EP&T

ELECTRONIC PRODUCTS & TECHNOLOGY

OCTOBER 2020

CANADA'S INFORMATION LEADER FOR ELECTRONIC ENGINEERS AND DESIGNERS

EPT.CA

AI & HARDWARE DESIGNS

Key steps engineers can take when deploying AI p.12

RAISE YOUR VOICE

Use of speech recognition AI-enabled hardware gets louder p.14

TRUSTING AI

Emerging tech is powerful, NuEnergy makes it trustworthy p.16

STAY WOKE

Artificial intelligence may out design you! P.10

DELIVERING THE BRANDS YOU NEED

FREE SHIPPING
ON ORDERS OVER $100 CAD OR $100 USD*
SAME-DAY SHIPPING
ORDERS placed by 8:00 pm

1.800.344.4539
DIGIKEY.CA

Digi-Key® ELECTRONICS

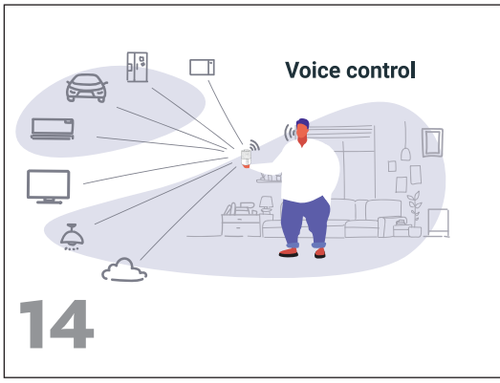
9.2 MILLION+ PRODUCTS ONLINE | 1,100+ INDUSTRY-LEADING SUPPLIERS | 100% AUTHORIZED DISTRIBUTOR

*A shipping charge of $8.00 CAD will be billed on all orders of less than $100.00 CAD. A shipping charge of $20.00 USD will be billed on all orders of less than $100.00 USD. All orders are shipped via UPS, Federal Express, or DHL for delivery within 1-3 days (dependent on final destination). No handling fees. All prices are in Canadian dollar or United States dollar. Digi-Key is an authorized distributor for all supplier partners. New products added daily. Digi-Key and Digi-Key Electronics are registered trademarks of Digi-Key Electronics in the U.S. and other countries.

ECIA MEMBER
Supporting The Authorized Channel

INSIDE

EP&T
OCTOBER 2020



UNESCO consults with globe on AI ethics

When first considering inclusion of artificial intelligence (AI) as part of EP&T's editorial calendar more than a year ago, I won't lie that I did so with some trepidation. Of course, in the rapidly accelerating timeline of AI in terms of global development and growing use in our daily lives – looking at it today, making it the feature focus of this current issue turned out to be a 'no brainer'.

Relevancy at home is strong. As stated in this month's West Tech Report (EP&T Oct issue pg. 8), Artificial Intelligence (AI) and Machine Learning (ML) continue to garner strong foreign direct investment across Canada. AI development is emerging in focused hubs, specifically Toronto's Vector Institute, Montreal's Mila and Edmonton's Amii.

Force for good or existential threat

As far as the technology itself goes, well the jury may still be out. Which direction does humanity take this juggernaut. Or, does it 'take' us? Benevolent force for good or existential threat to humanity?

The ethics and governance of AI is a significant global issue. Thus, UNESCO's Member States decided to launch the process of developing a global recommendation on the ethics of artificial intelligence (AI) in November 2019. The United Nations declared that "artificial intelligence is a critical frontier issue for the whole UN system and the whole world."

In March this year UNESCO asked 24 leading experts with multidisciplinary experience in the ethics of artificial intelligence to develop a draft recommendation on the ethics of AI.

UNESCO then launched a wide process of consultations to obtain the many points of view of stakeholders. This involved experts from 155 countries, members of the public (through a global online survey), United Nations agencies, major stakeholders from the sector such as Google, Facebook and Microsoft, and the world of academe with the University of Stanford and the Chinese Academy of Sciences.

Developed for us and not against

"We must make sure AI is developed for us and not against us' declared UNESCO director-general Audrey Azoulay. "We need a robust base of ethical principles to ensure artificial intelligence serves the common good. We have made this process be as inclusive as possible since the stakes involved are universal," she explained.

Over recent years and all the more so since the outbreak of COVID-19, there have been ever more applications drawing on AI, notably with the aim of accelerating research into vaccines and improving tracing of the virus. AI has contributed to the development of telemedicine and distance learning. It has also been used to operate drones for the delivery of medical supplies and the need for a global regulatory instrument has grown on a par with the spread of AI applications.

The potential of artificial intelligence, as described in both scientific publications and works of fiction, gives rise to fear that machines will take decisions out of human hands, that it will erode individuals' rights and that it will expose people to manipulation to the detriment of their rights and freedoms. The massive quantity of data collected and processed daily raises major concerns over confidentiality, privacy, and the reproduction of discriminatory practices and stereotypes.

Draft recommendations

The draft recommendation establishes a number of over-arching concepts:

- Proportionality: AI technologies must not exceed what is necessary to achieve legitimate aims or objectives.
- Human oversight and determination: humans are ethically and legally responsible for all stages in the life-cycle of AI systems.
- Stewardship of the environment and peace: throughout their life-cycle, AI systems must contribute to the peaceful interconnectedness of all living creatures with each other and respect the natural environment.
- Gender-inclusion: AI technologies must not reproduce the gender inequalities found in the real world, notably with regard to salaries, representation, access, and stereotyping.

UNESCO will assist governments and civil society players (corporations, members of the public etc.) in developing concrete awareness-raising campaigns and ethical impact assessment tools for AI in all fields. Beyond wishing to establish international consensus on the subject, UNESCO's experts urge Member States and AI players further to raise public awareness and stress that is important for everyone to be made aware of their digital rights. **EP&T**

STEPHEN LAW
Editor | slaw@ept.ca

Connect with EP&T magazine

@EPTmagazine facebook.com/EPTmag/ /ept-magazine info@ept.ca ept.ca

EP&T
ELECTRONIC PRODUCTS & TECHNOLOGY
Canada's information leader for electronic engineers and designers

OCTOBER 2020
Volume 42, Number 7

EDITOR Stephen Law
slaw@ept.ca · (416) 510-5208

WEST COAST CORRESPONDENT
Sohail Kamal · sohail@nextgear.ca

SENIOR PUBLISHER Scott Atkinson
satkinson@ept.ca · (416) 510-5207

MEDIA SALES MANAGER Jason Bauer
jbauer@ept.ca · 416-510-6797

ACCOUNT MANAGER Joanna Malivoire
jmalivoire@ept.ca · direct 866-868-7089

MEDIA DESIGNER Mark Ryan
mryan@annexbusinessmedia.com

CIRCULATION MANAGER Anita Madden
amadden@annexbusinessmedia.com
416-510-5183

ACCOUNT COORDINATOR Shannon Drumm
sdrumm@annexbusinessmedia.com

COO Scott Jamieson
sjamieson@annesbusinessmedia.com

EP&T is published eight times per year by
ANNEX BUSINESS MEDIA
111 Gordon Baker Road
Suite 400
Toronto, ON M2H 3R1
Tel (416) 442-5600
Fax (416) 510-5134
www.annexweb.com

SUBSCRIPTION RATES
Canada – $58.50 one year;
$94.00 two years
USA – $134.00 (CAD) per year
International – $183.50 (CAD) per year
Single copy – Canada $15

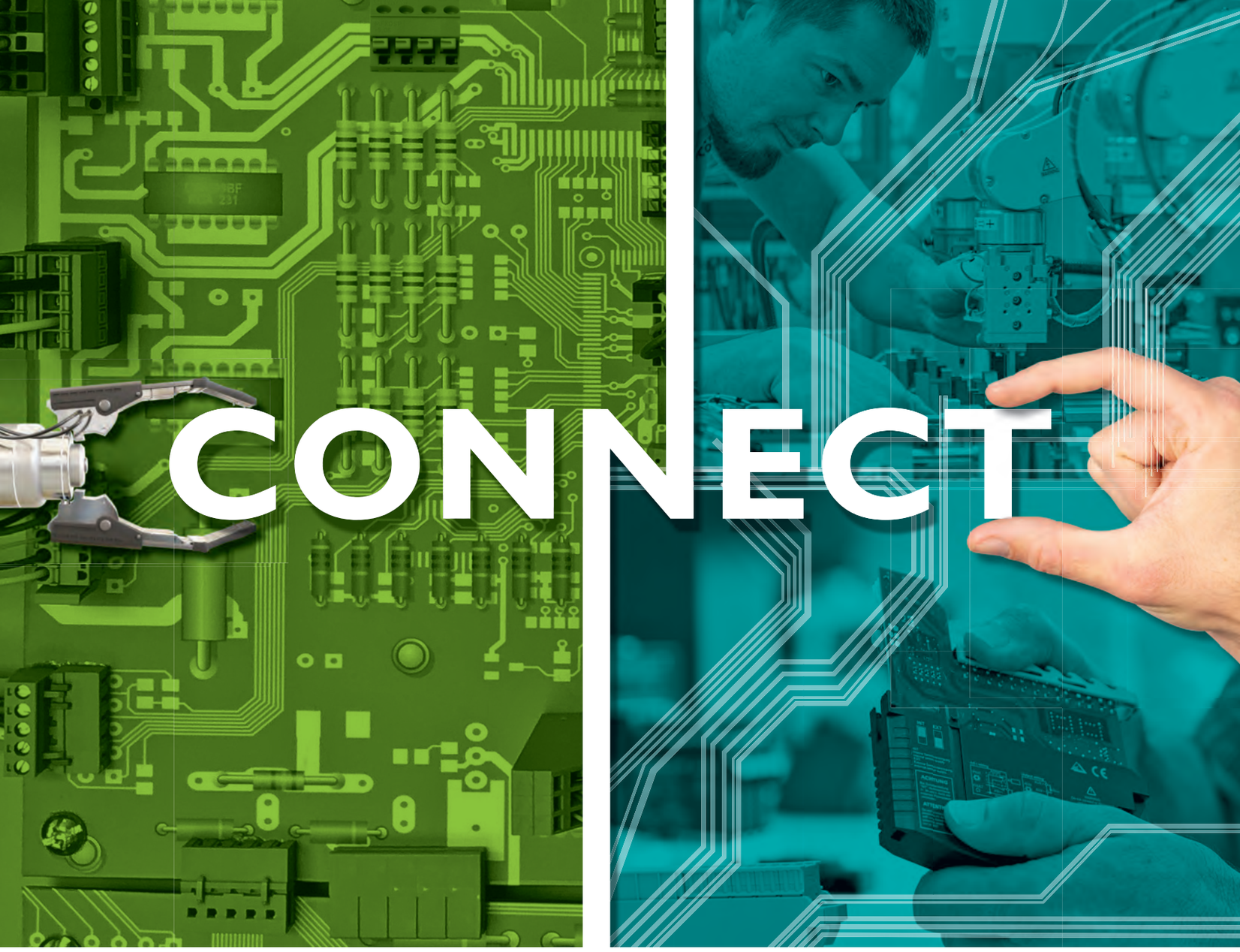
CIRCULATION
amadden@annexbusinessmedia.com
Tel: 416-510-5183
Fax: 416-510-6875 or 416-442-2191

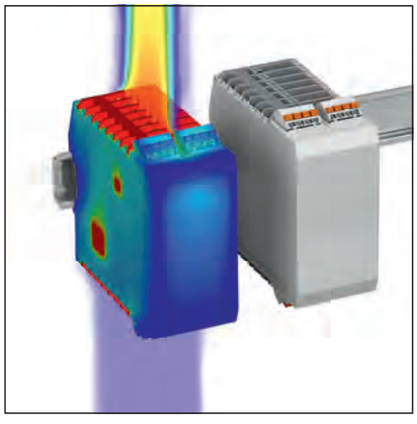
ISSN 0708-4366 (print)
ISSN 1923-3701 (digital)

PUB. MAIL AGREEMENT NO. 40065710
Return undeliverable Canadian addresses to: EP&T Circulation Department,
111 Gordon Baker Rd. Suite 400,
Toronto, ON M2H 3R1

PRINTED IN CANADA

Funded by the Government of Canada | Canada





When technology and expertise come together

Phoenix Contact's expertise spans a wide range of applications so that you can make power, control, and network connections with absolute confidence. ICS modular electronics housings are ready for IoT devices of tomorrow with graduated sizes, variable connection technology, and optional DIN rail connectors. The ICS 50 series features passive heatsinks to protect devices used in thermally demanding applications. By performing extensive thermal simulations, Phoenix Contact supports you in optimizing your printed circuit board layout. No matter the application, you can trust Phoenix Contact for consistent quality, reliability, and high performance – every time.

CONNECT
WITH CONFIDENCE

www.phoenixcontact.ca/ics

PHOENIX CONTACT
INSPIRING INNOVATIONS

NEWSWATCH

TRADE SHOWS

ELECTRONICA 2020 TO BE HELD VIRTUALLY

The world's leading trade fair and conference for electronics - Messe München - will organize as a virtual event this year. The current travel restrictions in Europe have required a re-thinking of planning.

