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OCTOBER 2021

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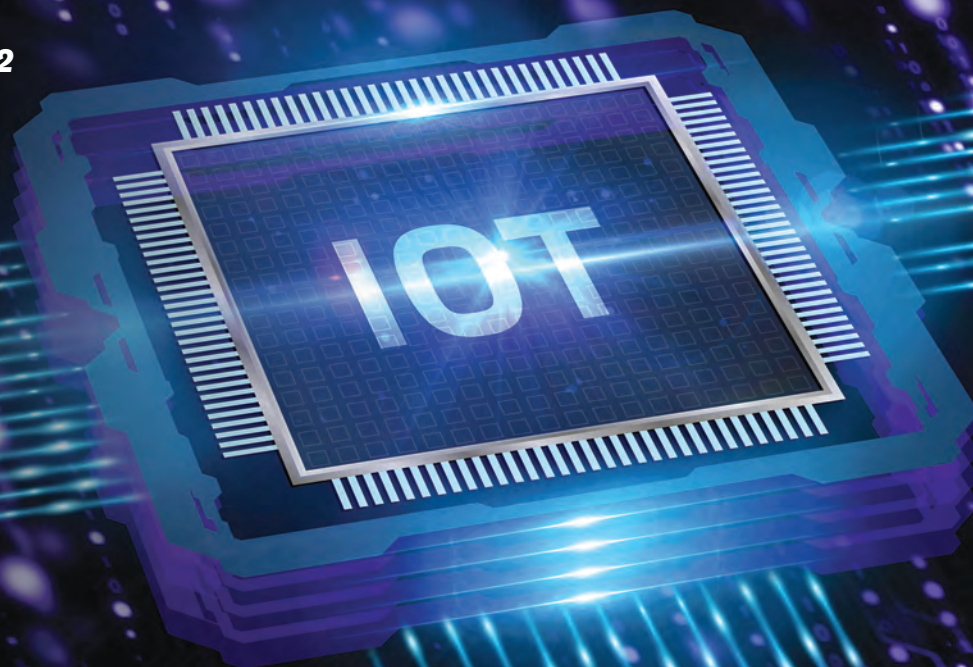
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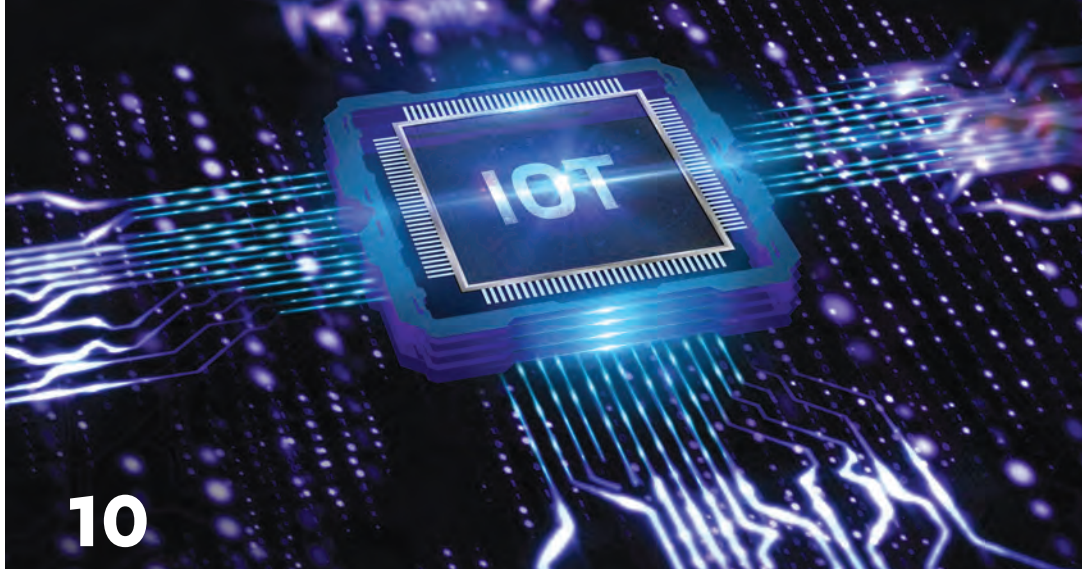


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# Silver lining to global connectivity in electronic applications

*Precious metal is key to development of emerging design sectors*



It's not very hard to find the silver lining in electronic applications these days. Silver is found in virtually every electronic design. Silver is also used in conventional switches like those used for controlling room lights. For printed circuit boards, used in consumer items from mobile phones to computers, silver-based inks and films are applied to composite boards to create electrical pathways.

