EP&T

ELECTRONIC PRODUCTS & TECHNOLOGY

JANUARY/FEBRUARY 2021

CANADA'S INFORMATION LEADER FOR ELECTRONIC ENGINEERS AND DESIGNERS

EPT.CA

POWERING DOWN

The ultimate way to reduce power consumption in IoT devices p.12

HIGHER POWER

Knowing the advantages of high efficiency power supplies p.14

CURRENT TRENDS

Integration is key to powering the future of technology p.18

POWER PLAYS

Ups & downs of the most common power management techniques p.10

DELIVERING THE BRANDS YOU NEED

FREE SHIPPING
ON ORDERS OVER $100 CAD OR $100 USD*
SAME-DAY SHIPPING
All orders entered by 8:00 p.m.

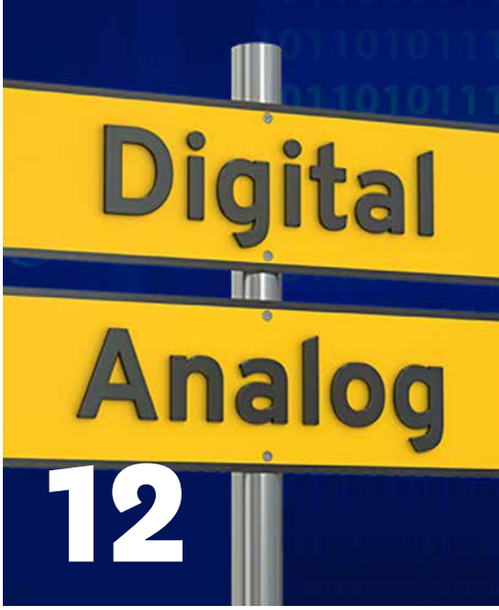
1.800.344.4539
DIGIKEY.CA

Digi-Key® ELECTRONICS

9.7 MILLION+ PRODUCTS ONLINE | 1,200+ INDUSTRY-LEADING SUPPLIERS | 100% AUTHORIZED DISTRIBUTOR

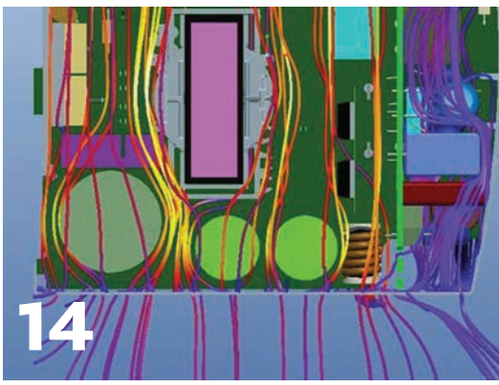
*A shipping charge of $8.00 CAD will be billed on all orders of less than $100.00 CAD. A shipping charge of $20.00 USD will be billed on all orders of less than $100.00 USD. All orders are shipped via UPS, Federal Express, or DHL for delivery within 1-3 days (dependent on final destination). No handling 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
JANUARY/FEBRUARY 2021



Cover photo: Getty Images
Photos (this page, from top): Getty Images; Aspinity; PULS Power USA; ABB Power Conversion

Emerging technology sectors to watch in 2021

After experiencing one of the most turbulent years in recent history, one must agree that not a single country or industry has been unaffected by the COVID-19 pandemic, and the impact will be felt for years to come. Despite this, there have still been some notable industrial activity and commercial progression within emerging and burgeoning tech sectors – particularly within electronic design circles. Let's take a look at some of these 'hot market' growth areas.

Flexible Hybrid Electronics

The implementation of flexible hybrid electronics (FHE) is predicted to become ubiquitous by 2030, according to a recent report by UK research group IDTechEx. With the market projected to reach over $3-billion, an FHE circuit is an elegant compromise that uses printed conductive interconnects, antennas and possibly sensors, while mounting complex components such as integrated circuits. The overarching principle is perhaps best expressed as 'print what you can, place what you can't. FHE has applications across multiple sectors ranging from wearable technology to smart packaging.

IoT

At the end of 2019 there were 7.6 billion active IoT devices globally, a figure which will grow to 24.1-billion in 2030, according to research published by Transforma Insights. Short range technologies, such as WiFi, Bluetooth and Zigbee, will dominate connections. Public networks, which are dominated by cellular networks, will grow from 1.2 billion connections to 4.7 billion worldwide in 2030. In revenue terms, the total IoT market in 2019 was worth USD $465-billion, a figure that will rise to USD$1.5-trillion in 2030. Services, including connectivity, will account for 66% of spend, with the remainder accounted for by hardware, in the form of dedicated IoT devices, modules and gateways, Transforma says.

Smart Cities

It is anticipated that smart cities could create business opportunities worth USD$2.46-trillion by 2025, according to the research at Frost & Sullivan. How much of that will directly impact the electronic designer and engineer remains to be seem.

But, the uncertain post-pandemic situation will compel smart cities to focus more on developing collaborative, data-driven infrastructure to provide appropriate healthcare facilities, as well as public security services. This will create significant business opportunities for some.

5G

The COVID-19 pandemic is the black swan to disrupt the rollout of 5G. Although the pandemic has had little adverse impact on telecoms so far, the resulting global economic crisis is likely to reduce the telecoms' investment in 5G infrastructure and harm the willingness of customers to adapt to 5G devices and applications. The deployment of sub-6GHz 5G base station might be 20% lower than the expectation, and the rollout of 5G mobile networks will be delayed by 9-18 months in many countries, says IDTechEx.

VR / AR

Virtual, augmented and mixed reality products have continued to receive high levels of funding and investment during the past decade. There has also been immense hype over these products during the decade, with evangelists of the technology believing that it will be used in all aspects of day to day life. The growth of the technology over the COVID period has been noticeable, with many new use cases for the technology.

While use is diverse and extensive, one key application for VR headsets is for training in extreme environments. Some users include manufacturing, remote assistance, education and training, to name but a few.

AI

According to artificial intelligence authority and Microsoft alum Irfan Khan, there are many benefits of leveraging AI data-driven insights and technology in a way that will create actual and actionable value right now—the kind of insights that enable new and evolved business models and empower companies to increase both revenue and profitability.

Khan explains: "Overall, AI is ushering in a new and more sophisticated era of data literacy. It's a new paradigm founded on automated, comprehensive and holistic data discovery, which is fostering elevated cognitive insights and actionable strategies that positively impact the top and bottom line."

Khan says perhaps the future mandate for AI should not only focus on becoming smarter, faster and more accountable than predecessors, but actually bridge the gap between human intuition and data-backed decisions. Doing so will assuredly advance an organization's ability to transact with utmost trust.

We shall see what lies ahead. **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

JANUARY / FEBRUARY 2021
Volume 43, Number 1

READER SERVICE
Print and digital subscription inquiries or changes, please contact
Anita Madden, Audience Development Manager
Tel: 416-510-5183
Fax: 416-510-6875
email: amadden@annexbusinessmedia.com
Mail: 111 Gordon Baker Rd., Suite 400
Toronto, ON M2H 3R1

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 Alison Keba
akeba@annexbusinessmedia.com

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

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

The (lowest) Loss Leaders

XGL Family power inductors feature the industry's lowest DC resistance and extremely low AC losses for a wide range of DC-DC converters

Coilcraft's XGL Family of molded power inductors is available in a wide range of inductance values (from 82 nH to 47.0 µH) and current ratings up to 43 Amps. With up to 60% lower DCR than previous-generation products, they are the most efficient power inductors available today!

Their ultra-low DCR and higher Irms also allow XGL Family inductors to operate much cooler than other components.

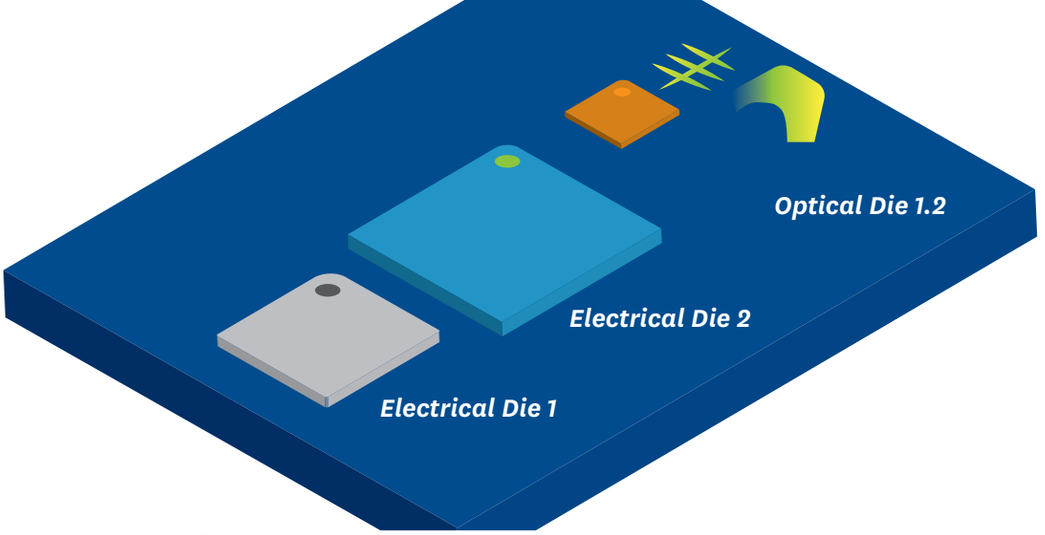
All XGL Family inductors are qualified to AEC-Q200 Grade 1 standards (with a maximum part temperature of 165°C) and have no thermal aging issues, making them ideal for automotive and other harsh environment applications.

Download datasheets and request free samples at **www.coilcraft.com/XGL.**

Coilcraft®

WWW.COILCRAFT.COM

NEWSWATCH



AUTOMOTIVE

POET UNVEILS TINY 100G CWDM4 OPTICAL ENGINE

POET Technologies Inc., Toronto-based developer of the POET Optical Interposer and Photonic Integrated Circuits (PICs) for the data center and tele-communication markets, has completed and tested its high-speed Directly Modulated Laser (DML) designs using a distributed feedback (DFB) structure and successfully 'flip-chipped' these lasers onto the firm's Optical Interposer platform.