The digital format for electronica in November will give exhibitors the opportunity to book digital trade fair booths. electronica virtual will also provide all customers additional ways to interact and network. A large portion of the conference and supporting program will also be available digitally.

The virtual format of electronica will provide a platform for global industry discussions. Its opportunities will include virtual trade fair booths, which will enable exhibitors to continue to communicate with their international customers and sell them on their products and solutions. The virtual event will be complemented by a digital conference and supporting program. Individual talks and panel discussions on trend topics like the automotive industry, embedded systems, IIoT, 5G, medical electronics and smart energy will be available online.

The electronica trade fair will be held in a virtual format.

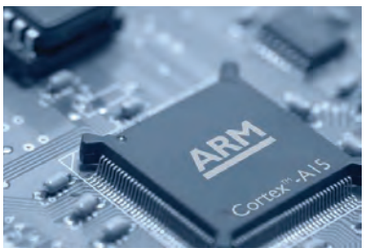
SEMICONDUCTORS

NVIDIA'S ARM DEAL TO SHAKE-UP SEMI SECTOR

The semiconductor sector will likely not be the same following the news that Nvidia is to buy UK chipmaker Arm for $40-billion, according to Snigdha Parida, thematic research analyst at GlobalData, a leading data and analytics company.

"The combination of Nvidia's artificial intelligence (AI) and autonomous driving chips and Arm's mobile-friendly CPU ecosystem will shake up the semiconductor sector," says Parida. "Nvidia will control the world's most popular CPU architecture and become a leading provider of chips for AI, mobile, and the Internet of Things (IoT), three of the most significant tech themes. It will increase the pressure on market leaders such as Intel, which currently sits at the top of GlobalData's Semiconductor Thematic Ranking."

Parida states that Intel's lead is based on the breadth of its product range, including memory chips, which account for over 20% of the overall semiconductor market, and its financial strength. Intel currently scores better than Nvidia in the data center, 5G, IoT, Industrial Internet, and high-performance computing themes. Nvidia's acquisition of Arm offers it the opportunity to sharpen its attack in data centers and reduce Intel's gap at the top of GlobalData's Semiconductor Thematic Ranking.



Nvidia's recent purchase of UK-based chip maker ARM could 'shake up' the semiconductor sector.

IOT

GEOTAB ACHIEVES FEDRAMP AUTHORIZATION

Geotab Inc., Oakville ON-based leader in IoT and connected transportation, has achieved full Federal Risk and Authorization Management Program (FedRAMP) authorization for its cloud-based telematics platform. With a standing reputation as the chosen solution provider for all levels of government across North America, Geotab's FedRAMP status validates the organization's ability to meet stringent security requirements set forth by the U.S. federal government and enables Geotab to offer its fleet management products and services to the General Services Administration (GSA) and other federal, state and local government agencies.

"FedRAMP authorization helps to solidify Geotab's position as a leader not only in telematics, but in the IoT space at large. Today, Geotab becomes a member of an exclusive list of innovative organizations who have made a similar commitment to ensuring their customers have access to the most reliable and secure solutions possible," stated Jean Pilon-Bignell, Geotab's VP of biz dev, government & smart city.

In March 2019, Geotab was awarded the world's largest single-source telematics contract by the GSA Fleet, a division of GSA (General Services Administration), which provides centralized procurement for U.S. federal agencies. As part of this award, Geotab embarked on the quest to achieve FedRAMP certification, a government-wide program that provides a standardized approach to security assessment, authorization and continuous monitoring for cloud products and services.

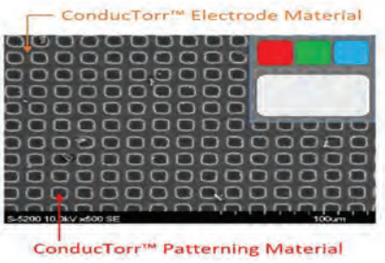
With the full FedRAMP certification, Geotab has received an Authority to Operate (ATO) from the GSA, making Geotab's products and services available across the federal fleet and allowing other government agencies to leverage Geotab's services through the contract.

Geotab achieved FedRAMP approval for its Cloud-based telematics platform

OPTOELECTRONICS

OTI LUMIONICS UNVEILS ADVANCED DISPLAY MATERIALS

OTI Lumionics, Toronto-based developer of advanced materials for OLED displays, recently unveiled its latest version of ConducTorr Cathode Patterning Material (CPM, which is ready for mass production and will start shipping to display customers later this year. The material is for use in next gen mobile devices, with under display camera and face unlock.



"The challenge in making under display camera and face unlock work is that the cathode layer, a thin layer of metal that covers the entire surface of the display, absorbs a lot of light, particularly in the wavelength range required for the face unlock sensors to function," said Michael Helander, co-founder & CEO, OTI Lumionics.

"Our ConducTorr CPM materials are the only mass production-ready solution to pattern microscopic holes in the cathode to let enough light through for the under display camera and face unlock to function well."

OTI Lumionics also recently

Photo: electronica; ARM; OTI Lumionics

received a strategic investment from LG Technology Ventures – the venture capital investment arm of LG Group. This investment will be used to help accelerate the adoption of OTI's materials in mass production, including its ConducTorr CPM solution for under display cameras.

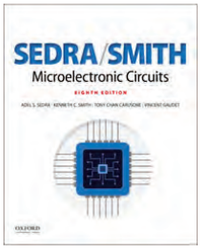
EDUCATION

CLASSIC ELECTRONICS TEXTBOOK GOES DIGITAL

Nearly 40 years ago, the University of Toronto's Adel Sedra and K.C. Smith – both engineering professors at the time – launched what would become the classic introductory textbook for students and instructors of electronics, selling more than one million copies.

Now, the eighth edition of the text is being made available as an enhanced e-book, making it ideally suited for virtual course delivery in the era of COVID-19.

Microelectronic Circuits, known simply to students and instructors in the Faculty of Applied Science & Engineering as 'Sedra/Smith,' was revolutionary when it first appeared in the early 1980s. To that point, the study of electronics had begun with first principles, a bottom-up approach.



"Sedra/Smith was the first book to say, if we're really going to take full advantage of this new technology, we can't be starting from ground zero all the time," says Tony Chan Carusone, a professor in the Edward S. Rogers Sr. department of electrical and computer engineering and one of the new edition's four authors.

"You don't have to think in binary digits every time you sit down to write code. Similarly, you don't have to think about electrons every time you design a circuit."

Sedra/Smith's reputation as the go-to textbook was further cemented by the richness of its problems and the expressiveness of its prose. The sustained effort to keep it up to date, with new editions every five years, meant that even an instructor from outside the field could step in and find everything they need.

Today, the book has sold more than one million copies and has been translated into 11 different languages.

AI

MFG SUPERCLUSTER SUPPORTS TECH PROJECTS

Next Generation Manufacturing Canada (NGen), an industry-led organization leading Canada's Advanced Manufacturing Supercluster, continues to support industry-led manufacturing projects in Canada with a collaborative funding effort totaling almost $9-million to support three projects.

Among the projects selected by a panel of independent experts included artificial intelligence imaging sensors from AiimSense Inc. and industrial partner SorenaTech Corp. which are developing a prototype for a portable brain scanner based on electromagnetic imaging and artificial intelligence that will allow for the diagnosis of stroke faster and earlier than is currently possible.

"There are various applications of electromagnetic imaging for medical diagnosis. Developing this cutting-edge technology will position Canada among the global leaders in the fast-paced growing med-tech sector," says Atefeh Zarabadi, CEO, AiimSense. "There are also opportunities to apply the knowledge and technology gained in this project to other medical and non-medical applications."

"The projects that NGen continues to support are transforming Canada's advanced manufacturing sector," adds Jayson Myers, CEO, NGen.

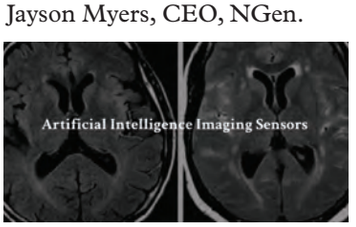


Photo: University of Toronto; NGen

Amii leverages scientific expertise in AI

Alberta group helps increase AI adoption & drive economic improvement

The amount of data that is generated today, by both humans and machines, outpaces our ability to interpret and use the data. To maximize productivity, complex decisions are made faster than ever before, and increasingly, researchers, agencies, and companies are turning to machines to help with decision making.

Artificial Intelligence (AI) and Machine Learning (ML) continue to garner foreign direct investment. AI development is emerging in focused hubs, specifically Toronto's Vector Institute, Montreal's Mila, and the Alberta Machine Intelligence Institute (Amii) in Edmonton.

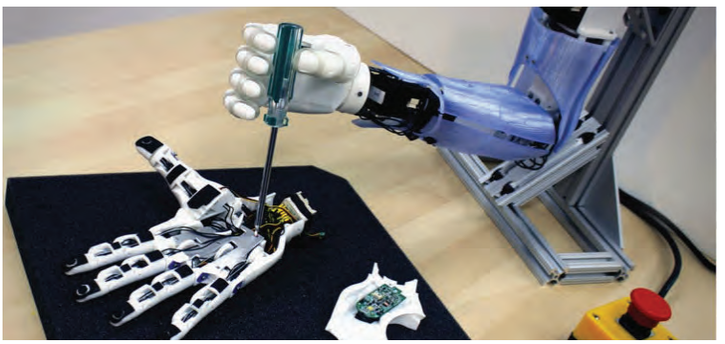
West Coast Report recently had the opportunity to interview Cam Linke, CEO of Edmonton's Amii, to find out how the group inspires world-changing machine intelligence for good. He details how this leads to sustainable growth for Alberta's economy, and what role it plays in research, advisement and education.

Amii CEO Cam Linke.

Initiated in 2002, Amii is a 30 employee non-profit organization that was originally launched as the Alberta Ingenuity Centre for Machine Learning (AICML). It was a joint effort of the Government of Alberta and the University of Alberta, founded by four U of Alberta researchers.

"We had the goal of creating a world-class research centre for AI and machine learning," says Linke.

Thanks to the forward-thinking investments of Amii partners, the gorup soon attracted top AI talent from around the world, including noteable players: Richard Sutton, Michael Bowling, Dale Schuurmans, Csaba Szepesvári – among others.



HANDi Hand is a creation from BLINC Lab and Amii in Edmonton.

"We now have 26 primary researchers, who collectively supervise over 100 early-stage researchers," Linke adds.

Amii recently received $5-million in funding from the Province of Alberta to develop a program to reduce emissions using AI which will task them to optimize oil and gas production while minimizing emissions.

Attract top global talent

"With significant amounts of data accumulated from years upon years of conventional operations, AI is poised to provide end-to-end optimization for the oil and gas value chain - from efficient extraction and predictive maintenance to emissions reduction," explains Linke. In areas such as agriculture, farmers can now use AI and ML to analyze a variety of factors in real-time to increase productivity, identify problems and create forecasts to protect and increase yield, resulting in greater profitability. As a proficiency advocate, Amii focuses on leveraging their scientific expertise to help businesses and other organizations develop in-house AI capabilities. This leads to increased AI adoption, which helps to drive large-scale economic improvement as partners gain competitive advantages that come from AI adoption.

AI management course

The group also received funding to lead an AI management course created for non-technical people who need to understand the use and implications of machine learning within an organizational context. It has also enjoyed a close relationship with the University of Alberta, the home base for their Fellows. And, they have had their share of success.

"We advance the frontiers of AI – solving checkers, launching the Arcade Learning Environment, and producing foundational algorithms that power research around the world," explains Linke. "We have created leading-edge applications of machine learning – from intelligent prosthetic limbs to competition-winning legal reasoning software and diagnostic tools for physical and mental health."

Other examples include working with Okaki, a health analytics company that helps the medical community predict opioid overdoses, and DeepStack, the first AI to beat human professionals at heads-up no-limit Texas hold'em poker. Alberta has benefitted from early and long-term investments on AI and Machine Learning, leading to an impressive talent pool.

"Our province was investing in AI at the University of Alberta at a time when AI wasn't as in-vogue as it currently is. We started in 2002, when MSN Search was still the top search engine, and Facebook didn't exist yet," says Linke.

This early mover advantage has led to advantages for research groups and businesses looking to secure world-leading talent. Further to this, access to talent and expertise is probably the greatest challenge facing any organization interested in leveraging the power of AI. There is fierce competition for talent around the world, and organizations showing a willingness to invest in AI and innovation are ahead of the game in being able to secure top talent.

Power of community

"That's how Amii overcomes the challenge of attracting talent," he says. "We invest in our people and give them opportunities to grow their skills, to engage with our collaborative research community and to tackle interesting challenges through research and industry engagement," notes Linke, suggesting that companies should never underestimate the power of community.