Needless to say, silver is a pretty important ingredient for making the electronics world go 'round. With the highest electrical conductivity of all metals, silver is a component in almost all electronic devices we use daily. But, silver isn't just vital today; the next generation of technological advancements, especially those related to global connectivity expansion, will rely on the white metal's inherent properties throughout the 21 century.

As a result, the use of silver in electronics applications (excluding photovoltaics) is forecast to rise from 224-million ounces (Moz) in 2020 to 246Moz in 2025, reflecting a 10 percent increase, underscoring silver's role in emerging technologies.

To further examine silver's role in expanding global connectivity, the Silver Institute - the industry's principal voice in expanding public awareness, released a report titled '*Silver and Global Connectivity*'.

## Within the report were the following key points:

- The world is becoming more connected through the billions of physical devices that

connect to the internet. Silver is playing an important part in providing increased access to information, global markets, and communication, and, as a result, boosting productivity, reducing waste and inefficiencies, strengthening supply chains, allowing greater automation, and spurring economic activity. This is especially notable today as the Covid-19 pandemic has caused a dramatic uptick in the number of employees working and students learning remotely.

- Radio-frequency identification devices (RFID) wirelessly connect objects for tracking, monitoring, and data collection. The logistics and supply chain industry have had high adoption of RFID tracking systems to monitor their assets through air, rail, road, or ship. Health care has also benefited by allowing workers to discover real-time location of life saving medicines and equipment. Projected usage of silver for RFID's is expected to increase as much as 400 hundred percent through 2030.
- Silver is integral to applications used to forge connections across the globe. These include the expansion of 5G communications technology and the joining of once 'unintelligent' goods to a greater ecosystem through the 'Internet of Things' (IoT), the network of historically non-communicative physical objects that are now able to relay information. For example, silver is at the heart of many new technologies that establish reliable and instantaneous connections between people and a wide array of machines, appliances, and devices, including

smartphones, white goods, and exercise equipment.

- As global connectivity expands, each application will require various sensors, communication, tracking, and monitoring devices. Many of these applications will use silver in their semiconductors, electrical contacts, and elsewhere. In addition, the underlying infrastructure supporting this connectivity transition, such as the 5G network and IoT, will contribute to increased silver demand.

- Notably, silver offtake in electronics and electrical applications will benefit from the global green revolution's need for additional power distribution to connect renewable power, off-grid energy storage, and increasingly, the installation of electric vehicle charging stations. For instance, according to the International Energy Agency's Sustainable Development Scenario, the proportion of electricity generated globally from renewables will increase from 29 percent in 2020 to 49 percent by 2030.

As the world drives towards greater connectivity, which will require higher amounts of electrification, silver will continue to be vital to the expansion of flexible and printed electronics technologies.

Unless science discovers an alternate solution in conductivity, silver will continue to deliver the 'gold' standard in any electronic design. **EP&T**

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## MANUFACTURING

### CMC OUTLINES PLAN TO ACCELERATE HIGH TECH MANUFACTURING IN CANADA

CMC Microsystems (CMC), has brought together 14 project founders from industry, academia and non-profit technology research organizations to support a five year, \$700-million program to accelerate high tech manufacturing in Canada.

Called FABrIC, Fabrication of Integrated Components for the Internet's Edge, the program expects to attract \$480M in industrial R&D. The proposal also details \$100M generated as revenues or provided by provinces or matching funding and used during the project. This proposal has been submitted to the Government of Canada's Strategic Innovation Fund, (SIF) administered by Innovation, Science and Economic Development Canada (ISED) for a \$120M investment

Program funds will complement



the R&D programs at over 100 small, medium and large Canadian companies and accelerate their commercialization of products. Some 4,000 new high-tech jobs will result. FABrIC will ensure a prosperous future in the quantum space by supporting prototyping and manufacturing for Canadian quantum firms including Xanadu, 1Qbit, SB Quantum, Photonic, and D-Wave, and others.

Under the program, CMC will build and assemble quantum devices in Canada with the help of partners and quantum institutes at Université de Sherbrooke, University of British Columbia, and University of Waterloo. This will provide manufacturing capacity

to start-ups and scale-ups which would otherwise be out of reach.

## SOFTWARE

### SEMI ANTI-PIRACY SERVER CERT PROTOCOL ACHIEVES MILESTONE

The SEMI Electronics System Design (ESD) Alliance announced completion of the anti-piracy SEMI Server Certification Protocol (SSCP) for software license management, a year-long joint development effort led by the ESD Alliance, a SEMI Technology Community.