The flip-chip assembly technique enables a true single-chip, fully integrated optical engine to be produced at wafer-scale, resulting in the lowest-cost, smallest-size 100G CWDM4 optical engine with a form factor of 9mm x 6mm, while including banks of four lasers, four monitor photodiodes, four high speed photodiodes, a multiplexer, demultiplexer, taps for power monitoring and features supporting a self-aligned fiber attach unit.

MAGNA EYES DRIVER ASSISTANCE SYSTEMS

A premium automaker in Europe will soon be able to offer industry-leading driver assistance features across a larger portion of its vehicle lineup, thanks to the next generation of camera-based driver assistance from Aurora ON-based automotive parts supplier Magna International Inc.

Magna and Mobileye have collaborated since 2007 to provide automakers and consumers with leading-edge driver-assistance systems.

The Magna Gen5 'one-box' solution is a Mobileye EyeQ5-based system - where the forward-facing camera and related software are contained in a single assembly. The system will provide drivers with safety and convenience features such as adaptive cruise control, automatic emergency braking and pedestrian detection. As with previous generations, the system combines Magna's electronics and camera expertise with Mobileye's system-on-chip (SoC) image-processing technology. The camera features a 120-degree, 8-megapixel optical path, while Magna has continued to refine its world-class camera manufacturing processes to achieve the quality and volumes required of global vehicle platforms. Mobileye collaborated with Magna engineers to ensure that the EyeQ5 met and exceeded new requirements related to the launch program.

``This system represents a new level of performance and functionality. We're already looking for ways to make subsequent generations even better," says Erez Dagan, executive VP at Mobileye.

dSPACE AND LEDDARTECH COLLABORATE ON LIDAR

dSPACE and LeddarTech, a Quebec City-based developer of level 1-5 ADAS and AD sensing technology, have entered into a partnership to jointly drive forward the development of lidar technologies for autonomous driving. The close cooperation will enable both firms to provide high-precision simulation models and interfaces for lidar sensors, enabling OEMs and suppliers to integrate lidar innovations into ready-for-application solutions faster.

The cooperation will support the emulation of new LeddarTech laser sensors in simulation solutions at an early development stage. Moreover, dSPACE will provide simulation models for testing and validation, as well as the sensor simulation environment for validating camera, lidar and radar sensors throughout the development process – accelerating customer's projects.

The dSPACE simulation solution generates point clouds in real time to simulate objects. The simulation models help determine the most effective positioning of the sensor on the vehicle (sweet spot), as well as the sensor limits (corner cases). LeddarTech will be able to seamlessly incorporate dSPACE's sensor models into its development projects.

MATERIALS

COLOUR CHANGING TECHNOLOGY SERVES ELECTRONIC DEVICES

Opalux, a Toronto-based smart materials company and creator of a stimulus-responsive, colour-changing material and coating - is now developing its own brand - Chameleonix for the consumer goods market.

Co-founded by the award-winning Dr. Andre Arsenault in 2006, the technologies developed by Opalux grew out of his studies and doctorate thesis at the University of Toronto. Chameleonix provides next level custom aesthetics, as the colour-changing technology features a thin film device that can be applied to most surfaces and is controlled with a tiny electric current that will change the colour from violet to red and anything in between.

"This product will permit consumers to choose the colour of their product - whenever they like, allowing for unprecedented customization," says Allan Firhoj, Opalux's CEO. "The colour change can also be pre-programmed to respond to environmental changes, notifications, mood, wellness, music the user is listening to, or décor they choose on a given day."

Chameleonix is extremely thin, less than a millimetre, which allows it to be seamlessly integrated into consumer electronics. It requires only a small amount of power which will not impact battery life, which is critical for these devices. This technology will create new experiences for consumers allowing them to interact with their products in ways they never were able to before.

"Chameleonix has the breadth of colour, while using super low power, making it ideal for products on the go," adds Dr. Arsenault. "The device can be wirelessly controlled to fit into our modern world providing consumers the ability to change the colour of just about anything, with a touch, with an app, with a dial."

E2IP TECHNOLOGIES GETS NOD FROM CES 2021

Montreal-based e2ip technologies has been named a CES 2021 Innovation Awards Honouree in the Smart Cities category for its Electromagnetic Engineered Surfaces (EES) technology, developed in conjunction with the Communications Research Centre of Canada. The thin, semi-transparent plastic sheets reflect, redirect or block specific radio frequency waves. The low-cost flexible sheets can be deployed on outdoor or indoor structural surfaces

Image: Magna International Inc.

(buildings, signage, interior walls) to augment, direct or inhibit specific telecommunication services (5G, Wi-Fi).

In the case of 5G networks, e2ip EES sheets reduce deployment costs and facilitate network deployment by reducing the number of antennas required to ensure omnidirectional 5G access to mobile users and fixed location access points. e2ip EES printed sheets do not require power and reduce the need for additional small cell antennas – traits highly needed in a 5G NR environment. EES provide an economical opportunity to better manage infrastructure for telecom operators, heads of Smart Cities, and managers of large venues.

EES surface designs are tailored to each network's specific needs and depending on the design of the surface, EES can act as a band-stop, band-pass structure, reflect signals at varying angles, or act as a diffusing or as a focusing instrument. These properties of EES can then be used to enhance the propagation of mmWave signals and help improve the overall reliability of the underlying infrastructure.

e2ip Technologies' thin, semi-transparent plastic sheets reflect, re-direct or block specific RF waves.

Photo: e2ip technologies; Ynvisible Interactive

"Our DNA in chemistry and printing functional electronics are at the heart the EES innovation, enabling us to embed printed electronics in structural surfaces that enhance 5G network performance and reduce network deployment cost" said Eric Saint-Jacques, e2ip CEO.

PRINTABLE ELECTRONICS

PRINTED INTELLIGENT LABELS FIGHTS FOOD WASTE

Ynvisible Interactive Inc., a Vancouver-based materials provider, recently announced that Innoscentia AB has chosen Ynvisible's displays for its expiry date labels on food packages.

Instead of static expiry date estimations on the packages, Innoscentia has developed materials that combine with the Ynvisible display, enabling real-time quality monitoring of the food. This solution aims to reduce food waste significantly and detect spoiled food in time, even before the expiry date.

"After recent breakthroughs with our sensors, we are now ready to take the next step to produce a prototype, and we believe Ynvisible to be the optimal partner for this because of their experience and cutting-edge technology within printed displays and electronics," says Erik Månsson, CEO of Innoscentia. "The results of the project will hopefully move us a big step closer towards disrupting the current labelling system of food and help us create a more sustainable food value chain in the future."

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

HEXAGON/NOVATEL integrates autonomous solutions for farm tractor OEMs

We hear a lot about self-driving vehicles. Technology has arrived that makes their deployment affordable and, likely one day, straight forward. Self-driving cars and trucks have been put through rigorous testing over the years and it will only be a matter of time before they become mainstream.

For years, Calgary-based NovAtel, part of Hexagon's Autonomy & Positioning division, and part of the Swedish Company, Hexagon, has been focusing on automation in agriculture, providing OEM tractor manufacturers with technology like their SMART7 antenna which detects tractor position and directs tractor manoeuvers. The impetus for building autonomous tractors came from the recognition of how hard farmers have to work, a desire to deliver the full potential of sensors, and accurate positioning capability to enable independent farm operations. West Coast Report recently interviewed Mike Martinez, segment manager, agriculture at Hexagon | NovAtel, about its autonomous tractor technology and questioned how they plan to navigate through some challenging safety considerations.

The agricultural industry has not yet been able to enjoy the benefits of automated tractors, according to Martinez.

"While there are some developers of autonomous custom-built tractor and agricultural machinery platforms, autonomous tractors have not yet been released mainstream. Therefore, significantly less than 1% of all agricultural tractors produced annually [are autonomous]," Martinez says.

Tractors are adaptive to vast areas

The reasons for an autonomous tractor for farmers seem obvious. Tractors are adaptive to vast areas, for multiple fields and for multiple crops, and farm chores can be tedious and never-ending. Making matters worse, the farming population has been shrinking, and the work is often in remote, isolated fields where workers are hard to come by. NovAtel wants to remedy farmer shortage by producing equipment that will be as multi-tasking and flexible as farmers themselves.

There is a strong consensus that self-driving cars can save countless lives, so what about agricultural vehicles? Designing an agricultural self-driving tractor is not as complicated as a self-driving car, which has to interact with multiple fast-moving vehicles, slow-moving pedestrians, bikes, and strollers, not to mention emergency vehicles, unscheduled road closures and diversions. A typical farm environment is much simpler, but this is what Martinez had to say.

"Safety is obviously a significant concern. Like the automotive market, the identification and design of the safety system for agricultural machinery will take some time for the global industry to agree upon," he says. "Like anything, the careful balance between functionality and affordability must be considered."

The challenge arises when one considers any farm that might conceivably have children nearby. Does the tractor recognize humans amongst crops? Autonomous tractors need to make decisions electronically and mathematically in order to react, and keep people out of harm. There are a lot of strategies involved in accident prevention, but the best strategies remain human guidance and vigilance.

"[Machines can] either incorporate a safety operator onboard or are closely monitored in controlled environments offboard," Martinez says.

Applying technology to off-road markets

NovAtel has more than 10-years of experience in autonomy, with hundreds of platforms built. The firm is now taking this experience and applying it to off-road markets, where they already provide positioning solutions for autonomous and semi-autonomous machinery. NovAtel's stated competitive advantage is its experience and competency in positioning and autonomy that is used to satisfy customer's needs, and the tractor is an ideal utility to test this technology.