"A supportive and collaborative community has always been foundational to our success at Amii, and it's what has enabled Alberta to become a hotspot for AI research and development. Amii is committed to inspiring world-changing machine intelligence for good and for all," he concludes.

To learn more on this Edmonton based AI group visit www.amii.ca. **EP&T**

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

Photo: Credit tk here

Are Your Cords Lost at Sea?

Let Interpower® Navigate Quarantines & Restrictions

Don't let your cords sit inside a warehouse on some overseas wharf. Interpower's state-of-the-art North American cords & cord sets fly past global quarantines and slowdowns. These U.S.A.-made power cords are customizable—lengths, colors, labels—to *your* specifications. All Interpower cords are tested in both design and production phases.

With 1-Week Lead-Times and no minimum order or dollar requirements, Interpower helps you design for global markets providing the end user with correct connections to the local mains power supply. Whether 1 cord or 5,000, Interpower provides customized solutions. Interpower remains unaffected by shipping delays due to overseas quarantines and slowdowns. Interpower constantly assesses ways to keep client production schedules streamlined—**and we never cut corners on quality**.

Let Interpower Connect You to the World

- 1-Week Manufacturing Lead-Times
- Same Day Shipping on In-stock Products
- No Minimum Order or Dollar Requirements
- Blanket and Scheduled Orders Available
- Rigorously Tested Cords & Cord Sets
- Value-Added Options Available
- Free Technical Support

Order Online! **www.interpower.com**

Business Hours: 7 a.m.–6 p.m. Central Time

interpower®

INTERPOWER | P.O. Box 115 | 100 Interpower Ave | Oskaloosa, IA 52577 | Toll-Free Phone: (800) 662-2290 | Toll-Free Fax: (800) 645-5360 | sales@interpower.com

Can AI outdesign you?

Creating products grounded in originality, empathy and responsibility

BY HEBA MALAEB & AFSHIN MEHIN, WOKE STUDIOS

This article is adapted from a talk that Woke Studio's founder, Afshin Mehin, gave at the Interior Design Show Conference in Toronto this past January. The topic was 'Disruptive Technologies in Design.' Mehin spoke about AI and how it will impact the creative process and makeup of design studios as we look towards the future.

Over the past decade, we have witnessed major advancements in artificial intelligence technology; some would say the decade's most defining development was the rapid rise and evolution of AI.

As it becomes more and more ubiquitous, AI is transforming various aspects of everyday life – from the healthcare industry to the highly personal act of listening to music. As a design studio, we are focused on turning visionary technology into beloved products and services. Which means we are always deep in thought about the changes we will need to adapt to, whether that's in meeting our users' evolving needs, or in adapting our design process to the huge technological strides we're witnessing today, with AI or otherwise.

AI today

'AI' is an umbrella term that describes the ability of a computer to make predictions based on patterns and relationships that it automatically discovers in data.

The quantum leap in progress AI has seen in recent years can be attributed to three main factors:

1) a huge increase in the amounts of data used for training AI;
2) improvements made around deep learning algorithms, which allow computers to filter information in layers;
3) much more pxowerful hardware that allows for faster progress, and widens the possibilities for both testing and application.

What AI can and can't do

In 2018, the UK-based company DeepMind built AlphaGo, an AI designed to play the 2,500-year old board game Go. AlphaGo ended up defeating the world champion, Lee Sedol – something that AI experts had previously thought would not be possible for at least another decade, because Go is such a complex game (the moves in Go outnumber the atoms in the universe). AlphaGo won the game by performing a move early on, Move 37 specifically, that employed a completely different type of intelligence than that typically practiced by humans – stunning both the researchers and the AI's opponent.

Like in the case of playing Go, AI has proven to be extremely adept at learning complex tasks that have very clear and identifiable goals. Solving these hyper-specific problems requires narrow intelligence – a highly specialized skill set that applies to highly specialized use-cases. But as good as AI is at specific and complex activities, it lacks the ability to perform in other capacities: it's bad at metaphors, concepts, creativity, and imagination.

This means that AI will be less like a sentient being that performs diverse and general tasks, and more like an appliance – something that does one thing really well. As a result, it will be the type of technology that will be ubiquitous not as a new product, but through powering a lot of existing products and systems that can be made better with AI.

Woke Studios' industrial design was on full display with its contribution to creating a surgical robot for Elon Musk's Neuralink venture.

AI in the studio

Though hearing about artificial intelligence might arouse anxieties in some ("Will we have a job in 10 years?"), and rightly so, design might have less to fear than other fields. While a game of Go has a clear goal and a very narrow set of constraints, the process of design more often than not involves answering multilayered questions in a way that requires having a holistic – and human – perspective of a problem. Think of all the conditions that define the design of a successful public library, or a motorcycle, or even the design of a pair of shoes. AI, with its narrow intelligence, can't come up with the creative, big-picture thinking we employ all the time to tie things together in the design process.

To counterbalance the skills of AI, designers more and more will have to become generalists – or, as Kristian Simsarian put it, "As designers we will need to be more 'Verby' and less 'Nouny'." So at the end of the day, if what we're in charge of is coming up with the big idea, then the best thing AI can offer is to play a supporting role in our process. Ergo, the AI design intern.

New interns, roles

AI technology can be applied towards everything from the most mundane tasks, to more

Photo: Woke Studios

collaborative, generative work. Recognizing this, companies like Google, Adobe, and Autodesk are working to develop AI resources that can respond to designers' specific needs – whether that's smart image editing tools or parametric modeling softwares. These new tools effectively act as 'interns' – playing a supportive role in the creative process, and growing with time and experience.

Like any design intern, an AI intern will need to be trained and guided. After hiring an intern, you get acquainted with their skill set and work ethic by assigning them basic tasks like renaming files, color-correcting photos, cleaning up sketches, or touching up images. And it's precisely these tasks that are perfect for an AI to do. This is something that Adobe has made some great progress on with Adobe Sensei, an AI product designed to take tedious tasks off designers' hands.

After the AI intern is trained to complete straightforward tasks, it could start taking on increased responsibility, and more creative roles. AI's way with images makes it a great candidate for creating mood boards based on keywords or reference images; over time, the designer can teach it to return results that align with their creative vision. Another way AI can act as a creative collaborator is through generative design, where you teach the AI the constraints of a problem you're trying to solve, and it returns a breadth of options that fit the brief. We can see a recent example of this in Philippe Starck's AI chair for Kartell.

Photo: Woke Studios

Neuralink surgical robot was created in collaboration with the industrial design team at Woke Studios. The robot can perform an extraordinarily complex surgical procedure of implanting neural threads safely into the brain.

Having the reliable and personalized support of an AI intern could free up time, space, and mental energy for deeper creative processes. A great quote on the potential for AI to empower designers was from Josh Lovejoy, head of ethics and Society at Microsoft: "The role of AI shouldn't be to find the needle in the haystack but to instead to clear as much hay as possible so we can better find the needle ourselves."

Humans in design?

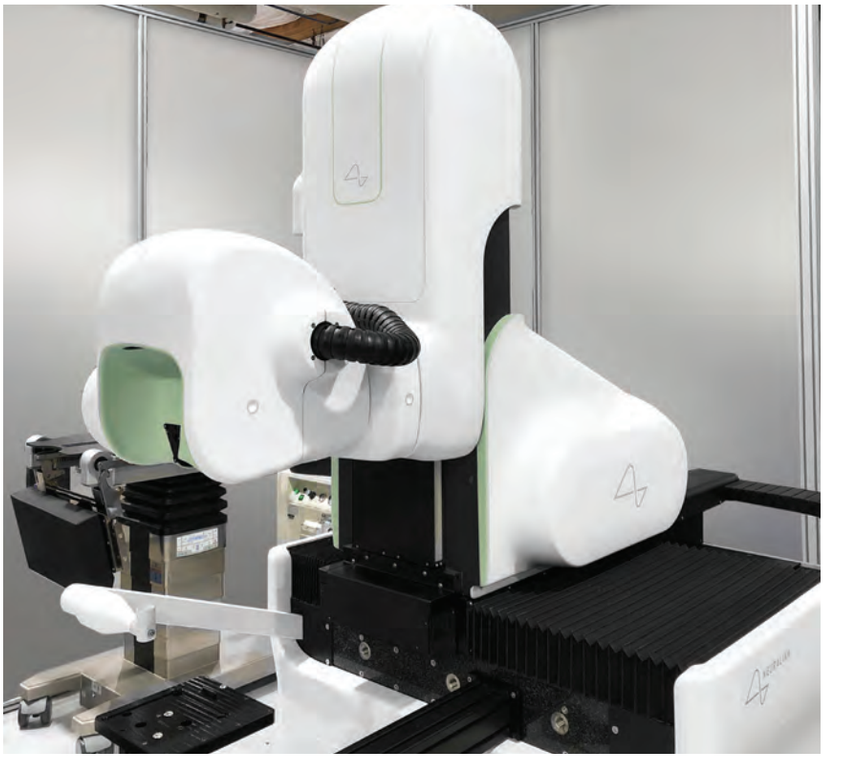
The good news is that this does not mean that living, breathing interns will be obsolete. The roles of an intern are directly related to the roles of their mentor, and the focus of the design studio. This means that with a redistribution of responsibilities between AI and designers, human interns can get increased opportunities to be involved in the creative process itself. This creates the conditions for maximum creative output, or at the very least, a good environment for a consistent and more diversified creative flow.

In a collaborative environment like a design consultancy, and especially at WOKE, the human conversation is paramount to the design process. We are constantly trying to create products grounded in originality, empathy, and responsibility. Just as we can adapt to AI's inevitable and evolving role in our industry, we can adapt AI as a tool that helps us continue to reflect and support our fundamental principles.

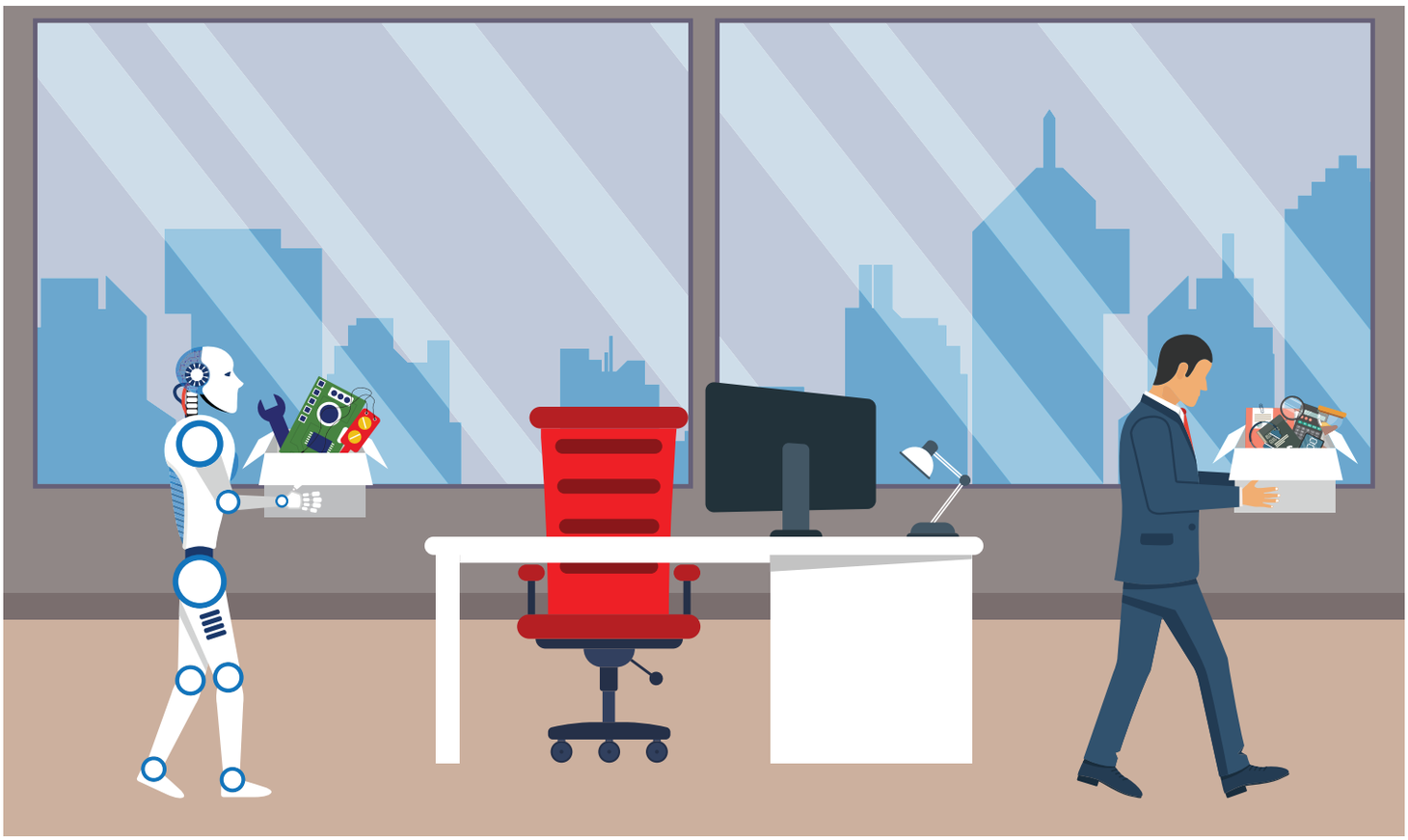
In conclusion, the future is bright and exciting. As designers we'll grow to be more like conductors of an orchestra than sculptors shaping clay ourselves. We'll be more focused on defining a good question than on the process of carrying out the task itself. After all, is there anything more human than asking a good question? **EP&T**

The Neuralink engineering team built this robot and worked with Woke on the industrial design for use in clinical settings, as well as the aesthetic design that would comfort potential patients.