The SSCP, approved by development committee members Cadence, Siemens EDA and

Synopsys, uniquely identifies each customer license server to assure that licenses are issued only by authorized servers to help protect against software piracy. The SSCP is now undergoing standardization and will be managed by the SEMI Standards group after its finalization as an industry standard. The committee members intend to implement the protocol in their respective license management software.

An industry-standard protocol to combat software piracy is a growing necessity for design automation software suppliers to ensure only authorized servers are issuing licenses. Design automation software is complex and requires ongoing and significant R&D investments. Bad actors can apply server cloning techniques to access unlicensed copies of the software, putting legitimate users and software vendors at a competitive disadvantage by forcing software vendors to increase prices to support continuing investments in R&D.

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## CONTRACT MANUFACTURING

### URTECH FACILITY COMPLETES AS9100D CERTIFICATION

URtech Manufacturing Inc., a North American provider of end-to-end Electronic Manufacturing Services (EMS), has announced the certification of its Canadian facility's Quality Management System to AS9100D. With this milestone, together with its ISO9001 and ISO13485 certifications and ITAR registration, URtech's facility in Burlington ON has the appropriate, consensus-driven quality benchmarks to serve the aviation, space and defense industries.

"We have enhanced our QMS (quality management system) by integrating key process requirements for our defense, aerospace and avionics customers with our MES (manufacturing execution system)," stated Michael Wallace, VP of business development & customer programs. "This allows us to efficiently provide component traceability, assembly traceability, FAI reporting and other critical device record keeping activities for these mission critical accounts."

AS9100 is an aerospace standard based on the ISO 9001 quality system requirements, adding more stringent requirements specific to the aviation, space and defense industries. The standard takes the requirements of ISO 9001 and supplements them with additional quality system requirements, which are established by the aerospace industry in order to satisfy DND, DOD, NASA and FAA quality requirements.



**URtech's CEM facility in Burlington ON has achieved AS9100D quality certification.**

BG21 Bluetooth System on Chip (SoC); Telit's ME310 LTE CAT-M1/NB-IoT cellular modem (AT&T and Verizon); and an array of proven and pre-tested cloud service SDKs, drivers, and sensors.

This powerful combination of pre-tested hardware and software building blocks allows customers to rapidly prototype their unique application, while benefitting from a cost-effective and seamless transition to volume manufacturing.

"With an engineering team averaging 25 years of experience in the industry, we understand the pain points of IoT product development," said Gregor Bleimann, VP & GM at Connected Development. "We created the blueprints, initiated the testing, and integrated the leading software to help developers take off on the ground running."

The customizable IoT design platform is an ultra-low-power consumption design—offering integrated security features and extensive cellular connectivity for applications like industrial IoT, asset tracking, sensor monitoring and reporting, remote asset control, motion detection and reporting, and battery-operated IoT devices.

others are likely further out on the horizon. As a result, no unanimous description emerged of a typical mobile device in 2026.

The top-five disruptive features most anticipated, and ranked in order, by respondents are: self-charging; holographic or projection displays; fully recyclable; environment-proof, such as dust- or waterproof; and no-break displays. Also on the list are foldable devices, pop-up cameras, health biosensors, rollable devices and separation of device and display. Time will tell which features attain enough practical applications, market momentum and customer traction to become standardized in five years, if ever.

According to the survey, form factors (e.g., screen size, shape, etc.) also will evolve over the next five years. While 90% of those polled expect mobile devices to take on different form factors, there wasn't consensus on whether they would be smaller, larger or different altogether. Nearly two-thirds believe demand for novel wearables will grow, including smart clothing (40%), glasses (33%), earpieces (29%) and watches (29%). Typical consumers will likely have more specialized devices by 2026, according to two-thirds of those polled. Still, 64% believe smartphones with integrated capabilities will minimize or replace the need for tablets.

## WIRELESS

### WIRELESS POWER CONSORTIUM AWAITS QI V1.3 STANDARD

The Wireless Power Consortium (WPC) Inc., a global standard development body for wireless power, announced the release of Qi v1.3, the latest version of its Qi specification for smartphones and small mobile devices. As demand for faster charging of smartphones and small mobile devices accelerates, Qi v1.3 adds features and updates that make it easier for WPC's member companies to develop products that are safe to use at higher power levels. Qi v1.3 introduces product authentication as a new safety feature, improvements in the compliance testing procedures that make it easier to develop interoperable and safer products.

"With more than 100 new Qi products certified every month, it's important to make it easier to develop wireless charging products that are safe at high power levels and easy to use," said Menno Treffers, executive director and CEO at WPC. "These new features and

## INTERNET OF THINGS

### IOT REFERENCE PLATFORM SOLVES COMMON ENGINEERING ROADBLOCKS

Three leaders in Internet of Things (IoT) design and solutions have come together to deliver an all-in-one, comprehensive IoT Reference Platform. IoT design engineering firm, Connected Development, partnered with cloud-based IoT solutions firm, Kopis, and cellular connectivity and subscription platform, Zipit, on this platform that is aimed to help customers with size, power, and cost constrained IoT applications accelerate time to market.

