are available with additional product sizes and models. Devices are also available in the T series, a watertight IP68 connector. Product range is configurable through the embedded electronics, featuring a wide range of colours with a RGB indicator arranged in a ring around the connector. The three different designs are called LEG, LMG (with a standby light) and LNG (with a narrow ring shape light). Device's indicator can be configured as required: status (on/off or blinking), light intensity and colours.

**www.lemo.com**

## TINY RTC MODULE SERVES WEARABLE, IOT DESIGNS

**MICRO CRYSTAL**

RV-8263-C7 universal Real-Time Clock (RTC) module with tiny dimensions for wearables and IoT is small and highly precise. Device accepts a large supply voltage range and the small current consumption are suitable for wearable and IoT applications. The

tiny package measures 3,5 x 1,5 x 0,8mm and hosts the resonator crystal and the RTC-circuit, nor requiring any pairing. Device delivers low power consumption of 190nA @ 3V, plus a wide operating voltage range of 0.9V to 5.5V.

**www.microcrystal.com**

## PCI EXPRESS 5.0 TECHNOLOGY SOLUTION DELIVERS SPEED, MARGINS

**KEYSIGHT TECHNOLOGIES**

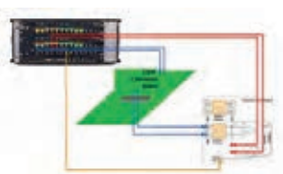
Keysight PCIe 5.0 comprehensive transmitter (Tx) and receiver (Rx) testing solution provides the speed and margins needed to meet the Peripheral Component Interconnect or PCI Express 5.0 Technology (PCIe Gen5) standard.

Solution enables the design and validation of circuits capable of tolerating significantly attenuated signals at 32 GT/s. Product utilizes aggressive equalization techniques helping the receiver restore the quality of the transmitted signal, allowing for error-free recovery of the digital information from the PCIe Tx signal.

**www.keysight.com**

## MODULAR AOI PLATFORM IS OPTIMIZED TO INSPECT WAVE, SELECTIVE SOLDERING

**MEK**



SpectorBOX modular AOI platform is optimized for the inspection of wave & selective soldering of through hole & surface mount components. Unit inspects printed circuit boards (pcbs) inside solder frames, directly from the conveyor system.

Unit can be equipped with 9 cameras: 1 top and 8 side cameras. Depending on the requirements, it can be equipped with an adjustable 30mm-Z-axis optical head with Autofocus function to focus and position optimally for varying pcb distances or warpage. The ultra slim design only requires a minimal height of 280mm (11")

**www.marantz-electronics.com**

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# Role of hardware in IoT grows

## *Common standards & policies are key to accelerating the benefits of IoT*

Hardware platforms have become an essential part of the early stage design process, enabling engineers to test their designs quickly and cost-effectively and rapidly deliver proof of concept, according to research published by Newark element14.

Survey results show design engineers use a range of hardware platforms to accelerate development pace and shorten time to the market. Results show 50% of developers use single board computers such as the Raspberry Pi or BeagleBone Black as they provide ready-to-use embedded development platforms for building end-products. Other developers advised that they used their own design platforms (27%) or development platforms provided by the silicon vendors (19%).

Respondents to the survey also advised that they prefer to design a complete solution for edge-to-cloud-security themselves (58%), rather than relying on third-party providers. Security continues to be top on the list of developer considerations (52%). Developers understand the critical importance of choosing an IoT platform that efficiently, securely and economically supports their IoT applications, rather than relying on external parties which can sometimes cost more to run and maintain.

"Opportunities within the Internet of Things have grown as developers gain greater access to hardware and software solutions that allow them to bring products to market quickly," says Cliff Ortmeyer, global head of solutions development for Premier Farnell and Newark element14. "Newark element14 provides access to an extensive range of development tools for IoT, and works with innovative providers to bring the latest for AI and security, including the Smart-Edge Agile, adding intelligence at the edge with zero-code, to the Zymbit ZYMKEY 4i security module for plug-in security in connected devices."

The need for common standards and policies was also highlighted as key to accelerating the benefits of IoT. Interoperability (certified standards), connectivity standards, open standards and common privacy policies were all high on the list of developer wishes.

Research also suggested that opportunities within IoT will continue to grow, including home automation, industrial automation & control and artificial intelligence. The greatest perceived opportunity for benefits is seen in professional and industrial areas, with operational applications, including opportunities to collate data across entire operations to optimizing workplace resources. **EP&T**

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# PRODUCT SOURCE GUIDE



## AD INDEX



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40 YEARS

# A Look Back

## *Celebrating four decades of electronics design*

*Marking its 40th anniversary this year, EP&T will feature this special column throughout 2019, providing readers with a peak at our past, while paying homage to our history.*

In this issue, A Look Back puts its focus on Mitel Corporation, the darling of the electronics industry in Canada in 1979. In its fifth year of operations at that time, Mitel had grown rapidly from a $300,000 start-up to $21.6-million in 1979 — and, was expected to eclipse $42-million before its fiscal year was out. With expectations of 10% growth per month, Mitel had just moved into its sprawling 85,000-square-foot facility in Kanata Ontario (just outside of Ottawa).

Founded in June of 1973 by Michael Cowpland and Terry Matthews, the pair formed the corporation with the blessing of their employer, Bell Northern Research (based on the original premise that it stood for "Mike and Terry Lawnmowers"), in order to protect their intellectual property rights of tone to pulse converter design from their employer, who otherwise would have legal ownership rights.

According to Wikipedia, Mitel's first shipment of three lawnmowers was lost in shipping, so they quickly adjusted to produce a telephony tone receiver product (a tone-to-pulse converter for central office use based on Cowpland's Ph.D. thesis). Cowpland has also stated that the lawnmowers were not suited to Canadian lawns.


***This double-page advertisement from Mitel Corp. appeared in EP&T's Nov edition in 1979. It featured the Mitel SX-200 phone system, "The most compact full-capability PABX on the market."***

Following the success of the tone receiver, the founders extended their interest in the telecommunications industry. Early on, the pair realized the significance of the then-new microprocessor and software technology to the design of telecom switches. In 1975, they introduced the SX200 PBX. The company grew at a rate of over 100% per year for several years. They reached the $100 million annual revenue mark by 1981.

Coverage of Mitel's success which appeared in the November 1979 edition of EP&T, read like this:

"Right from the beginning, Cowpland and Matthews have opted for high volume, competitive products. But, in order to be successful and a leader in the market dominated by the giants of the telecommunications industry, they have spent considerable sums in developing new and innovative approaches to existing markets.

The progression of new products also shows a definite trend towards larger and larger systems as the company grows." **EP&T**

Photo: EP&T

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