Founded in 2013 by Iranian-American designer Afshin Mehin, Vancouver-based Woke Studios is a futurist-led design studio working at the convergence of industrial and experience design. https://woke.co



The robot can be divided into three parts - including the head, which holds the needle that performs the operation. This piece guides the surgical needle, and is home to a plethora of cameras and sensors to perfectly capture the entire brain.



Implementing AI into hardware designs

4 Key steps engineers can take when deploying artificial intelligence. **BY CHRIS CATTERTON, DIRECTOR OF SOLUTION ENGINEERING, ONE TECH INC.**

Artificial intelligence (AI) is becoming increasingly used within our personal or consumer devices, such as smartphones, digital assistants, even automobiles. For example, Gartner predicts that by 2022, 80 percent of smartphones shipped will have on-device AI capabilities, up from 10 percent in 2017. These capabilities include features such as 'digital me's' that make the smartphones an extension of the user, user authentication, natural-language processing and more.

But it's the more 'durable' home goods that may receive a bigger boost from AI. While consumers expect their smartphone to last two to three years before they upgrade, they expect appliances such as washers and dryers, refrigerators and dishwashers to last seven to 10 years—or more. It's here where the asset performance management (APM) side of AI pays big dividends. APM systems use AI to monitor device health, improving the reliability of physical assets while minimizing risk and reducing costs. According to Arc Advisory Group, APM solutions typically include "condition monitoring, predictive maintenance, asset integrity management, reliability-centered maintenance, and often involves technologies such as asset health data collection, visualization, and analytics."

Raw sensor values

On all consumer appliances, energy draw is a good indicator of machine health—when energy use is trending upwards, it's trending toward failure. AI systems can listen to bearings, belts, pulleys and other components to get more specific data on what's failing—before it fails.

Engineers have several paths they can take when it comes to deploying AI on this type of consumer equipment and each has its own sets of benefits and challenges. A key benefit of deploying and specifically training AI locally on the asset, is that the raw sensor values that are generated from the equipment can be processed locally, and only transmitted to the cloud when a sign of failure or anomaly is detected with that asset. Without diagnostics powered by AI, owners of such goods may experience a shorter asset lifecycle, increased maintenance costs and unexpected failures.

For simplicity's sake, let's walk through the end-to-end process for installing AI on one type of device—a washing machine.

1) Installing AI

a. Direct install on the device. Adding AI to a washing machine could be as simple as downloading an applet using firmware over the air (FOTA) or another means. Many carriers use lightweight M2M (LWM2M), allowing the AI package to be uploaded to the LWM2M server and having it spider out to all applicable devices to reside on. Another possible implementation of AI on this consumer appliance would be building AI into the MCU that is embedded within the asset itself. When the machine is powered on for the first time, the machine learning engine goes through a training period to form a behavioral profile for the asset. Once sufficient data has passed through the machine learning engine, alerts/notifications are sent out when signs of failure and anomalies are detected. These alerts can then be passed to the asset OEM for further analysis.

Photo: Timplaru Ovidiu / Getty Image

b. Add-on to the device. The biggest challenge design engineers face in all AI projects is space. AI clients have shrunk in size, but there are still devices that cannot accommodate them. In these cases, design engineers may need to bolt on a separate device containing sensors to gain the benefits of AI for the washing machine. Such benefits include optimal asset performance, improved reliability, improved predictability, and more. Another example where there may not be enough space is in the automotive industry, where vehicle manufacturers need to make sure any AI solution fits into their telematics control unit (TCU) or be bolted on separately in an aftermarket scenario.

2) Developing training models. Many of today's washing machine models have at least basic AI capabilities. For example, if a washing machine has a controller monitoring the belt and the motor, adding more AI capabilities could be as easy as piping into that already onboard controller and seeing what additional data can be derived from it. Training at the endpoint itself rather than in the cloud allows the training to account for the machine's environment.

For instance, is it an area of high humidity where one washing machine may operate differently than another in a drier area? Creating specific training models for each washing machine allows the manufacturer or carrier to spot trends across machines, as well. For example, if X happens to Machine A, and it's similar to what happened with Machine B under similar circumstances, AI can help solve problems more quickly.

3) Determining who is in control. Once AI systems are installed and data is being pumped to an onboard applet, the next step is determining where that data should be sent. If an AI system prompts an alert that some measurement of the washing machine functionality is outside of normal parameters, who should receive that alert? Should it be sent to the owner's smart home portal? To the manufacturer? To the carrier? To all three? Understanding "who owns the data" is a critically important piece of the AI process for consumer goods.

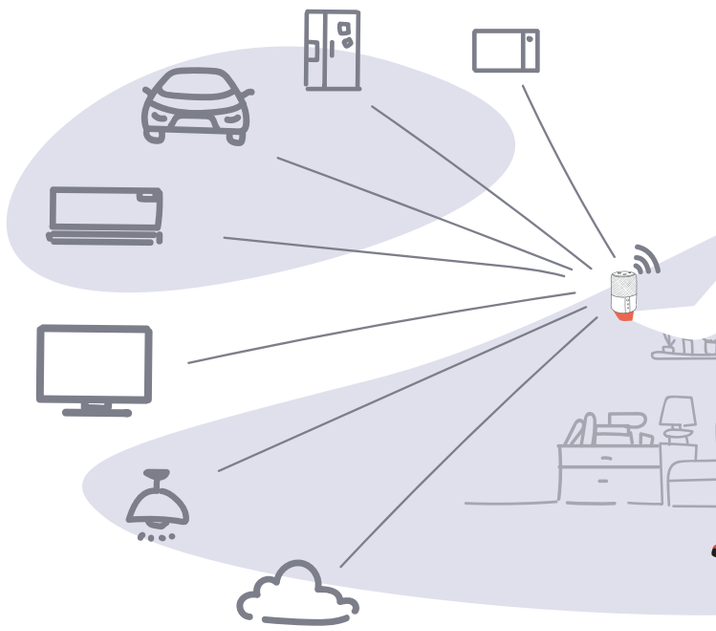
4) Understanding what data is missing for a use case. Manufacturers usually do a good job of incorporating of all the things that could be measured, but can often miss some outlying data. Using the washing machine example, the machine likely measures all things associated with water. However, in some environments where wear and tear is more likely, it may not be soon enough to detect water before a leak happens. If the machine also detected humidity, it could prevent a leak before it happens, saving time and money.

From washing machines to under-the-sink water filters to automobiles, consumer goods are getting smarter every day. For the designers and engineers at the manufacturers of consumer goods, the sky is the limit in terms of what can be measured, processed and reported via AI solutions. The more they can build into their products, the performance of the product will benefit and the customer experience will improve. **EP&T**

Chris Catterton *is director of solution engineering at ONE Tech. He has over 10 years of experience deploying global enterprise software solutions - primarily in the space of Industrial IoT, business process automation and AI. https://www.onetech.ai/en*

The rise of voice AI-enabled hardware

Speech recognition operates fully offline, embedded on low-footprint consumer device hardware **BY PROBAL LALA, CHIEF EXECUTIVE OFFICER, FLUENT.AI INC.**



The development and evolution of voice recognition artificial intelligence has led to a proliferation of devices in everyday life that can be controlled by voice. Everything from wearable fitness trackers and wireless earbuds to microwaves, refrigerators and robot vacuum cleaners have been equipped with voice recognition capabilities.

These use cases for voice recognition are increasingly shifting from cloud-based to offline, embedded speech recognition on various types of hardware, from low-footprint microcontrollers to powerful AI chips. As a testament to this proliferation of voice-controlled devices, the entire speech and voice recognition industry is expected to grow to $21.5B USD in 2024 at a CAGR of 19.18%, of which embedded/offline speech and voice recognition is expected to grow at the highest CAGR.

Speech recognition technologies such as Amazon's Alexa and Google Assistant operate in the cloud following the traditional two-step process: first, the user's speech is transcribed into text, then Natural Language Processing (NLP) is applied to the text in order to derive meaning. This type of approach gives the benefit of voice searching anything over the Internet. However, it also generates concerns about consumer privacy and presents limitations in terms of language and accent support, and the need for an Internet connection in order to use these technologies. For these reasons, market demand has been growing for more secure, offline speech recognition. A handful of speech recognition technology providers, such as Montreal-based Fluent.ai, have undertaken to fill this market gap by developing speech recognition technologies that can operate fully offline, embedded on low-footprint consumer device hardware.

The proliferation of IoT devices that are putting consumer privacy at the centre of design benefit from an offline voice recognition solution, which in addition to being private-by-design, also offer the benefits of lower latency, minimal power consumption and relatively low cost – all factors that are driving today's consumer device hardware design. By eliminating the cloud computing requirements of traditional voice recognition technologies, offline, embedded speech recognition solutions have minimal power and storage requirements, enabling them to work on low-footprint systems such as Arm Cortex-M series of microcontrollers. On the other side of the spectrum, powerful AI chips are increasingly looking to edge-based voice recognition and other edge AI capabilities for the same reasons of data privacy, low latency and power efficiency.

Small footprint AI systems

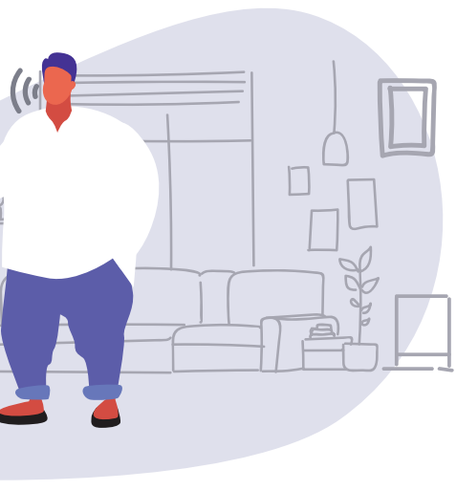
AI technologies by their very nature consume a significant amount of compute power and are therefore typically better suited for the Cloud. Several software companies have tackled the problem of developing small footprint AI systems that can be compiled and run in embedded systems using Tiny Machine Learning (TinyML). The increased development of AI technologies including voice recognition, and the growing demand for secure, edge-based solutions offer an opportunity for hardware companies to implement these technologies into their designs.

Voice recognition software providers offer a variety of solutions, from wake words to trigger a device to turn on without the need to press a button, to voice command recognition – "pause music", or "preheat the oven to 425 degrees" – to voice biometrics and sound recognition. Voice recognition software solutions either come as off-the-shelf SDKs with a generic library of commands to custom solutions tailored for use case, noise environment, and languages and accents to be supported. These features are important as hardware manufacturers increasingly look to expand their reach in overseas markets and target growing sectors for voice recognition such as factory automation, where noise robustness is key.

Small wearable devices are also making the shift from cloud-based to embedded voice user interfaces in order to offer lower-latency and more noise robustness

In the smart home, consumers are beginning to look for alternatives to the market-dominating Alexa and Google Assistant smart home hubs. The scandals involving consumer privacy breaches of these always-connected devices has spurred a growing movement towards offline, embedded and therefore 100% private voice user interfaces. Voice control has been embedded into the home appliances that Alexa and Google previously controlled through the cloud – tiny devices such as light switches can be controlled through voice recognition technology running on small footprint MCUs such as Arm-Cortex M4. The next frontier of voice recognition AI in the home which is already being explored is

Photo: gmast3r / Getty Image



the multi-modal edge AI chip – hardware that can combine voice recognition, image detection and other AI tools in one chip that can be embedded in appliances and other devices all throughout the home, creating a secure, offline smart home ecosystem.

Wake word technologies

Small wearable devices such as fitness trackers and wireless earbuds are also making the shift from cloud-based to embedded voice user interfaces in order to offer lower-latency and more noise robustness for use in outdoor environments. While contemporary wake word technologies operate on low power requirements despite being always-listening, further power saving can be achieved using a push-to-talk set up, where the user would first press the button on their device, then speak a command.

Lastly, factory automation has been another growing area for embedded voice AI. The time savings that come from low-latency, embedded voice control can translate to millions of dollars in savings for manufacturers, and the privacy component of offline voice recognition is important too. Robustness to noise is key in a factory environment, and offline, embedded voice solutions typically perform more accurately in noisy environments when combined with a quality, noise-cancelling microphone front end.