"We don't provide it to the end-customer, we tailor our services to the OEM manufacturers. Here we've fashioned a tool, a very advanced tool, to educate the manufacturers as to what type of perception sensors will be used and how they will be integrated with the smart software that will bring them into working together."

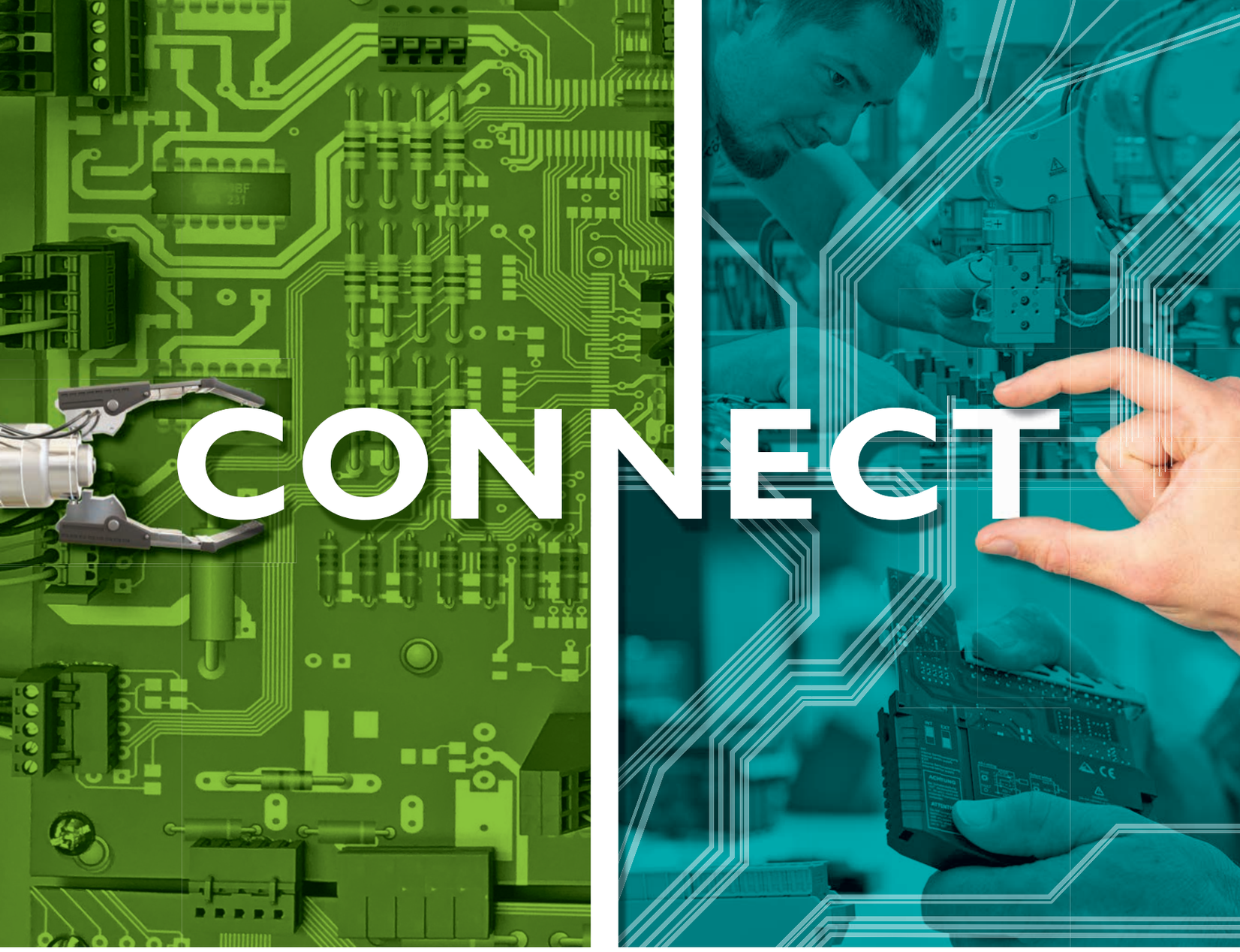
A tractor needs an incredible amount of intelligence to know what to do when confronted with a person or an object. The NovAtel team has sorted out the types of sensors required to support a variety of tasks.

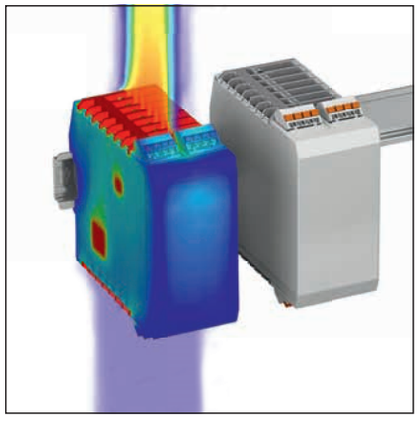
"Vehicle control, position, perception, path planning…must all work together flawlessly. There are pieces that different manufacturers will concentrate on, there are specialties that integrators will specialize in, like path planning, or the decision-making process. But, they may not have that full technical competency yet to tie it all together," explains Martinez.

This is a competitive advantage that they hope to harness to yield even greater success: the ability to successfully integrate all the options and data to make this complex technology intelligently useful. To learn more about NovAtel's agriculture autonomy capabilities, go to novatel.com/ag-autonomy, or take a virtual tractor tour via their 3D interactive app. **EP&T**

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

Photo: NovAtel





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

Wisebatt CEO details techniques that allow engineers to optimize power consumption & battery life.

Advantages and drawbacks of the most common power management techniques

BY WILFRIED DRON, WISEBATT

Battery life is an important differentiator for IoT devices' development. It must be taken into consideration right at the beginning of the design phase, as one of the main technical specifications. With some simple techniques, engineers can drastically improve the power consumption of their connected devices to reach the battery life expected by the market.

In this article, Wisebatt's CEO Wilfried Dron shares five techniques that allow engineers to optimize the power consumption and the battery life of their devices. He compiled a non-exhaustive list of the most common power management techniques and explored their practical application, advantages and drawbacks.

For this demonstration, we used a basic IOT device composed of a microcontroller, a sensor, a radio, a linear regulator and a battery. This is a 90-min battery life long device which costs around $8 for 1,000 units.

1- Use a LDO regulator

The first tip consists of putting another LDO regulator in to lower the power consumption by splitting the power domain. It also helps to balance heat dissipation and wear level.

There are two possible architectures:

The first one is a parallel architecture. The battery supplies the voltage to two regulators: one for each supply voltage rail. In our case, the power draw is unbalanced (126mW on the 1.8V rail versus 27mW on the 2.7V rail).

The second architecture is the follow-up topology. Each LDOs is placed one after the other. The first one is lowering the voltage to the highest supply voltage (from 3.6V to 2.7V) the second one is lowering the voltage even more from 2.7V to 1.8V. By doing so, the power dissipation is balanced between both regulators.

LDOs are very useful when it comes to sensitive applications. In addition, the efficiency will be higher when the input supply voltage is closer to the output supply voltage (considering the necessary drop). The last things that should be considered when choosing an LDO are the 'enable' and 'bypass' features, which can be very useful.

Advantages :

Using two LDO rails is a low noise solution that can expand devices' battery life up to x1.5 times.

Drawbacks:

The efficiency relies on the ratio between the input supply voltage and the output supply voltage. Indeed, in some cases, the battery life could encounter marginal gains because of higher energy spent in the regulator.

Complexity:

This solution is simple to apply, with a small footprint and few passives.

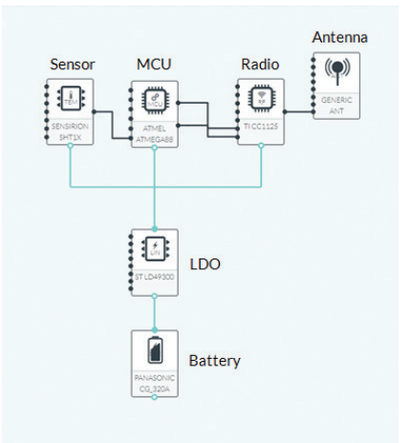
Cost:

The costs are low, as this technique requires the use of just two passives: one at input and one at output (approx. 20¢ for the regulator and 3¢ for the filtering capacitor for 1,000 pieces).

2- Use a buck regulator

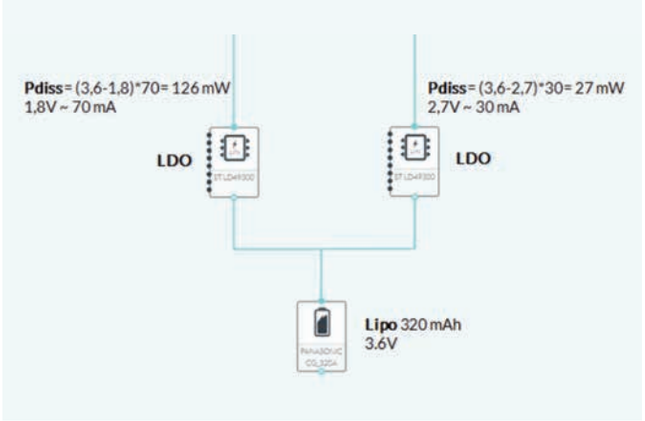
With a follow up architecture, the buck regulator does most of the conversion by dropping the voltage from the battery from 3.6V to 2.7V. The linear regulator will further drop the voltage to 1.8V. This topology is adapted to designs in which a part of the circuit is sensitive to switching noises. This part will be supplied with a LDO while a buck regulator supplies the other part.

The second architecture is a parallel

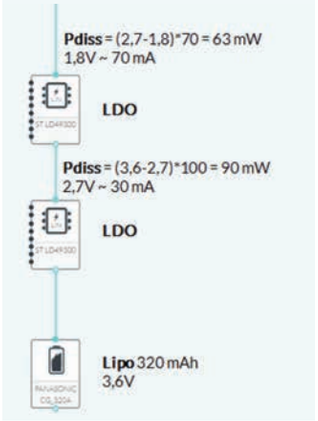


Powering down unused peripherals allows designers to minimize power consumption and leakage. Thus, every small saving can help increase battery life.