With the continued development and growth of AI capabilities such as voice and image recognition, we expect AI-enabled hardware to proliferate. The very term "artificial intelligence" has set consumer expectations for devices that must perform at a more natural human level in their interactions with users and their environment.

These expectations are driving new technology innovations, whether it be new speech recognition software solutions from Fluent.ai that go directly from acoustic to action, to AI chips that support multimodal understanding.

Certainly, the COVID era we're living in has ushered in growing demand for contactless user interfaces, where voice AI offers a prime solution. EP&T

Fluent.ai Inc. is privately held, founded in 2015 and based in Montreal. Fluent.ai's mission is to voice enable the world's devices. The firm has developed a range of AI voice interface software solutions for OEMs and service providers. http:llfluent.ai EP&T

Probal Lala, *chief executive officer, Fluent.ai Inc.*

NuEnergy.ai leads governance of AI

Artificial Intelligence (AI) is powerful. Trust in AI is critical.

The rapid progress of artificial intelligence (AI) technologies in the last five to 10 years has led many to wonder where it could ultimately take us. From SIRI and self-driving cars to facial recognition technology, AI is progressing rapidly. This revolutionary technology offers numerous opportunities for the advancement of most existing tech platforms, however, while regulations remain – achieving its ethical use ultimately looms as a significant challenge as AI matures.

This is where NuEnergy.ai comes in. The Ottawa-based AI management software and professional services firm partners with governments, technical experts, industry and entrepreneurs to provide solutions that help make AI trustworthy for clients and for global society.

EP&T recently sat down (virtually) with Niraj Bhargava, co-founder and CEO of NuEnergy.ai and asked him to delve into issues relating to governance, ethics and trust. As a Canadian leader in AI governance, NuEnergy.ai is the only company on the Government of Canada AI Source list with its sole focus on the governance of AI. NuEnergy.ai has teamed with the Federal Government on ethical AI guardrails.

With more than 30 years of technology, business creation and leadership experience under his belt, Bhargava has a unique profile of entrepreneurship, corporate business expertise and academia, while holding a degree in systems design engineering from the University of Waterloo and an MBA from the Ivey School of Business. He served as university professor and Dean, and as well as CEO, founder and leader of technology companies focused on energy demand for the smart grid and deep neural network AI/ML technology for high-accuracy voice recognition.

At NuEnergy.ai, Bhargava leads a team of expert associates who work with clients in defining ethical and cutting-edge AI-enabled solutions with innovators in the creation, launch and scale up of AI trust measurement techniques. Here is what he had to share.

Q AI governance is about AI being explainable, transparent, and ethical. How do you ensure those qualities are built into the AI solutions that NuEnergy.ai is supporting for its clients?

A While NuEnergy.ai is qualified to develop algorithms, we have decided to focus our efforts solely on the governance of AI. We act as a third-party partner to make sure AI 'guardrails' are in place for organizations developing, procuring or deploying AI. We do this through education, co-creation of organization-specific frameworks, and monitoring software via our Machine Trust Platform.

There are many use case examples of why AI needs governance. One is facial recognition technology. While AI recognizing faces can be helpful in preventing crimes, for example, some of these technologies have recently been banned in Canada. One of the concerns is that they could be biased based on skin colour – this misstep has had serious repercussions on organizations and citizens, and could have been avoided.

A governance policy needs to exist and interact with the world around it or within the organization it is intended to serve. Who and what bodies should be developing such a governance policy? Who is ultimately accountable?

Every organization has a governance body that is accountable – often that is the Board, and the Board may assign these accountabilities to senior management. While legislation is often required, legislation is often lagging in technology innovations like AI. In 2020, governance bodies need to not only govern people, but also machines. AI now has the ability to influence and augment decisions, as well as continuously learn and perhaps make its own decisions.

It is the responsibility of any governing body to oversee its AI.

NuEnergy.ai describes itself as having a passion for contributing to building an AI-enabled world that everyone can trust.

As an end-consumer, how do I know I can trust your AI solutions?

We provide transparent measurements. NuEnergy.ai advocates measurements against ethical trust questions that are developed by our clients. We facilitate the framework co-creation and measurements using the best known techniques that are open, auditable and transparent.

Niraj Bhargava, CEO, NuEnergy.ai

As AI becomes increasingly prevalent in more and more tech devices, how do consumers safeguard themselves from 'bad' AI?

Be demanding to their suppliers and be selective of those you trust. Look for transparency and informed consent. Encourage third-party standards and measurements.

> ***"If you can't measure the trust level of AI, you can't manage it"***

How can makers of electronic devices who incorporate AI into their designs ensure that it is developed and marketed ethically?

NuEnergy.ai and others are not only helping develop standards but also some common measures and Trust Index questions. NuEnergy.ai can provide a transparent trust index to measure and monitor the AI. Further, I add that electronics sensors and the Internet of Things often create devices that gather data without being fully informed on how the data is used. Transparency from electronics customers will become more important to safeguard those creating electronic devices.

How big a role does training and education of AI use play in its acceptance and eventual global adoption?

Very important. There has been a high level of interest in NuEnergy's AI Governance Education Series. In 2020 and beyond, no one should develop or deploy AI without organizational training and frameworks for ethical checks and balances.

We most recently delivered a novel program to Transport Canada where over 50 senior leaders were educated on the need for governance and how to

Photo: NuEnergy.ai

create an ethical roadmap for the organization as they transport people and goods across the country and globally.

Describe how NuEnergy.ai is helping the world put on "ethical guardrails" amidst the rapid change that AI is bringing about?
We recommend and facilitate
1) Custom education programs;
2) Organization specific AI governance frameworks;
3) Configurable measurement software. If you don't measure AI, you cannot manage AI.

More than ever, organizations are using artificial intelligence to customize and prioritize their business and commercial actions. While the public and the average consumer is getting used to the idea of AI making impact on their everyday transactions, it is taking a wide form of the public attention as well. The latest developments regarding facial recognition technology for policing, contact tracing tech (Covid-19), virtual health care, use of AI in financial sector (i.e. to administer loan applications) and autonomous vehicles are front and center in society today.

Unfortunately, even obvious ethical failures in AI have not fully embedded the need to govern AI from the perspective of the developer or deployer of such technologies. So whose problem is this anyway?
The debate on whose responsibility it is to worry about risks of AI is taking place in many boardrooms by many board directors today, as well as government bodies. Do we need strong regulations by our governments to manage the risks of AI? Or do we allow manufacturers and creators of AI to self-govern on the areas of transparency, bias, explainability and safety? How does the average company deploying innovative tech/AI tackle such a problem? Who is accountable for the impact of rogue or opaque AI that damages societal risks, or even causes harm to citizens?

The task of governing AI can seem daunting and requires unique frameworks and resourcing. Unfortunately, most companies wait for a crisis to get this right, and often risk losing their reputation and public trust as a result of ethical failures in AI. A recent example related to facial recognition AI has turned this useful technology upside down. Government of Canada has recently stopped use of Clearview AI facial recognition technology, with the giant tech companies (IBM, Amazon and Microsoft) stopping development of this tool altogether.

Governments need to start playing a pivotal role in AI governance. Most notably Canada and a handful of other countries have led this effort and Canada has introduced the Algorithmic Impact Assessment (AIA) tool that allows deployers of AI to assess and mitigate the risks associated with deploying an automated decision system.

The good news is that AI can in fact be trustworthy. A framework that is co-created by the developer/deployer and a third-party company is an unbiased solution that allows guardrails around new innovations that can co-exist with society, without endangering lives or damaging trust of the public. As a pioneer in the area of AI Governance, NuEnergy.ai, an Ottawa start-up in the business of AI governance, does exactly this. **EP&T**

NuEnergy.ai™

NuEnergy.ai is a Canadian artificial intelligence management software and professional services firm that partners with governments, technical experts, industry and entrepreneurs in providing solutions that help make AI trustworthy for clients and for global society.
https://www.nuenergy.ai

Nuvoola launches AI health screening solution

Device aims to help organizations limit spread of COVID-19

Nuvoola Inc., a Montreal-based artificial intelligence firm, launched a new health screening business solution aimed at helping companies limit the spread of COVID-19 in the workplace. The solution includes a touchless kiosk and a web-based questionnaire that leverages its flagship artificial intelligence platform.

The solution is called LUKE AI for Health Screening and Protection (HSP) and it includes an app that employees use to assess their health status before arriving at work, in addition to an onsite, touchless kiosk that rapidly screens people for symptoms of COVID-19 as they enter buildings. The kiosk recognizes people by their employee card or by facial comparison and uses an automated process to greet and screen visitors using natural language interactions in French or English, based on their preference. At the same time, the AI-powered kiosk can verify whether a face mask is required, and measure body temperature using Teledyne DALSA's Calibir infrared camera.

With the first wave of the virus waning, de-confinement measures are continuing and businesses owners, executives and decision-makers are feeling pressure to reopen safely. With the threat of a second wave still to come, they are searching for ways to implement easy-to-deploy safety procedures that comply with government regulations.

The unit generates visual and audio warnings in real-time if a risk is detected and can be monitored remotely. With many companies facing a shortage of security guards, this automated kiosk serves as an alternative that reduces human error and speeds up the detection process so crowding at entry points is reduced. Auditable logs are also created automatically to answer government requirements. Nuvoola also leverages Amazon Web Services (AWS), taking advantage of the secure underlying infrastructure to run its applications."

"Our solution includes analytics and predictive insights capabilities, meaning that it can alert on trends or changes in someone's condition. Plus, you can take advantage of a powerful artificial intelligence platform that can be used in many other business applications," Renière added.

"COVID-19 has forced a new normal where supporting local businesses has become a common message. We have a talented team and we quickly realized that our expertise in AI could help develop a unique Canadian solution that would help companies with their relaunch while introducing AI to their operations." **EP&T**

The launch of Nuvoola's LUKE AI for HSP is perfectly timed to offer organizations an effective solution that can be installed at any location, including industrial plants, factories, universities, hospitals, train stations or even airports.

"Our system is unique because it uses our artificial intelligence platform to screen employees, suppliers, customers and visitors in just a few seconds," says Nuvoola president Martin Renière. "Our expertise in computer vision, natural language processing and speech recognition provide our LUKE AI kiosk the ability to automate and reinforce safety measures."

Photo: Nuvoola Inc.

AME TORONTO 2020
ENERGIZE YOUR JOURNEY
VIRTUAL CONFERENCE | OCT. 27-29

JOIN US OCT. 27–29

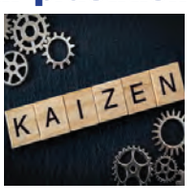
Energize your journey at the 36th annual AME International Conference

- **100% Virtual**
- **40+ Hours of live & on-demand content**
- **Deep dive into vital industry topics including:**

2-Second Lean	Gemba	LeanShoring™
Benchmarking	Innovation	Passion
Connectivity	Integration	Performance Measure
Culture	Internet of Things	Resiliency
Engagement	Kaizen	Supply Chain
Enterprise	Leadership	TWI

SESSIONS: Our practitioner-based sessions include:

AGCO Corporation
Seizing the upside of disruptive innovation in manufacturing



Alcon
Leading a kaizen revolution

Coherent, Inc.
Data doesn't speak for itself

Delphi Technologies
Hoshin kanri: Realizing impact through strategic relevance

HM Electronics, Inc.
Lean transformations: Cultivating excellence through positive culture

IMP Aerostructures
Kata-mazing: Kata is not about change, it's about evolution

Innovair Group
Continuously seeking improvement

Lincoln Electric
Deploying lean initiatives

KEYNOTE SESSIONS

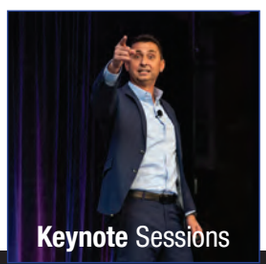
Katie Anderson
Leadership Coach, Author, Consultant, Professional Speaker

Michael Lombard
Managing Director, East Bay service area at Kaiser Permanente

Michael Muilenburg
Operational Technology & Strategic Planning Manager at 3M

Thomas Rajan
Managing Director, Global Co-Brand Partnerships at American Airlines

Isao Yoshino
Toyota Leader (retired), Former NUMMI Training Manager



REGISTER NOW

AME.ORG/VIRTUAL

Surviving and thriving through COVID19

A Canadian EMS player tells their story

BY MARK WOOD, CEO, MICROART SERVICES

2020 has been an unusual year, no doubt. As a manufacturer and electronics service provider we saw impact from the pandemic from the start of February when our well laid Lunar New Year plans were blown off course by what seems, in retrospect, to have been a perfect storm of disruption. It started with the disruption of supply chain, quickly followed by serious demand swings that came almost at the same time as changes to our working practices, courtesy of social distancing and the like.

So, how have we coped during the crisis, how did we minimize the impact on our customers and what have we learned from the strangest year in our almost four decades in the electronics manufacturing industry?