Photo: Main: © Trifonenko / iStock / Getty ages Plus. Inset: Wisebatt



One tip shared by the author is by putting another LDO regulator in to lower the power consumption. It also helps to balance heat dissipation and wear level.



Here each LDO is placed after the other - the first lowers the voltage to the highest supply.

topology, where both buck regulators are set in parallel. Unlike the LDOs, the buck regulator efficiency is less sensitive to the ratio between the input voltage and the output supply voltage.

Advantages:
With this second technique, the device can reach up to 2.5x battery life extension.

Drawback:
Buck regulators introduce a switching frequency that generates some noise on the power supply. In addition, one must be careful when choosing a buck regulator, as it may dissimilar quiescent current consumption.

Complexity:
The complexity of this solution is moderate, as it requires one additional passive (compared with the use of LDOs). Also, it has a medium impact on the pcb footprint (the passive is an inductor and it could be bigger than the regulator itself).

Cost:
This technique is expensive. I.E: in the case that we demonstrate, it could cost $2.2 per regulator and 20¢ for the inductor and 2 x 1.4¢ for the filtering capacitor - for 1,000 pieces.

3- Use a load switch

The following technique consists in using a load switch in order to shut down all the unused components in the system, instead of putting them in sleep mode.

Advantages:
Using a load switch can lead to a gain of at least +10% of battery life, depending on the device's application and the shut-down components.

Drawback :
It implies the use of a microcontroller GPIO which might be limited, depending on how many pins are already used.

Complexity:
This straightforward solution has a small footprint, as it requires adding a component between the power supply and the component that is load-balanced.

Costs:
This very low cost technique can even be free when using the 'enable' feature of the regulator. In the demonstrated case, it will cost 18¢ per switch for 1,000 pieces.

4- Power down unused peripherals

Powering down unused peripherals warrants minimized power consumption and leakage. Each small saving can lead to a substantial increase of the battery life.

Advantage:
This solution may improve battery life up to 2.5 times. Indeed, it demands only software modifications, while the hardware design can remain unchanged.

Drawback:
We might stress the need to rewrite some existing software and drivers. This increases firmware complexity.

Complexity:
This approach is quite simple, as it does not require any hardware modification.

Cost:
Free, except for the engineering time invested.

5- Get a bigger battery

If the previous battery life optimization techniques are not enough, the very last option would be to consider a bigger battery. However, this solution has no advantages.

Drawback:
Selecting a bigger battery will increase the device's form factor, with a high probability of having to redo the mechanical casing. It might also require new certifications and consider specific rules (especially if air delivery is needed).

Complexity :
If the mechanical design is not determined yet, it is a simple technique.

Cost :
This solution is the most expensive one. When battery life is an important constraint, IoT devices need to be designed to reach the most optimized power consumption. These techniques can help engineers improve their hardware design with a longer battery life.

***Wilfried Dron**, CEO & co-founder, Wisebatt, Paris France. The firm's technology estimates the battery life of a device by taking into account the entire system, its operation and its power consumption, as well as the non-linearities of its power source(s). Dron has a PhD in computer science, telecommunications and electronics*
wisebatt.com

Photo: Wisebatt

SUM UP

Here is a recap of the five power management techniques introduced in this article.
The results come from Wilfried Dron's experience, as well as battery life estimations conducted on the simulation tool Wisebatt.

USE AN LDO REGULATOR

- ADVANTAGE - *1.5 X*
- DRAWBACK - *EFFICIENCY*
- COMPLEXITY - *LOW*
- COST - *LOW*

USE A BUCK REGULATOR

- ADVANTAGE - *2.5 X*
- DRAWBACK - *NOISES*
- COMPLEXITY - *MODERATE*
- COST - *HIGH*

USE A LOAD SWITCH

- ADVANTAGE - *+ 10%*
- DRAWBACK - *SW COMPLEXITY*
- COMPLEXITY - *SIMPLE*
- COST - *LOW*

POWER DOWN UNUSED PERIPHERALS

- ADVANTAGE - *2.5 X*
- DRAWBACK - *SW COMPLEXITY*
- COMPLEXITY - *LOW*
- COST - *FREE*

GET A BIGGER BATTERY

- ADVANTAGE - *N/A*
- DRAWBACK - *FORM FACTOR*
- COMPLEXITY - *VERY LOW*
- COST - *VERY HIGH*

Machine learning in analog

The ultimate way to save power in IoT devices

BY TOM DOYLE, CEO AND FOUNDER, ASPINITY

The IoT age is upon us. Demand for more intelligent always-on connected devices is creating explosive growth in smart speakers, hearables, personal health-monitoring devices, smart home security systems, and other smart IoT products—resulting in a serious, though unintended, consequence. If IDC's research estimate is on target, we'll have 41.6 billion IoT devices generating an astounding 79.4 zettabytes of data by 2025, and these devices have traditionally relied on the cloud for processing. But, clogged networks, as well as privacy and performance requirements, have necessitated a move to more local processing (edge processing), bringing more of the powerful cloud computing capability into the device.

It might sound attractive to move more data processing to the device edge, thereby increasing localized intelligence, but it's not that straightforward, because as devices have become smaller and more portable, they're also relying increasingly on battery power instead of on wall power. The recent advancements in tinyML—the integration of machine learning into small semiconductor chips—has helped to bring smart functionality into portable devices, but ultimately, the power levels are still too high for the next generation of small battery-powered devices, such as hearables and wearables, smart home-security sensing, industrial-equipment monitoring, and countless other applications.

The real challenge to power efficiency in always-on devices is the continuous collection of ambient data and its movement through the signal chain. All data is treated equally, digitized upon entry into the system, and then analyzed for a specific trigger: a wake word, a vibration anomaly, the sound of breaking glass, etc. The entire system is on all of the time just 'waiting' for an event to happen. For certain devices, like those that are always listening for the sound of broken glass in a home-security system, that wait could be many months or years during which the system wastes power by digitizing and analyzing sounds that are irrelevant.

Workarounds don't work

Tackling this power issue is also critical to keeping private data secure. Unfortunately, it's also exceptionally difficult. Design engineers have tried workarounds to decrease power consumption in an always-listening system, including duty cycling and reducing the power of each individual component in the audio signal chain that handles the data. The reality is that these types of approaches don't address the root cause of the problem: too much data.

To truly tackle the problem, we need to change our approach to a system solution, not a component solution. By moving to a more efficient edge architecture that intelligently minimizes the amount of data that moves through the system, we can focus the system's energy resources on analyzing the data for a specific trigger, not on searching all sound, relevant or not.

Systems architecture is key

It's time to move away from the digitize-first approach that has dominated the architecture of always-on edge applications since the invention of the first battery-powered edge device. In any application, we know that not all data are equally important, so if we can determine importance earlier in the signal chain, we can minimize the amount of data that moves through the full system, keeping higher-power chips in sleep mode until they're actually needed for further analysis.

For example, in a voice-first application, such as a TV remote or smart speaker, the digitize-first model requires digitizing 100% of the incoming microphone data for wake word analysis. But because voice is spoken only randomly and sporadically, up to 90% of the system power that is used to digitize and analyze the audio signal is wasted searching for a wake word when there is only noise.

Analog machine learning (Analog-ML), is an ultra-low-power analog edge-processing technology that is changing this paradigm. For the

Design engineers have tried workarounds to decrease, power consumption in an always-listening system, including duty cycling and reducing the power of each individual component.

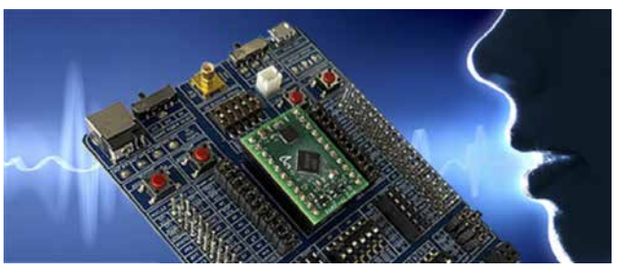
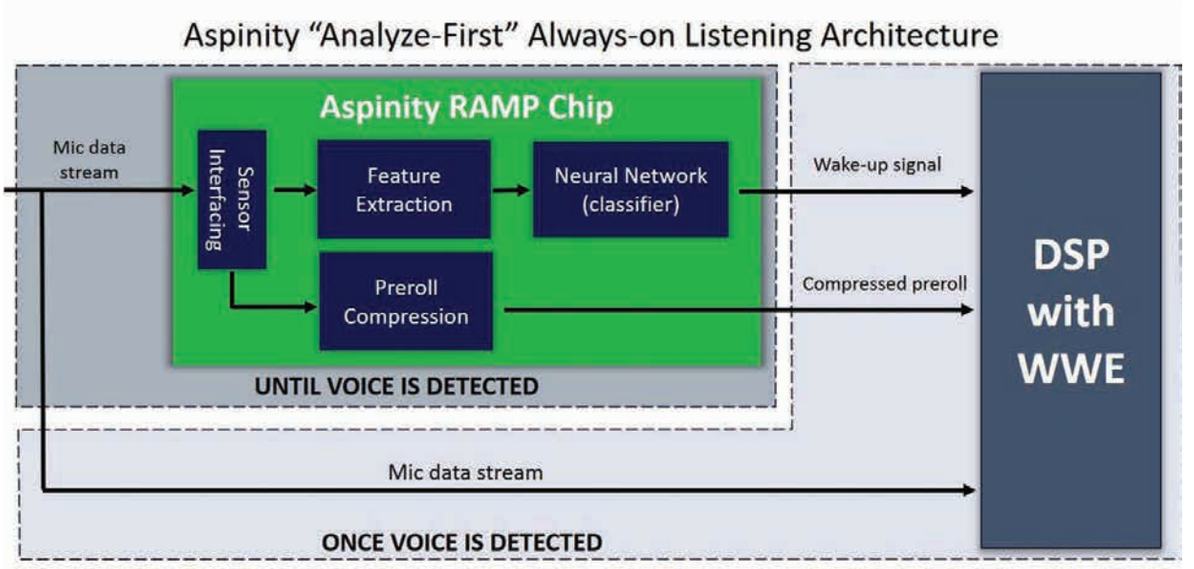


Photo: Aspinity



Analog machine learning (analogML) is an ultra-low power analog edge processing technology that is changing this paradigm.

first time, device designers can use analog machine learning to detect which data are important for further processing and analysis prior to data digitization. In an analyze-first architecture, the analogML chip allows the higher-power-processing components in the system, including the ADC and the DSP, to stay asleep until voice has actually been detected, and only then does it wake them to 'listen' for a possible wake word.

Delivering a post-microphone audio chain that draws as little as 10µA of current when always-listening, this analyze-first architecture is so efficient that it extends battery life by up to 10 times, compared to the traditional digitize-first approach to always-on listening. That's the difference between smart earbuds that last for days, instead of hours, or a voice-activated TV remote that lasts for years, instead of months, on a single battery charge.

Suitable for portable IoT and IIoT applications (including those operating in remote locations), analogML enables the design of thousands of new types of power-efficient always-on devices that run significantly longer on battery. **EP&T**

Tom Doyle, *CEO & founder of Aspinity, has more than 30-years of experience in executive leadership in analog and mixed-signal semiconductor technology. He holds a B.S. in electrical engineering from West Virginia University and an MBA from California State University, Long Beach.* ***aspinity.com***

Photo: Aspinity

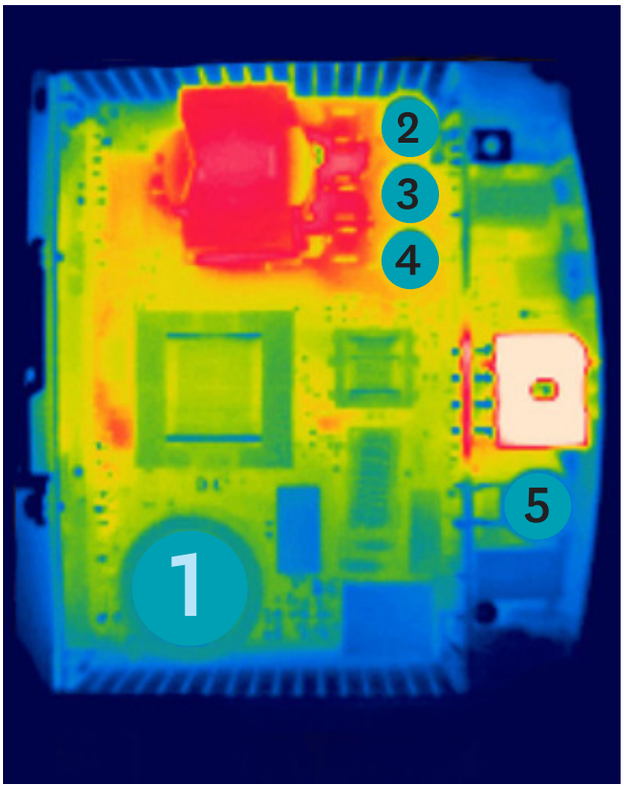
Understanding the advantages of utilizing high efficiency power supplies

BY PULS POWER USA

Efficiency is one of the most important features that every control systems engineer/designer must consider when selecting the appropriate power supply for their application requirements. When you use a power supply, energy flows through the product, but not 100% of that energy can be used. The difference between the usable energy and what is lost is dissipated in the form of heat. Heat is the number one enemy in an electrical panel because it degrades the power supply and other surrounding electrical devices.

Let's compare two power supplies; one is 92% efficient and the other is 96%. The 92% efficient unit is very good, so what is the point of going to 96%? Using these figures, one might think that the difference is only 4% (96%-92%=4%). Using a 100 watt power supply as an example, the 92% efficient power supply loses 8.7 watts, and the 96% efficient power supply loses 4.2 watts. That is greater than 100% less heat loss from the 96% highly efficient power supply.

Let's look at a real-world example using two 480 watt power supplies. Manufacturer A has an efficiency rating of 95.6%, and Manufacturer B has an efficiency rating of 93.1%. The apparent difference is 2.5%. Not a big deal, right? The table below demonstrates the actual differences between these two power supply units.



MFG	Efficiency	Heat Loss (Watts)	Energy Waste Per Year	% Difference
Mfg. A	95.6%	22.1	$7.47	-
Mfg. B	93.1%	35.6	$12.03	+ 69%

Based on 50 hours of operation per week and $0.13 per KW

Considerations of Heat

Heat is the number one enemy to a power supply because electrolytic capacitors are used in all switch mode power supply designs and electrolytic capacitors degrade at a higher rate in high ambient temperature applications. Often times, there are far more sensitive electronic components inside an enclosure which can be affected by heat like PLC's, industrial computers, communication devices, and HMIs. Heat can radically change the reliability and lifetime of the power supply and in many cases can force you to increase your enclosure size, install some form of cooling and/or derate the unit to compensate for high heat losses. The general rule of thumb as published by capacitor manufacturers is that every 10°C increase in temperature results in a 50% decrease in life of the capacitor/power supply. Since capacitors are very sensitive to heat, a good power supply design will also thermally separate the capacitors from heat producing components like transformers and bridge rectifiers.

As shown in the thermal image at left, the larger blue circle (1) at the bottom, and the 3 smaller blue circles (2, 3, 4) in the upper right are electrolytic capacitors. These capacitors are positioned so that they are either placed in a naturally cooler location (bottom), or they are separated by an air channel that protects them from stagnant heat and therefore extends their lifetime and reliability. More importantly, reduced heat will lengthen the life of all products, substantially reduce replacement costs, and provide a lower total cost of ownership.

So, by choosing a power supply with the highest efficiency and good thermal design can mean the difference between a highly reliable control system and a system where problems ultimately will occur.

Energy Savings

Another area that should be carefully considered by the designer is the amount of lost energy consumption required to operate the load. If we look back at the same example of the two 480 watt power supplies, but this time from an energy standpoint, you will be surprised with the results. The power supply which was rated 93.1% efficient from Manufacturer B had 35.6W of lost energy and from a simplistic calculation loses 1.78KW over a 50-hour work week. As compared to the 95.6% efficient power supply from Manufacturer A, with losses of only 1.1kW over the same period. Using an average kilowatt cost of $0.13 per kilowatt/hour, the lower efficient power supply from Manufacturer B would waste approximately $12.03 per year versus $7.47 per year for Manufacturer A, Multiply this by the number of power supplies utilized in a facility and the savings can be quite significant over the life of the control system.

Total Cost of Ownership

Let's look at examples of three different brands of 240 watt power supplies. If we calculate energy losses, and lifetime over a 10-year period for a facility with 50 power supplies and

Photo: PULS Power USA

a 40°C ambient temperature, we can see the true difference in costs. Manufacturer A has 14.5W of losses and a lifetime of 57,000 hours based on the data from the manufacturer of the electrolytic capacitors that were used in that power supply. Manufacturer B has 18.8W of losses and a lifetime of 18,000 hours, and Manufacturer C has 17.6W of losses and a lifetime of 34,000 hours. The table below shows the true cost of ownership of each power supply brand.

The Bottom Line

This data shows the many significant impacts of choosing the right manufacturer for an efficient power supply.

Feature	Manufacturer A	Manufacturer B	Manufacturer C
Losses (W)	14.5W	18.8W	17.6W
Lifetime (hrs.)	57,000	18,000	34,000
Replacement schedule (Years)	6.5	2.1	3.9
Lost Energy $ per PSU/ 10 Years	$165.13	$214.09	$200.43
PSU Acquisition costs Per Machine/ 10 Years	$300.00	$750.00	$450.00
TCO Per Machine / 10 Years	$465.13	$964.09	$650.43
TCO 50 Machines / 10 Years	$23,256.50	$48,204.50	$32,521.50

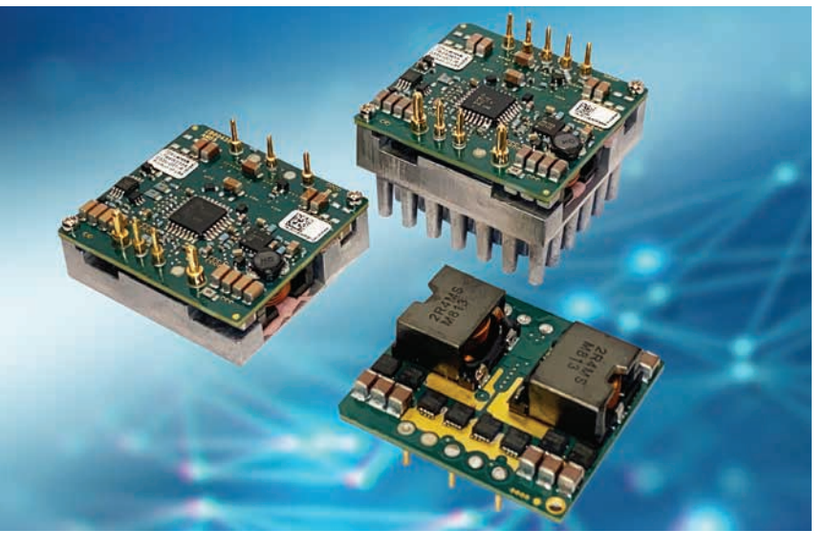
Based on 24/7 operation and $0.13 per KW.