A Triple Whammy of Disruption

Right after Chinese New Year we started to see warning signs and ripples in the supply chain for components and printed circuit boards (pcbs) that we purchase in China. We had already planned for the normal disruption of the annual holiday, and had a reasonable stock of most of what we needed. Forty years in manufacturing teaches you that Chinese New Year needs to be planned for. We quickly got our purchasing and supply chain team working on sourcing those parts that were in short supply to mitigate any disruption from those that were perhaps only single or dual source and might be at risk. Our supply chains systems are largely digitally enabled, so we had a clear picture of where we were, what might be in danger and how to plan and mitigate any risk.

The second and third waves of disruption came around the same time. By mid to late March we were already cancelling spring break vacations and focusing on keeping our team safe. We quickly learned what social distancing means and made arrangements regarding Personal Protective Equipment (PPE). This is when we really had to switch up a gear and move into more of a crisis mode.

Our team is like a family and many of our staff have been with us more than a decade. Their health and wellbeing is extremely important to us and we quickly took steps to protect both. We spaced out the team on the factory floor to ensure they met the criteria for social distancing and provided those that needed to be on site with the right PPE. For those that could work from home we made sure they had the right setup there to do their job and to stay close to the team. Our IT team quickly made sure that those that needed a laptop to go home had one and that it had the right setup to ensure we could work remotely and securely through a lockdown that was far from clear in terms of how long it would last.

Open, honest communication

The general wellbeing and mental health of our staff is equally important, so we quickly got onto the business of open and honest communication with the whole team and of course with our customers. Regular town halls, open doors, and clear lines of communication are essential anytime, but when there is so much uncertainty, leadership style becomes even more important. It felt like the pandemic was really shining a bright light onto the Microart team, asking them to go the extra mile. We needed to do our very best for our customers, many of whom had essential status or were responding to the crisis themselves. I am extremely proud of how we reacted as a company, but most proud of the team and how they really came together to meet the challenges as they appeared in front of us. I knew we had a great team, but to see everyone pull together and do what it takes was extremely gratifying.

The demand disruption was a challenge and we saw some newer projects put on hold, other volumes dropped off, and some ramped rapidly to meet new demand in the market. Those involved in the fight against COVID-19 or any form of PPE or medical equipment were ramping fast, as were some brands that provided solutions or equipment that would help people in lockdown, like home fitness or work from home solutions. We have one customer in the fitness technology sector who has grown rapidly in 2020 and continues to see increasing demand.

Respond to any disruption

What we have seen is a shift in mindset from our customers in terms of what their manufacturing supply chain might look like and how it can respond to any disruption that might occur in the future. They are looking for agility, flexibility, visibility and resilience. They want to know that when the supply chain is disrupted we can provide them with timely information about the impact of that disruption. And that we can quickly adapt and implement a contingency plan.

For some that has meant re-evaluating the manufacturing they currently have done overseas, particularly in China. Many have been surprised at the value on offer here in the Americas, when you take everything into account. And by that I mean understanding the true cost of producing in a different continent and different time zone to the developers and the customers. The cost of procurement, of transport and logistics, of factory audits, of new

Photo:praetorianphoto / Getty Image

product introduction, of line management, of quality control, of vendor management, can all add up very quickly and erode any savings seen at the assembled part price. And, that doesn't even take into account the stress related to late night conference calls, wondering if things are as they seem thanks to poor tracking and visibility, concerns over IP protection, and worries about tariffs as the trade war between the US and China continues. All in all, we have been able to show great value and service, and perhaps some peace of minds that's worth a few cents on the dollar.

Continue to invest

We did experience a little delay installing our newest SMT line, which got stuck on the loading dock in the crisis. But it's in now and our investments in greater capability and capacity are back on track. We continue to invest in digital transformation and the kind of equipment that makes us even better, even more efficient, and even more agile for our customers.

Next year we celebrate our 40th anniversary and will enter 2021 with confidence and vigour, knowing that if we get through 2020 we can get through pretty much anything the world has to throw at us…

The pandemic really did lay enterprises bare, bathing any weakness and strength is equally bright light. I could not be more proud of the team at Microart and what they have done for each other, for our customers this year and for the company. As I look forward I know we can capitalize on that amazing team and our loyal customers. The industry is changing and we are ready for those changes. The pandemic might not have created that change, many changes were already underway, but it has certainly accelerated change, and that change will make us an even better company and an even better partner for our customers. **EP&T**

About Mark Wood: *With more than 35 years' experience in the electronic manufacturing world, Mark joined Microart Services Inc. 16 years ago and as the current CEO has led the firm to annual double digit growth through building effective relationships with customers.*
https://microartservices.com

How IoT tech is increasing efficiency

Internet of things works its magic across a wide range of industries

BY KENT RAWLINGS, PRESIDENT, SIGFOX CANADA

The Internet of Things (IoT) is transforming industries across all sectors. Industries ranging from aviation to healthcare to retail and more are embracing IoT technologies because of their ability to increase efficiencies and reduce costs. Adoption of IoT shows no signs of slowing down. In fact, Gartner forecasts that the enterprise and automotive IoT market will grow to USD$5.8-billion endpoints in 2020, a 21% increase from 2019, and a Business Insider report noted that the 'IoT industry is going to be a transformative force across all organizations,' projecting that there will be more than 41-billion IoT devices by 2027.

According to IoT analytics some of the verticals showing the most IoT projects include transportation and mobility, retail, healthcare, and buildings. Some of the ways these industries are using IoT technology to drive efficiency and reduce costs include:

Aviation

The aviation industry is leveraging IoT solutions to help manage a highly complex business operating environment which involves the logistics of moving billions of people and goods across the globe. A survey on airport IoT adoption trends cited in a July 2019 Deloitte Insights post found that 76 % of airport respondents using IoT indicated they used it for efficiency/optimization.

One of the ways airports are using IoT to drive efficiencies is to reduce the incidence of mishandled baggage. Cost and energy-efficient, globally connected trackers allow access to provide real-time information on the location of luggage anywhere in the airport. Reusable tags placed on luggage coupled with proximity sensors installed across airports allow airlines to monitor luggage, accurately tracking its location.

IoT technology used in PinPoint, a partnership between Sigfox and Amadeus (a tourism IT solutions provider), helps airlines reduce incorrect routing and incidence of lost bags, ensuring that luggage gets to the right place at the right time. Proximity sensors installed across airports and Sigfox global coverage provide real-time visibility into the location of luggage at all times, allowing airlines to monitor luggage, accurately track its location and detect anomalies.

IoT solutions

Airports are also using IoT solutions to increase efficiencies and reduce costs in asset tracking. Asset tracking is a critical operational function in airports and an area where IoT technology can provide gains in efficiency and reduce the financial impact of lost assets. Airports and airlines use IoT technology for real-time visibility and control of all key terminal assets including items such as spare parts, landing gear, and Unit Load Devices (ULD). For high-value assets such as ULDs, airlines use this technology to collect data on ULD location and movement to optimize ULD management and significantly reduce the risk of loss. Asset tracking IoT technology can even help reduce departure delays by making sure equipment like ground service vehicles, portable water trucks, de-icing vehicles, and catering vehicles are at the right gate at the right time.

Retail

Retailers are using IoT technology to reduce costs, drive growth and improve overall performance. Currently, sensors are being used to provide supply chain insights and monitor food safety.

• Supply chain and logistics

IoT sensors are being used by retailers to monitor goods throughout the entire supply chain. Tracking systems report valuable data such as location, temperature, humidity, shock and tilt, providing insights into quality control and traceability. Tracking solutions also help determine if materials are safe, delivered on time, and transported in ideal conditions, providing actionable data that can help retailers make their transport logistics more efficient, reduce product damage and avoid loss.

IoT is also transforming how buildings are managed and operated. The technology delivers actionable data & analytics that can help manage buildings more efficiently.

• Food safety monitoring

Perishable food spoilage and deterioration in the retail grocery industry results in a significant loss of profitability, with grocers on average losing $70 million annually to spoilage alone.

Food and beverage industry retailers are using IoT technology to reduce this loss and prevent food spoilage with sensors monitoring temperature of food storage facilities. This is achieved with a simple device installed in the storage unit and linked to an online dashboard which is configured to send alerts in the event of abnormal temperature levels. Real-time data from IoT sensors helps retailers protect perishable goods, ensure optimal freshness and reduce waste.

Healthcare

According to a Business Insider report, the global internet of medical things (IoMT) market is expected to swell to a $158 billion valuation in 2022, up from $41 billion in 2017.

IoT in healthcare is being used for the remote monitoring of patients, measuring and monitoring data such as glucose level, blood pressure, cardiac status, and more. Hospitals are using smart beds with IoT sensors that sense the presence of a patient to provide proper

Photo: metamorworks / Getty Image

support by automatically adjusting the bed to the correct angle and pressure without the need for hospital staff intervention.

In the current COVID-19 lockdown, IoT is also being used to remotely monitor seniors living alone or even inside a care facility. IoT connected thermometers, heart-rate monitors and ventilators allow patients who require more intensive care to be monitored remotely, minimizing the risk of spreading infection further.

Building management

IoT is also transforming how buildings are managed and operated. The technology provides actionable data and analytics that can help manage buildings more efficiently and reduce operational costs. IoT technology in smart buildings can help businesses increase their energy efficiency and combat climate change by monitoring and optimizing temperature, lighting, energy consumption and more.

• Temperature

IoT sensors can control HVAC systems and adjust heating and cooling to save energy. This technology monitors occupancy levels, maintaining optimal temperatures when rooms are occupied and switching off the system when the building is empty. Smart thermostats detect when each room hits the ideal temperature and learn occupant preferences over time, adjusting automatically to meet their needs.

• Lighting

According to the U.S. Department of Energy (DOE), "adding lighting controls can reduce lighting energy use 10% to 90% or more depending on the use of the space in which the sensors are installed."

IoT occupancy sensors can turn lights on or off based on whether or not a room is occupied. IoT sensors can also raise or lower lighting depending on the amount of daylight in a room as well as raise and lower blinds for optimum lighting conditions.

• Energy consumption

IoT technology can also help businesses monitor energy usage patterns, providing data to help businesses alter usage patterns and make adjustments to avoid peak demand charges. This helps businesses use energy more efficiently and helps reduce costs by avoiding peak energy rates.

• Building maintenance

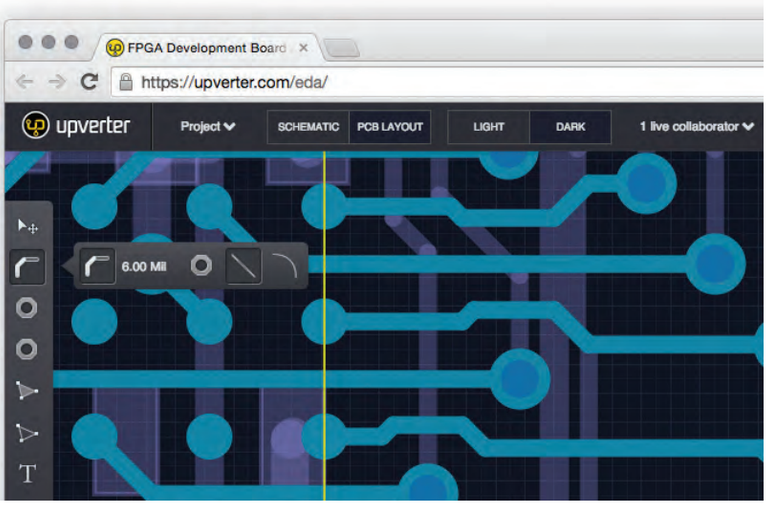
A network of IoT sensors connected to infrastructure, systems and machinery can provide data and alerts that allow facilities managers to get ahead of maintenance needs, proactively identifying problems before they occur. This optimizes building performance and prevents costly breakdowns.

An example of this is Sigfox IoT technology that detects damage to building structure by measuring cracks, extensions or strain gauges on key structural elements. Constant monitoring provides insights into the integrity of building infrastructure and can prevent extensive building damage by helping engineers better predict and plan building improvements.

These are just some of the ways IoT technology is being used in a wide range of industries to drive efficiency, streamline operations and cut costs. **EP&T**

Kent Rawlings *is president of Sigfox Canada, a senior executive with more than 25-years of progressive experience in sales and business development, operations management, business strategy and partnership development.*

https://www.sigfoxcanada.com/

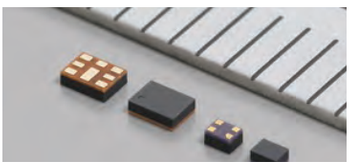


DISTANCE LEARNING PROGRAM BASED ON PCB DESIGN TOOL

ALTIUM

Upverter Education distance learning program is based on Upverter, a free, web-based printed circuit board (pcb) design tool that is easy to learn and use. The collaborative and remote learning features of Upverter fit perfectly with the needs of STEM educators for guiding students through the electronics design process and their exploration of technology and engineering. Program includes access to electrical engineering courses for students of all skill levels, including those with no prior exposure to circuit board design.

https://upverter.com/



TINY SAW DUPLEXERS, FILTERS CONTRIBUTE TO DENSER CIRCUIT DESIGN

MURATA

SAYAV Series, SAYARV Series, and SAYAP Series SAW duplexers and SAFFW Series filters allow transmitters and receivers to share a common antenna while electronically splitting the transmission and receiving lines. Devices meet the acute need for smaller SAW devices that transmit and receive signals at certain frequencies. SAW duplexers supporting the 700MHz to 2.6GHz bands are packaged in 1.6mm x 1.2mm (length x width) form factor, and SAFFW Series of SAW filters are packaged in a 0.9mm x 0.7mm (length x width) form factor.

https://www.murata.com RSN

LOW VISCOSITY EPOXY COATING DELIVERS ACID RESISTANCE

MASTER BOND

EP21ARLV two part epoxy may be used as an adhesive, sealant, coating or encapsulant. Product is capable of withstanding prolonged exposure to a wide range of chemicals, such as 70% sulfuric acid, 10% hydrochloric acid, 10% nitric acid and butyl acetate to name a few. Both parts A and B have a low viscosity of 3,000-6,000 cps and 4,000-6,000 cps, respectively. Product provides low viscosity and acid resistance.

https://www.masterbond.com/properties/chemical-resistance

0.8MM SHIELDED BOARD-TO-BOARD CONNECTOR BOOSTS EMC PERFORMANCE

HEILIND ELECTRONICS

Amphenol ICC FCI Basics BergStak shielded connectors are self-aligning and feature a 0.8mm double-row contact pitch, conserving printed circuit board space. Devices deliver enhanced EMI/EMC shielding, while offering reduced coupling inductance, resulting in improved electromagnetic compatibility. Device provide high signal quality and fast data transmission. Designed to support applications ranging from 2.5 Gb/s to 10 Gb/s, products meet PCIe Gen 1-3 and 10G Base KR specifications. Devices are available in 64 positions, with 40-140 contact options and 9mm-20mm stacking heights.

http://www.heilind.com

COMPACT CENTRIFUGAL FAN IS QUIET, POWERFUL

EBM-PAPST

RV45 dc Centrifugal fan is quiet and powerful, providing dynamic air delivery in a compact size for critical respiratory applications, as well as a variety of industrial applications. Unit's aerodynamics and motor are optimized for quick speed changes, while its small footprint and design keep it lightweight and virtually silent, making it suitable for applications requiring rapidly changing air flow and high pressures. Designed into a 64 x 69.5 x 54.5mm package.

https://www.sager.com/manufacturers/ebm-papst-inc/ebm-papst-rv45-dc-centrifugal-fan/

CUT & STRIP MACHINES BOOST PRECISION, EFFICIENCY

SCHLEUNIGER

PowerStrip 9580 and MegaStrip 9680 automatic cut & strip machines deliver high degree of production flexibility, high-precision processing and improved production output. Built with a state-of-the-art safety concept, both machines are available in various basic configurations and are based on a modular machine design that is retrofittable at any time. Units handle stranded wires, shielded cables and multi-conductor cables with cross sections up to 70mmÇ that can be processed with the PowerStrip 9580 and up to 120 mmÇ with the MegaStrip9680.

schleuniger.com

PUBLISHER'S PICK

HIGH RATED VOLTAGE EMI SUPPRESSION CAPACITORS

TDK's robust Y2 EMI "line to ground" suppression capacitors offer a rated voltage of 350 V AC and capacitance ranges from 4.7 nF to 1.2 µF. Even under harsh environmental conditions, these metalized polypropylene film capacitors provide stable capacitance value and are certified according to IEC 60384-14:2013/AMDI:2016 and classified with grade III high robustness under high humidity test B.

Link for product info: www.tdk-electronics.tdk.com/en/529456/products/product-catalog/film-capacitors/emi-suppression-capacitors

TDK ELECTRONICS INC.
732-906-4300
www.tdk-electronics.tdk.com

SILICON CARBIDE SCHOTTKY RECTIFIERS COME IN BARE DIE

CENTRAL SEMICONDUCTOR

Silicon Carbide Schottky Rectifier die portfolio is optimized for high temperature applications. Devices are available in both 650V and 1200V, with a current range of 4A to 30A for 650V devices and 2A and 50A for 1,200V devices. The primary benefits of Silicon Carbide (SiC) over silicon (Si) are stable switching performance over temperature

extremes and high levels of energy efficiency. Theoretically, SiC die can operate at junction temperatures greater than 600°C, well above the package device rating.
https://www.centralsemi.com

D-TO-BOARD CONNECTORS SAVE SPACE, PROVIDE DURABILITY

KYOCERA

5811 Series board-to-board connectors are miniaturized to be about 50% smaller than conventional products and optimized for wearable devices. Device provide a 0.35mm-pitch to save space, perform well in high current and are highly durable. Product's miniaturized size (1.7mm width x 3.6mm length) is optimized for wearables, handheld game consoles and other smaller electronics. The flat stacking structure maintains durability, workability when stacking, and reduction of damage despite its low 0.6mm stack height.
https://global.kyocera.com

ULTRA-SMALL OCXO BOOSTS TEMPERATURE STABILITY

RALTRON

OX7000 Series SMD oven controlled crystal oscillator (OCXO) is tiny, measuring 9mm x 7mm, and designed for applications that require ultra-small size and enhanced temperature stability. This includes all aspects of 5G wireless infrastructure, transmission, precision instrumentation, broadcasting, utility metering infrastructure, and more. Device covers a frequency range from 5.000MHz to 40.000MHZ with a power supply voltage of 3.3V at 150mA steady state. Product combines ultra-small size with ultra-reliable frequency stability of +/-10ppb.
https://www.raltron.com

2MM DUAL-ROW WIRE-TO-BOARD CONNECTORS DELIVER POSITIVE LOCK

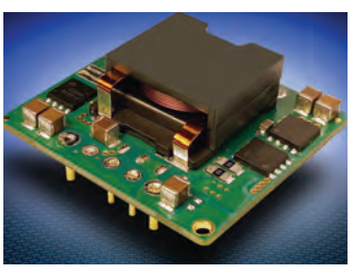
TTI

Molex iGrid 2mm dual-row wire-to-board connectors come with positive lock, right-angle headers and gold terminals. Devices provide a compact design and anti-tangle internal lock for applications requiring good mating retention. Device's inner lock prevents wire from getting tangled in the latch, compared to outer lock types where such damage can easily occur. The inner lock also provides space savings, an audible click and a robust design to withstand rugged handling.
www.tti.com

INDUSTRIAL RJ45 JACKS, PLUGS ENABLE 10GBPS DATA RATES

SAGER ELECTRONICS

Phoenix Contact Industrial RJ45 Jacks and Plugs series enable data rates of up to 10Gbps and are particularly suitable for demanding industrial Ethernet applications. Devices minimize factors that are constantly working against the wide range of connection combinations of RJ45 plugs and jacks such as vibration, shock and EMI. Product series is tested for above-normal IEC requirements. Single-port and multi-port jacks, as well as parts with integrated LEDS, and for THR or SMD soldering, are also available.
https://www.sager.com



BUCK-BOOST DC-DC CONVERTER IS 12.5A 300W RATED

TDK CORP.

i7C non-isolated dc-dc converter series now includes 12.5A 300W rated models. With an input range of 9 to 53Vdc, the output can be adjusted from 5 to 28V. Product's topology enables a seamless transition from buck (voltage reduction) to boost (voltage increase) operation. Product series is suitable for generating additional high power outputs, from existing 12, 24, 36 or 48V system voltages, in medical, communications, industrial, test and measurement and battery powered equipment.
www.jp.lambda.tdk.com/en

15W WIRELESS POWER RECEIVER TRANSFORMS MOBILE DEVICES

RENESAS

P9415-R wireless 15W power receiver equipped with firm's WattShare technology enables smartphones, power banks, and portable industrial and medical equipment, to wirelessly charge other mobile devices and accessories that also have wireless charging capabilities. Device features up to 5W of transmit power capability in transmitter/receiver (TRx) mode, as well as receive up to 15W on Qi transmitters, enabling quick and convenient mobile device charging on the go.
www.idt.com/P9415R

DC-DC CONVERTER WITHSTANDS EXTREME ENVIRONMENTS

WAGO

XTR 12 to 24Vdc DIN Rail mountable dc-dc converter withstands extreme conditions and has conformal coating which provides increased effectiveness against harsh environments. Device can also be used in a wide range of temperatures from -40 °C to +70 °C suitable for extreme applications. Product provides reverse polarity and short circuit protection- preventing problems with mis-wiring. Unit delivers 95% efficiency at full load- reducing energy loss and providing full ampacity without derating.
www.wago.com/us

DIGITAL HIGH POWER FACTOR CONTROLLER SERVES FLYBACK LED DRIVERS

INFINEON

XDPL8219 XDP digital power, high-performance flyback controller features secondary-side regulation for high-performance and robust LED designs. Device provides high power factor and constant voltage output. Device operates in quasi-resonant mode (QRM) to maximize the efficiency and minimize the electromagnetic interference (EMI) over a wide load range. Product accommodates active burst mode (ABM) at light load to prevent audible noise while achieving a no-load standby power level below 100mW.
www.infineon.com/xdpl8219

INTEGRATED DUAL RF TRANSCEIVER OPERATES FROM 30 TO 6000MHZ

RICHARDSON RFPD

Analog Devices ADRV9002 highly integrated, dual narrow/wideband RF transceiver has dual-channel transmitters, dual-channel receivers, integrated synthesizers, and digital signal processing functions. IC delivers a versatile combination of high performance and low power consumption required by battery-powered radio equipment and can operate in both FDD and TDD modes. Device operates from 30MHz to 6000MHz and covers the UHF, VHF, licensed and unlicensed cellular bands, and industrial, scientific, and medical (ISM) bands.
www.richardsonrfpd.com

Septentrio mosaic-X5, a high-end GNSS receiver module delivering reliable centimeter-level positioning, is available at Digi-Key.

DISTRIBUTION

DIGI-KEY INKS DISTY DEAL WITH SEPTENTRIO

Digi-Key Electronics, a global electronic components distributor, has partnered with Septentrio, a leader in high-precision GNSS positioning solutions. Digi-Key now offers mosaic-X5 globally for customers who need secure and reliable high-accuracy positioning in a compact and low-power form factor.

Septentrio's mosaic-X5 features complete multi-frequency multi-constellation technology and tracks every existing and future signal from all Global Navigation Satellite System (GNSS) constellations. Such signal diversity coupled with advanced anti-jamming technology allows mosaic-X5TM to deliver centimeter-level positioning with maximum availability even in challenging industrial environments. This makes mosaic-X5TM an ideal positioning solution for applications such as robotics, automation, telematics and many more.

"The mosaic-X5TM has a small form factor and low-power design, and brings high-performance positioning to volume applications," says Francois Freulon, head of product management for Septentrio. "Having Digi-Key as a distributor enables us to scale and reach out to find new markets and applications where secure high accuracy positioning is required."

TTI PARTNERS WITH TE AUTOMOTIVE

TTI Inc., a leading specialty distributor of electronic components, has extended its partnership with TE Connectivity, as the firms are now partnered to deliver solutions and support tailored specifically for manufactures in the automotive market segment.

"I am happy to confirm that TTI continues to broaden our assortment of TE Connectivity products with the recent partnering with TE Automotive", says Lew LaFornara, VP product and supplier marketing for TTI. "The addition of the TE automotive products to our stocking profile will benefit our customers from both an available to sell standpoint as well as a technical support."

Asif Mansur, TE Connectivity senior director, marketing, distribution and inside sales automotive Americas, commented, "TE Automotive and TTI have partnered to deliver unmatched technical knowledge and available inventory to support the needs of our shared customers as they design and build the vehicles of the future."

MOUSER UNVEILS NEW CUSTOMER RESOURCE CENTRE

Mouser Electronics Inc. recently unveiled its new Customer Resource Center, which simplifies the distributor's online purchasing services and tools through a central hub containing everything customers need to optimize the purchasing process.

Customers can opt to click the name of desired tool, and then view or request what they need. The resource centre allows customers to access and learn how to view or track orders, request technical support and data sheets, or place orders via API or EDI through Order Automation. The easy-to-use hub helps Mouser customers quickly get more information for parts and any other assistance they require for purchasing.

"Mouser continually assesses and improves our online resources to help buyers and engineers manage their product specifications and purchases," says Coby Kleinjan, Mouser's VP of Americas customer service and sales.

To experience, visit https://www.mouser.com/customer-resource-center.

PCB

BITTELE
Turn-key PCB Assembly

BITTELE APPROVED FOR ONTARIO MADE PROGRAM

Bittele Electronics Inc., a Toronto-based printed circuit board (pcb) assembly firm has announced that it has been approved for the Ontario Made Program.

Supported by the Ontario government and funded through Ontario Together Fund, the Canadian Manufacturers & Exporters' Ontario Made program was launched in July 2020 with the mission of promoting the many world-class goods that are made across the province by helping

Photo: Credit: Septentrio; TTI; Mouser Electronics

businesses and consumers easily identify, access, and purchase local products. The Ontario Made program will promote locally made products and help build a strong, self-sufficient province that is vital to its economic recovery.