Key benefits to the customer are:

- Lower Energy costs over the lifetime of the application
- Reduced Heat introduced into the control enclosure, potentially eliminating the need for cooling systems or oversizing the enclosure
- Reduced Stress on the electrolytic capacitors and other electronics increasing the lifetime of all devices in the enclosure
- Fewer replacements over the life of the application
- Lower total cost of ownership for the system

Best practices when determining which brand to choose include the insistence of the highest full and partial load efficiencies, documented lifetime of the electrolytic capacitors, (not just calculated MTBF) accurate and detailed data sheets and of course, the lowest total cost of ownership. **EP&T**

PULS** is a manufacturer of DIN-Rail and machine mount switch mode power supplies and dc power products. **pulspower.us



STEP-DOWN DC-DC BUCK CONVERTER DELIVERS OUTPUT RANGE OF 3.3 TO 24V

TDK-LAMBDA

i7A series 500W rated non-isolated dc-dc step-down converter is capable of operating from an input voltage of 18V to 60V, and deliver an output voltage that can be adjusted from 3.3 to 24V with an output current of up to 33A. Product series utilizes the industry standard 1/16th "brick" pinout, potentially offering cost reduction and efficiency improvements over isolated converters. Units can be used in conjunction with a single output 24V, 36V or 48Vac-dc power supply to generate multiple additional regulated outputs, with or without battery back-up.

jp.lambda.tdk.com/en/

EMBEDDED PROCESSORS ENHANCE PERFORMANCE, BOOST POWER EFFICIENCY

AMD

Ryzen Embedded V2000 Series processor is built on the 7nm process technology, 'Zen 2' cores and high-performance AMD Radeon graphics, and provides a new class of performance with 7nm technology. Device delivers improved power efficiency and continues to deliver enterprise-class security features for embedded customers. Product family is designed for embedded applications such as Thin Client, MiniPC and Edge systems. Equipped with up to eight CPU cores and seven GPU compute units, a single processor provides 2x4 the multi-threaded performance-per-watt, up to 30% better single-thread CPU performance and up to 40% better graphics performance over the previous generation.

amd.com

OSCILLATOR OPERATES WITH 1.6V TO 3.3V SUPPLY VOLTAGE RANGE

IQD FREQUENCY PRODUCTS

IQXO 951 standard packaged clock oscillator series operates with a supply voltage range from 1.6V to 3.3V. Device is available in industry standard packages of 3.2 x 2.5mm, 2.5 x 2.0mm and 2.0 x 1.6mm, and it will allow electronic equipment manufacturers to benefit from standard stability of ± 25ppm over the industrial temperature range from -40 to 85 degrees C. Parts are also available with extended temperature range up to -40 to 125 degrees C. Devices are suitable for most applications that are designed for battery-powered products. In addition, customers could reduce their BOM management by using a single part instead of multiple oscillators with fixed supply voltages.

iqdfrequencyproducts.com

SMALL TRANSFORMER ENHANCES BANDWIDTH WITH LOW LOSSES

PREMO

PLC-LW-series SMD isolation transformer 1:1 family for power line communication comes in small size

and enhanced bandwidth with very low losses. Unit is designed for coupling/decoupling signals for power lines communication according to IEC 15118 and IEC 61851-1 for charging system communication V2G & V2V. Product uses linear winding versus toroidal winding. Product is designed with NiZn magnetic core, providing the minimum insertion losses in a wide frequency band 1-30MHz and able for communication up to 100MHz.

grupopremo.com

TINY 300W SINGLE OUTPUT POWER SUPPLY QUALIFIES FOR MEDICAL SYSTEMS

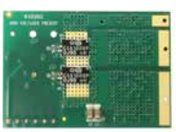
VOX POWER

BXT2-17TF single-channel, infrared (IR) detector comes with an integrated 4.67µm optical bandpass silicon filter. The high-performance lead selenide (PbSe) cooled device provides improved sensitivity for industrial carbon monoxide (CO) detection in harsh environments. The two-stage, thermoelectrically-cooled, packaged device with integrated thermistor boosts performance and reliability. Device provides additional sensitivity for low-level-emissions detection and enhanced temperature stability.

vox-power.com

100V HIGH-SPEED, HALF BRIDGE EVALUATION BOARD EVALUATES GAN

GaN SYSTEMS



GS-EVB-HB-61008P-ON 100V High-Speed, Half-Bridge Evaluation Board was designed in collaboration with ON Semiconductor. The high-performance solution is developed for existing and new pcb designs and allows power electronics designers to easily evaluate GaN for growing 48V market applications, including non-isolated step-down converters, non-isolated step-up converters, and half-bridge and full-bridge converters. The evaluation board includes an OnSemi NCP51810 GaN driver and two GaN Systems GS61008P E-mode GaN power transistors connected in a high-side, low-side configuration and all necessary drive circuitry. It provides the utmost flexibility of GaN transistor and driver combinations and can be applied in any topology that requires the use of a high-side/low-side FET combination. When connected into an existing power supply, it can replace HS/LS drives and MOSFETs.

gansystems.com

HIGH-RELIABILITY 16V SUPERCAP DELIVERS 65 FARAD CAPACITANCE

TTI

Eaton highly reliable 16V XVM EDLC SuperCap Module provides capacitance of 65 Farad and a temperature rating of -40°C to +65°C. Device provides a means to easily achieve higher voltage, power or discharge time through a series or parallel connection of multiple modules. Product's compact size allows for easy mounting as replacement for, or in conjunction with a 12V battery. Device also provides a high reliability, green solution for pulse or backup power applications.

tti.com

COMPACT DC ELECTRONIC LOADS MINIMIZES TEST BENCH SPACE

KEYSIGHT TECHNOLOGIES

EL30000 Series bench dc electronic loads provide a compact bench form factor with a built-in data logger that delivers insights for immediate, real-time decisions, and minimizes the need for additional instruments with an accurate system that measures voltage, current and calculates power. Units enable customers to test a wide range of power sources, perform both static and dynamic tests to ensure devices can output constant energy, as well as handle a sudden increase or decrease in demand. Multiple ranges allow accurate measurements for small and large devices from zero to 150V.

keysight.com/ca

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

GO GLOBAL

Interpower® Accessory Power

Interpower Accessory Power Strips make it easier to connect globally.

Product designers can design electrical equipment to be sold globally by simplifying power supply connections using an Accessory Power Strip with IEC 60320 components. Power strips incorporate an AC power inlet with multiple AC power outlets. Other features may include power on/off switches and circuit protection to combat spikes in voltage.

The Accessory Power Strip allows different components to work together in one system. Why export four different systems to four different countries when one system with a cord set and a country-specific plug will do? This allows the same system to be exported globally with cost-saving benefits.

To help prevent accidental power interruptions, some Interpower Accessory Power Strips include the new Interpower Connector Locks. This patent-pending design does not require tools for use

- **1-Week U.S. manufacturing Lead-Time on non-stock products**
- **Same Day shipments on in-stock products**
- **No minimum order or dollar requirements**
- **Lock in your price with blanket or scheduled orders**
- **Value-added options**

Visit Interpower's Virtual Trade Show by Scanning the QR Code.

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

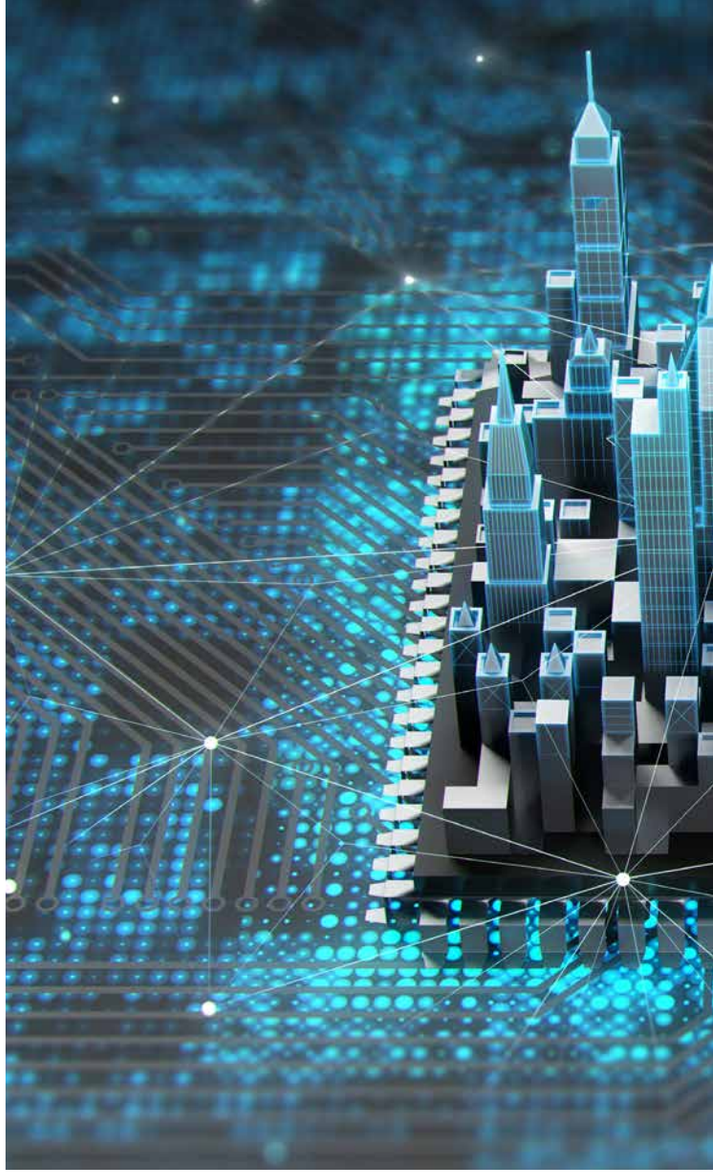
Business Hours: 7 a.m.–6 p.m. Central Time

interpower®

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

Integration: The key to powering the future of technology

BY RAJ RADJASSAMY, DIRECTOR, 5G WIRELESS SEGMENT FOR ABB POWER CONVERSION



As 2021 gets underway, technological innovation's rapid pace shows no signs of slowing any time soon. But while 2020 was all about the speed at which change occurred - with nearly two years of digital transformation happening in just two months (think the great e-commerce migration, with the U.S. Commerce Department showing a 37% increase in online sales in Q3) - the next phase of technological innovation will be marked by a different keyword — Namely, integration.