"Bittele has invested in its Markham facility in June 2019 and we now employ 50 people in Ontario. The Markham facility uses world class, high tech equipment to provide pcb assembly services to Canadian businesses. We supply pcs to many customers across Canada," says Ben Yang, CEO of Bittele Electronics, specialists in prototype and small-volume to mid-volume pcb assembly.

EMA DESIGN AUTOMATION DELIVERS PCB DESIGN EDUCATION

EMA Design Automation Inc. a full-service provider of electronic design automation (EDA) solutions, has decided to sponsor the newly formed Printed Circuit Engineering Association (PCEA) (www.pce-a.org) because of their mutual understanding of the importance of driving awareness and education throughout the pcb industry, according to Manny Marcano, president and CEO of EMA.

"Our collaborative efforts with the PCEA reinforce our main goal that has always been to provide our customers with the right tools and support to address their business needs," says Marcano.

The PCEA is an international network of printed circuit engineers that was formed as a means for education and to promote the exchange of information within the pcb industry. Printed circuit engineers need to have a comprehensive understanding of all phases of pcb design from concept, engineering development, and standards implementation to manufacturing (including fabrication), assembly, test, and compliance.

EMA and the PCEA both understand this need. EMA has already been diligently supporting engineers with their ongoing educational webinar series, as well as the publication of "The Hitchhiker's Guide to PCB Design" that is a free book empowering engineers with the knowledge needed to understand the complexities of the PCB design process.

"Pcb design continues to get more complex, and designers need every advantage they can get to keep up," added Marcano. "PCEA is the right idea at the right time."

TEST

KEYSIGHT BOLSTERS TECHNICAL SUPPORT SERVICE

Keysight Technologies Inc., a leading test & measurement solutions provider has expanded its KeysightCare program to provide a growing customer base with fast, reliable access to priority technical support.

KeysightCare is a scalable and comprehensive support model offering best-in-class test and measurement expertise through a dedicated, proactive single point of contact for instruments, software, application measurements and test. This integrated support model is now available with five tiers to meet the specific hardware, software and technical support needs of customers.

The newest offering in the KeysightCare portfolio is KeysightCare Technical Support,

tailored to cover all Keysight instruments at a customer site, regardless of performance level, use model, warranty period or discontinuance status.

KeysightCare Technical Support provides for committed response time from a live technical support expert, as well as access to technical expertise through the KeysightCare portal and a knowledge center 24x7, which contains decades of R&D expertise in thousands of technical articles and programming examples on leading edge technologies.

OPTO

EXFO TO ACQUIRE INOPTICALS

EXFO Inc., Quebec City, has acquired InOpticals Inc., a technology leader providing ultra-high-speed test instruments for the laboratory and manufacturing markets, subject to closing conditions by regulatory authorities.

InOpticals, based in Taiwan, supplies sampling oscilloscopes, bit-error rate testers (BERTs) and other critical test instruments to manufacturers of optical transponders, components and network equipment.

Its product portfolio specifically addresses 400G/800G high-growth sectors like silicon photonics-based transceivers, active and passive components as well as integrated test systems for R&D and manufacturing use cases.

InOpticals' solutions will be combined with EXFO's advanced optical test offering, bolstered by the Yenista Optics acquisition in October 2017.

"EXFO has intensified its focus on the research, development and manufacturing market as demonstrated by strong growth in this segment in recent years," says Germain Lamonde, EXFO's founder and executive chairman.

"InOpticals brings to EXFO a remarkable product portfolio that is highly complementary and strategic. This synergistic acquisition will allow EXFO to leverage InOpticals' innovative test solutions across global sales channels and expand market share." EP&T

Photo: Keysight Technologies

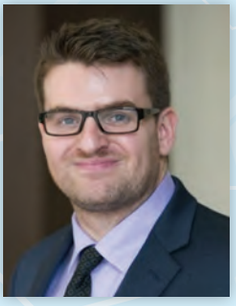
FIND OUT HOW

YOUR INDUSTRY 4.0 ADOPTION COMPARES WITH OTHER CANADIAN MANUFACTURERS

A FREE ONLINE PRESENTATION
November 2 • 2 pm EST.

Join us November 2 at 2pm EST as Jason Myers CEO of Next Generation Manufacturing and Will Mazgay, Editor of Canadian Manufacturing, discuss the results of the Advanced Manufacturing Outlook report and the adoption of Industry 4.0 technologies by Canadian companies.

Jayson Myers
Chief Executive Officer
Next Generation Manufacturing Canada



Will Mazgay
Editor
Canadian Manufacturing magazine

REGISTER ONLINE: bit.ly/indstry4report

WEBINAR SPONSORED BY

NGen Next Generation Manufacturing Canada

REPORT SPONSORS

Alps Welding Ltd.

LAPP

Machines Italia
Turning innovation into productivity.
a project by ITA
ITALIAN TRADE AGENCY
ICE - Italian Trade Commission

AD INDEX

PRODUCT SOURCE GUIDE

Canadian Women in Electronics

Exploring diversity through women in the Canadian electronics engineering and industry profession

Throughout 2020 EP&T explores the topic of diversity in the industry through a series of articles called Viewpoint; stories designed to get readers thinking about gender equity in the engineering profession, allowing others to maybe see their surroundings through a new lens.

Alexandra Dopplinger, P.Eng. is director product marketing – building and energy with NXP Semiconductors in Kanata, Ontario.

What led you into an engineering career?
My favorite subjects were math, physics and music. Memorial University of Newfoundland has an excellent co-op engineering program in my hometown, so it was an easy choice. I didn't know much about technology at first, but each course and work term guided me toward electrical engineering, which turned out to be an excellent path.

How has your role or career path evolved over the years?
I started as a hardware design engineer with Nortel Networks, which was a great foundation to learn about circuit board design, layout, manufacturing, software, and system verification. Each job since then has flowed naturally to the next – from telecom system product management at Nortel, to software and processor product marketing at Motorola, to leading the factory automation, robotics and industrial segments at Freescale Semiconductor, and now building part of the industrial edge processing business at NXP Semiconductors. I still use the lessons learned in my first job to better understand the perspective of the customers we serve today. I've been fortunate to seize exciting opportunities that presented themselves at the right times along the way.

What is your message to female engineers seeking leadership roles?
Q My advice is the same for all genders. (1) Consider carefully what you want, and then describe it to people who can help you reach your goals. It is easier to succeed when other people understand your plan and can help you achieve it. (2) Leadership roles demand tremendous commitment, so honestly assess your own interests and capabilities to work towards roles that best match your passions. (3) Be open to consider different forms of leadership roles. Many people believe leaders have people reporting directly to them, but my favorite leadership roles involve leading by influence, i.e. without direct reports. (4) Be prepared to fail and learn from those failures. The first few times I tried to lead people who did not report to me, the level of resistance was off the charts. Then I found ways to do it without anyone realizing what was happening, which meant I achieved the goal, but got no credit for it. Then after a few times like this, I was able to describe the hidden steps that led to those signification achievements, which built up my credibility in the organization. Now that my reputation is well-established inside my company and throughout the industry, it is much easier to lead by influence, which leads to my final advice - (5) build mutually supportive relationships with a diverse network of contacts.

What key words of advice do you have for employers seeking to create a supportive environment for women?
Recognize that female technology employees might face extra headwind to
A reach their full potential. Mentor and sponsor relationships can be tricky across genders, and there are few female role models. My career always moved fastest when a male leader helped me along, and it seems as if those male leaders' careers also accelerated at the same time. Who's to say whether it was cause or effect? Maybe the people who put more value on mentoring a female engineer are also more likely to be successful leaders, or maybe leaders are strengthened by investing in a person with diverse experience. Either way, male leaders should consider that sponsoring a female might benefit their own career too.

What does diversity mean to you and why is it important for engineering?
Engineering 101 is to identify the problem, consider the options, and then implement the 'best' solution. New and differentiating ideas flow easier from teams who can leverage a wider range of experience and perspectives. Diversity means success – however you measure it.

Can you share an engineering workplace encounter you've experienced that provides an example of unconscious bias based on gender or race?
In three decades, I have experienced and witnessed countless examples of bias in the workplace. The most compelling example is from a few months ago when I caught myself tuning out the only other female in an important meeting. I was paying careful attention to all the other participants, but suddenly realized that she had less of my attention. It forced me to question why, and to open a dialog with her to help us both figure it out. Now we are strong allies, helping each other identify and overcome unconscious bias in our male-dominated environment. **EP&T**

Photo: NXP Semiconductors

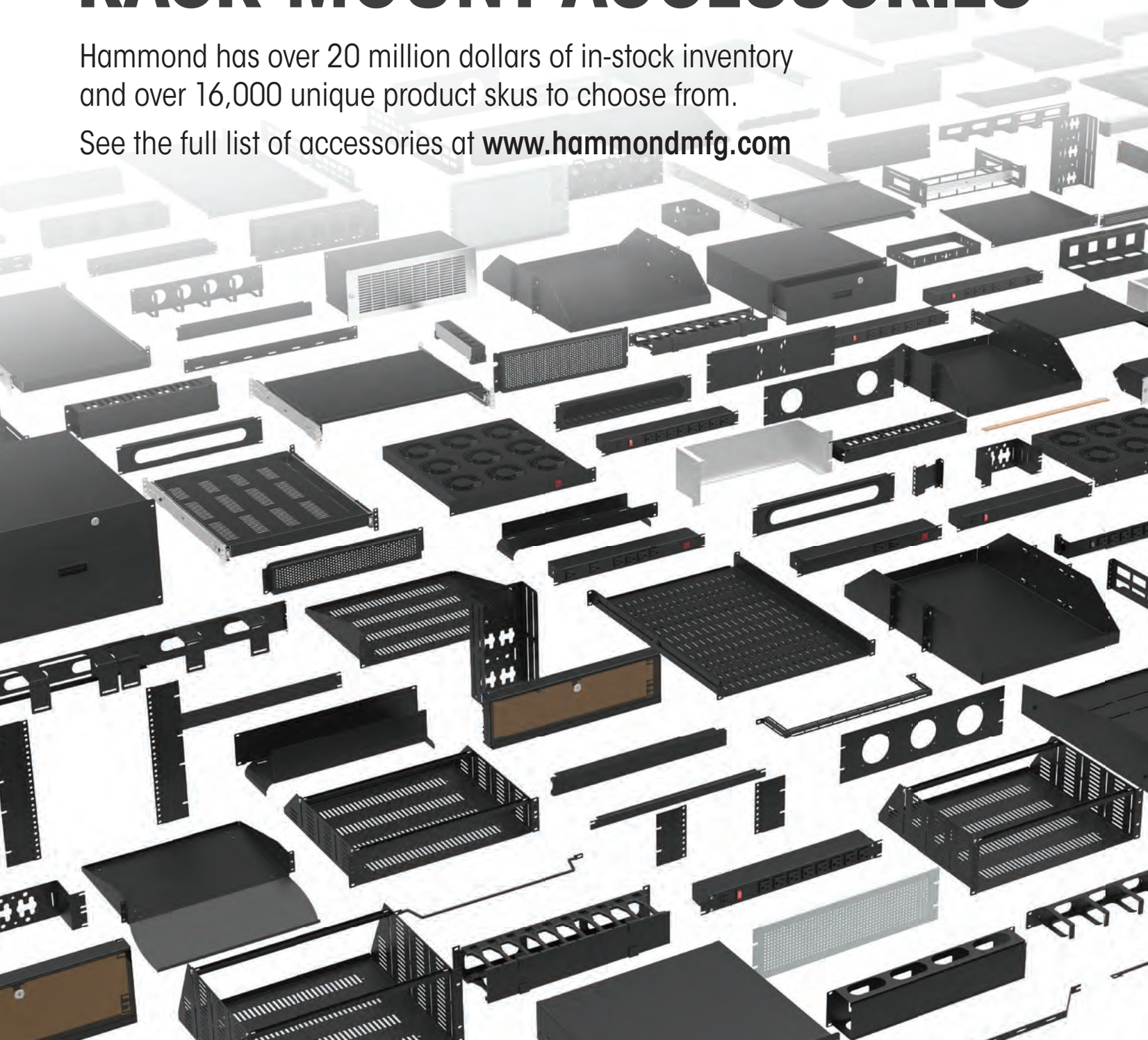
HAMMOND MANUFACTURING®

85 YEARS MANUFACTURING RACKS & CABINETS SINCE 1934

THE LARGEST SELECTION OF RACK MOUNT ACCESSORIES

Hammond has over 20 million dollars of in-stock inventory and over 16,000 unique product skus to choose from.

See the full list of accessories at **www.hammondmfg.com**



Increase your engineering and buying confidence

Engineers and buyers find the leading brands and the widest selection of products in stock at **mouser.com**

MOUSER ELECTRONICS