The seamless incorporation of technology into every aspect of our daily lives is becoming one of the most defining features of technological advancement. From ultra-fast 5G networks that provide unparalleled interconnectivity to smart cities complete with energy-efficient bike charging racks, electric vehicle (EV) charging stations, and data-driven infrastructure, suggesting that we stand on the cusp of a fifth industrial revolution is anything but hyperbolic.

The hallmark of technological innovation is often its imperceptibility. Advancements that become so tightly woven into the fabric of everyday life that they ultimately assume an air of inevitability, noticeable only in their absence. But, what exactly will it take for these revolutionary advancements at the intersection of technology and human-centered design to come to fruition? In a word, power. Simply put, power is the ultimate enabler of technological advancement. It lies at the heart of how we live, how we work, and how we remain connected to everyone and everything around us.

In this article, I will examine three technology trends currently underway with the potential to reshape our collective future. Each trend makes it abundantly clear that as technology continues to evolve, fulfilling the promise of innovation relies on the development and design of reliable, compact, and efficient power supply systems capable of propelling the world of tomorrow.

Connected Living: Powering & Untethering New Devices

Just a decade ago, the smartphone was considered a luxury. Today, our phones, personal computers, and mobile devices are integral rather than ancillary to daily life. At the start of 2021, the adjectival modifier 'smart' has become ubiquitous. Smartphones have given way to smartwatches, smart speakers, smart televisions, and all types of intelligent home appliances designed and manufactured with connectivity at their core. At present, U.S. households have an average of 11 connected devices, including seven smart screens to view content - numbers that are likely to increase in tandem with the widespread adoption of 5G networks capable of supporting even greater connectivity levels.

Not surprisingly, the penetration of technology and intelligent data sources in our daily lives has also led to increased power consumption. This distributed network of devices requires accessible and available power-on-demand just about everywhere we are – on our wrists, in our pockets, on our walls, and even spread throughout our communities and across industry. But the seamless integration of connected and smart technologies requires connectivity without the limitations of traditional cables and connectors that are not only cumbersome but, more importantly, prone to failure and expensive to maintain.

Facilitating a complete transition from wired to wireless requires power solutions robust enough to eliminate cables while remaining capable of accommodating an ever-increasing amount of power transmission. Moving forward, power engineers must focus on pushing the boundaries of wireless power transfer beyond smaller devices, like cellphones and toothbrushes, to handle increased power loads with the level of reliability and resiliency necessary to support an increasingly complex web of connected infrastructure.

11

U.S. households have an average of 11 connected devices, including seven smart screens to view content

Smart Cities: Connecting 5G & IoT Tech via Miniaturized Power Modules

As 5G network adoption grows, so too does the potential for the Internet of Things (IoT) to extend connectivity beyond the household and into cities themselves. Smart cities consist of an ecosystem of network sensors and devices at the intersection of technology and human experience to collect and transmit data in real-time. From commuter data with the potential to improve mass transit and the flow of traffic to smart infrastructure that can optimize power usage and advance sustainability initiatives, the

Photo: © Iaremenko / iStock / Getty Images Plus

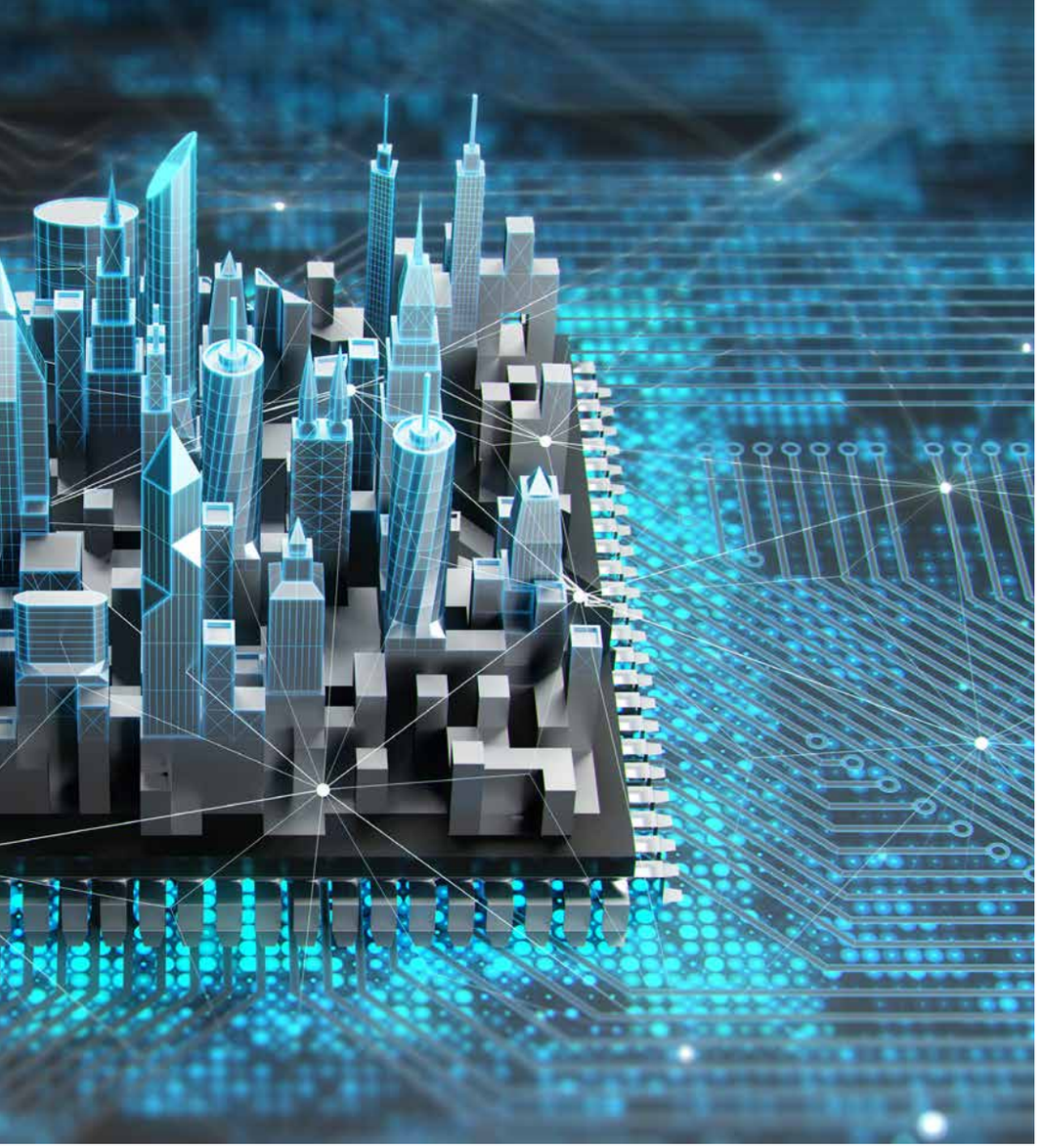


Photo: ABB

A decentralized dc artchitecture, for example, offers a more efficient approach to power conversion than centralized ac power architectures by reducing the number of voltage conversions needed from the grid to the rack.

promise of smart cities lies in their ability to reshape the citizen experience completely.

To be sure, the connectivity of the smart city depends on the development of a robust 5G network capable of ensuring reliable, hyper-connectivity at breakneck speeds with ultra-low latency. But fulfilling the true potential of 5G and the Internet of Things requires a level of network density that differs significantly from earlier generations of cellular and broadband infrastructure. The reliance of 5G on smaller, widely distributed transmitters requires a power infrastructure that is not only dense enough to handle the increased demand but, more importantly, compact enough in its design to integrate into a city's architecture without appearing unsightly, obtrusive, and out of place.

By emphasizing the design of miniaturized components capable of withstanding harsh weather conditions, power engineers can play a critical role in enabling greater flexibility for device placement and increase opportunities capable of facilitating greater connectivity. In short, smart cities' success hinges on the need for smaller, more compact power supplies that can live alongside the interconnected network of sensors and devices distributed throughout the city.

Mission-Critical Applications: Power's Role as Data Dependence Increases

With Cisco projecting cloud data centers to process 94% of all workloads and computational data in 2021, defining what we regard as mission-critical continues to evolve. And with good reason. No longer reserved for the power grid alone, mission-critical has grown to encompass everything from credit card processing and mobile payments to online banking and hospital computer systems. What's more, the overwhelming shift to remote work and an increasingly distributed workforce have facilitated an unprecedented level of demand for access to data from anywhere at any time.

Against this backdrop, the challenge for data center operators is clear. How can data centers ensure their facilities are well prepared to scale operations while increasing efficiency and reliability as uptime and resiliency demands continue to grow, especially in the face of a more significant number of applications regarded as mission-critical?

The answer lies in not just building larger data centers but in innovating within the data center itself, rethinking the critical role power supply architecture plays as a potentially enabling or limiting factor for expanding data center capacity.

A decentralized dc architecture, for example, offers a more efficient approach to power conversion than centralized ac power architectures by reducing the number of voltage conversions needed from the grid to the rack. What's more, a dc power architecture can eliminate the single point of failure typically associated with a centralized ac architecture by distributing battery backup power directly inside the cabinet while still leaving space for the computing and networking equipment central to data center operations.

Technological Innovation = Power Innovation

From connected living and smart cities to the explosive growth in mission-critical applications, it's clear that the technological innovations taking shape around us are about more than just convenience. At their core, they are about reimagining the world we inhabit. To be sure, their revolutionary potential is immense. The promise of innovations like wireless charging for electric cars and hospital beds, or advancements in autonomous vehicles driven by the transmission of data in real-time provides a glimpse of a future in which the integration of technology in every facet of human life delivers substantial societal benefits.

But fulfilling this revolutionary potential requires advancements in the design and engineering of the power supply systems at the crux of technological innovation. Typically, we take power for granted. It's often not until the lights go out that we consider the critical function it serves. But regardless of whether or not we choose to acknowledge the role power plays in our daily lives, it is, in fact, integral. The seamless integration of technology in every space we inhabit - from the living rooms in our homes to the streets in our cities - demands a foundation provided by a robust and ever-evolving power infrastructure. **EP&T**

Raj Radjassamy, *Ph.D., director, 5G wireless segment leader for ABB Power Conversion, works with telecommunications, data center, and industrial customers to provide advanced solutions for their dynamic power challenges.* ***electrification.us.abb.com***

SEMICONDUCTORS

AMD UNVEILS 'WORLD'S FASTEST' GPU

Advanced Micro Devices Inc. (AMD) has unveiled its Instinct MI100 accelerator –calling IT the 'world's fastest' HPC GPU and the first x86 server GPU to surpass the 10 teraflops (FP64) performance barrier.

Supported by new accelerated compute platforms from Dell, Gigabyte, HPE, and Supermicro, the MI100, combined with AMD EPYCTM CPUs and the ROCm 4.0 open software platform, is designed to propel new discoveries ahead of the exascale era.

Built on the new AMD CDNA architecture, the GPU enables a new class of accelerated systems for HPC and AI when paired with 2nd Gen AMD EPYC processors. The device provides up to 11.5 TFLOPS of peak FP64 performance for HPC and up to 46.1 TFLOPS peak FP32 Matrix performance for AI and machine learning workloads.

EXPANSION

EMA DESIGN AUTOMATION GROWS NA OPERATIONS

EMA Design Automation, Rochester NY, a full-service provider and innovator of electronic design automation (EDA) solutions, is expanding operations in North America through the addition of the Trilogic EDA engineering sales and support team.

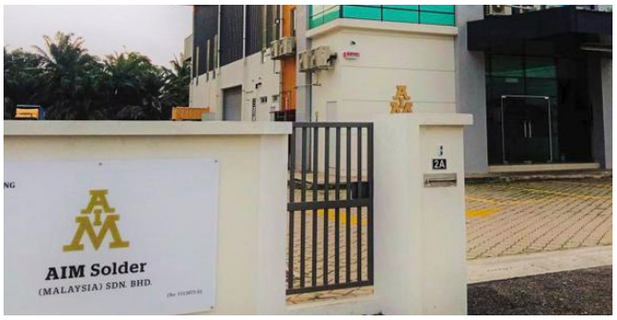
"We continue to see strong demand from customers looking to accelerate their digital transformation, as engineering teams adapt to increasing competition and shrinking time to market windows," says Manny Marcano, president and CEO of EMA Design Automation.

In 2020, EMA has seen a tremendous amount of growth, largely due to the increased customer need for automation and ability to deliver first-pass success through digital prototyping.

GOWANDA EXPANDS ITS DYCO FACILITY

Gowanda Components Group has completed nearly 50% expansion of its DYCO Electronics facility in Hornell NY. The 12,000-sq-ft expansion will help the firm address market demand for its products, enhance work flow and improve operational efficiency.

DYCO manufactures custom components and assemblies for the rail transportation industry so size and scale of those products played a role in the expansion. DYCO also engineers custom solutions for aerospace, military, space, medical and industrial applications.



Aim Solder has added a full-line manufacturing facility in Malaysia.

AIM SOLDER ADDS FACILITY IN MALAYSIA

AIM Solder, Montreal-based, global manufacturer of solder assembly materials for the electronics industry, recently added a new ISO 9001 certified facility in Malaysia.

The 12,000-sq.-ft. plant will provide locally made solder paste, liquid flux, bar solder, cored and solid wire. The fully-staffed facility will also provide sales support and customer service alongside the firm's technical support to an expanding customer base in Malaysia.

"The addition of the new facility in Penang strengthens our commitment to support the growing demand for electronic assembly solutions in Southeast Asia," said David Suraski, executive VP assembly materials division.

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

Photo: AMD; Gowanda; Aim Solder

PRODUCT SOURCE GUIDE

AD INDEX

TO ADVERTISE *in an upcoming issue of* **EP&T**, *contact* ***Scott Atkinson****, Publisher, satkinson@ept.ca or (416) 510-5207) or* ***Joanna Malivoire****, Account Manager, jmalivoire@ept.ca or direct 866-868-7089.*

iPhone 12 Pro Max Teardown

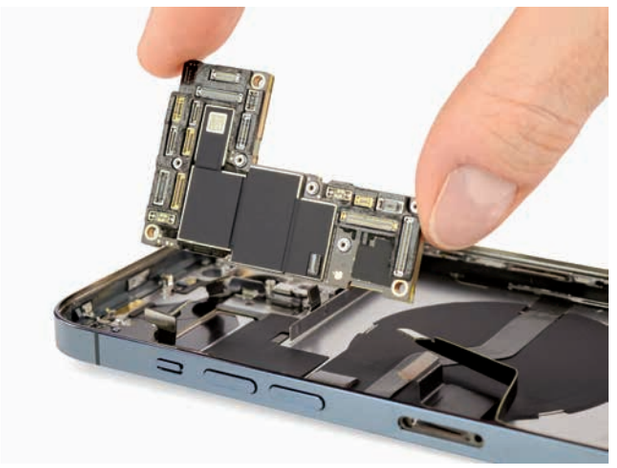
BY IFIXIT

These findings are from iFixit, the open-source repair guide. The popular site teaches people how to fix just about any electronic device, and sells the parts and tools to make it possible. This teardown exposes the iPhone 12, the Pro Max , which opens just like a book - and with a good story inside. Let's take a look.

Here's what we found inside:

- A14 Bionic SoC with fourth-generation Neural Engine.
- 6.7 inch (2778 x 1284 pixels) Super Retina XDR OLED display with P3 wide color gamut and True Tone.
- 12 MP triple camera system with wide angle ƒ/1.6 (OIS), ultra-wide angle ƒ/2.4, and telephoto ƒ/2.2 (OIS) cameras, with a LiDAR module.
- 6 GB of RAM and 128 GB of storage (256 and 512 GB configs available).
- 5G (sub-6 GHz and mmWave connectivity), plus 4x4 MIMO LTE, 802.11ax Wi-Fi 6, ultra-wide band (UWB), NFC, and Bluetooth 5.0.
- MagSafe 15 watt wireless charging.
- IP68 rating, water resistant to a maximum depth of 6 meters for up to 30 minutes under IEC standard 60529.

Like similar iPhone teardowns, the 12 Pro Max opens just like a book.



The 12 Pro Max benefits from a detached, modular SIM reader like in the 12 and 12 Pro - which also happens to be a bit more repair-friendly.

The standard wide camera (bottom left in the group of three) is the source of all the 12 Pro Max chatter. It's reportedly housing a 47% larger sensor, allowing it to gather more light and thus, better photos.

We're pleased to see this iPhone retain its high-tech L-shaped battery. Here's hoping those make a stronger comeback in the whole iPhone lineup next year—bigger batteries generally need fewer replacements over their lifetimes.

*These findings are from **iFixit**, a wiki-based site that teaches people how to fix almost any electronic device. Anyone can create a repair manual for a device or edit the existing guides to improve them. iFixit empowers individuals to share their technical knowledge and teach the rest of the world how to fix their stuff.*
https://canada.ifixit.com

Photo: iFixit

NOW VIRTUAL

EPTECH ON DEMAND

CANADA'S NATIONAL ELECTRONICS INDUSTRY TRADE SHOW

4 REASONS TO SIGN UP

- Secure real-time leads over 4 months, instead of one day
- Get in front of customers from coast to coast
- Book online meetings with new and existing customers
- Minimal effort, maximum payback

EPTECH LAUNCHES A SHOW GUIDE!

Exclusively available to EPTECH exhibitors.

The guide will appear as a special supplement – poly-bagged in the **March/ April edition of EP&T.**

BOOK YOUR SPOT in EPTECH on DEMAND and get an ad in the EPTECH Show Guide for Free.

The EPTECH GUIDE deadline is MARCH 5.

Don't miss this opportunity!

4 SPECIAL EXTRAVAGANZA DAYS

APRIL 28, 2021 - *EXTRAVAGANZA DAY 1*
STREAM 1 *Connectors & Components, Wire, Harness and Cabling*
STREAM 2 *Switches Sensors, Displays*

MAY 19, 2021 - *EXTRAVAGANZA DAY 2*
STREAM 1 *CEM Design & Manufacturing*
STREAM 2 *Production Equipment and Coatings*

JUNE 16, 2021 - *EXTRAVAGANZA DAY 3*
STREAM 1 *Enclosures, Metalwork, Thermal Management*
STREAM 2 *Power Supplies, Power management, Batteries*

SEPTEMBER 15, 2021 - *EXTRAVAGANZA DAY 4*
STREAM 1 *Wearable, Flexible, IoT, Wireless*
STREAM 2 *Test & Measurement, Regulation*

SECURE YOUR SPOT

Scott Atkinson
Publisher
satkinson@ept.ca
437-995-4651

Jason Bauer
Media Sales Manager
jbauer@ept.ca
416-510-6797

Joanna Malivoire
National Account Manager
jmalivoire@ept.ca
866-868-7089

PRESENTED BY

EP&T
ELECTRONIC PRODUCTS & TECHNOLOGY

WITH SUPPORT FROM

ONTARIO CREATES | ONTARIO CRÉATIF

HAMMOND MANUFACTURING®

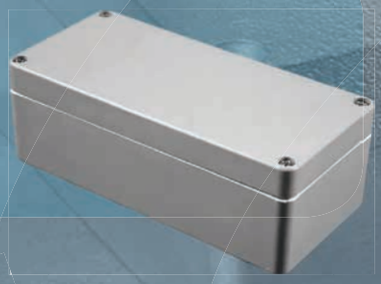
Hundreds
of industries served

Thousands
of models IN STOCK

Unlimited Applications

Polycarbonate Enclosures

Glass-Reinforced Polyester Enclosures



Industrial Wall-Mount Enclosures

Die-Cast Aluminum Enclosures

Stainless Steel Enclosures

www.hammondmfg.com