The feature-rich IoT Reference Platform offers pre-certified, detailed schematics, including Silicon Labs'



**Three IoT-centric firms pooled their expertise to formulate a reference platform aimed at helping users speed time to market with designs.**

## CONNECTIVITY

### SURVEY FINDINGS REVEAL 'THE FUTURE OF MOBILE DEVICES'

Molex, a leading global connectivity supplier, unveiled the results of its survey polling manufacturing stakeholders to identify the top trends and technologies shaping the future of mobile devices. Survey findings reveal continued evolution of mobile-device form factors, disruptive features and innovations that will impact smartphones, smart wearables and other mobile devices manufactured in 2026.

Survey participants were asked a series of questions to help inform a depiction of typical smartphones and mobile devices in 2026. While responses identified various features, some of which are available already,



improvements keep both these factors at the core of the Qi standard. Qi v1.3 allows us to ensure that increases in power levels do not come at the cost of consumer or device safety.”

Qi Certified products have been tested for compliance with Qi’s safety features. Wireless chargers that have not been successfully tested may, for example, be unable to detect foreign objects and cause metal objects such as coins to become hot and damage the phone or cause burns. Qi v1.3’s authentication feature enables mobile phones to determine whether a charger is Qi Certified and allows the phone to reduce the charging speed when the charger is not known to be Qi Certified.

#### EDGE AI

### iENSO TAKES ITS EMBEDDED VISION DATA SYSTEMS TO KYIV

iENSO, a Toronto-based provider of embedded vision data systems, has chosen Kyiv, Ukraine as its boots-on-the-ground gateway to Europe.

“A growing number of customers in Europe are working with iENSO to enhance their products with embedded vision, Edge AI, cloud services and reliable cybersecurity features,” said Sebastien Dignard, president of iENSO. “This trend toward creating a new generation of smart devices and appliances makes it the ideal time for iENSO to establish a local presence.”

iENSO’s Kyiv engineering team will help to expand the company’s capabilities as a turnkey solution provider, with vision system-on-a-chip (SOC) development and design and service support for customers. This builds on the company’s existing operations in North America (the HQ in Toronto) and in Asia (Shenzhen, China).

Established in 2003, iENSO designs, builds and integrates custom vision and multi-sensor systems for companies that need to embed cameras, sensing capability, image processing, Edge AI, and cloud services capabilities in their products.

#### FLEXIBLE ELECTRONICS

### YNVISIBLE, PRAGMATIC PARTNER TO DELIVER FLEXIBLE DISPLAY MODULES

Ynvisible Interactive Inc., a Vancouver-based player in the IoT market, and PragmatIC Semiconductor, a global provider of flexible electronics,



**Application example of Ynvisible display module with integrated PragmatIC flexible integrated circuit.**

have entered into non-binding technology partnership and supply agreement, for a period of three years for services and deliverables of up to US\$2-million, focused on fully integrated flexible display modules.

Many applications in growing markets such as smart packaging and healthcare require a display, for example to provide assurance that the item was transported correctly, or to guarantee authenticity, or simply to provide a read-out of critical data, according to Michael Robinson, CEO of Ynvisible.

“Traditional displays are inherently expensive, rigid and relatively bulky, which means that they are not suitable for packaging or printed media, or for embedding into mass market devices.”

The two companies also see strong synergies in their vision of enabling innovators to create optimised custom designs in a fraction of the time and cost required using traditional electronics. Under the recently signed agreement, PragmatIC will develop and supply a range of FlexICs that Ynvisible will integrate into both standard and customer-bespoke display modules.

#### WEARABLES

### SMART WEARABLES MARKET CONTINUES GROWTH PATTERN

The global pandemic has made more people aware of their health, fitness and well-being, and the smart wearables market is reaping the rewards, according to the latest report by technology analyst firm CCS Insight. Its recently published market forecast predicts that shipments of wrist-worn wearables will hit 232 million units in 2021, a growth of 20% from an already solid 2020. Of sales in 2021, 142 million units will be smartwatches and 90 million will be simpler fitness trackers.

“Smartwatches and fitness trackers clearly offer valuable benefits to their users at times when life is centred on the health of people and nations. Outdoor activities are extremely popular, so adoption of wearables is booming”,

observes Marina Koytcheva, VP of forecasting at CCS Insight.

Demand is being driven mostly by new users attracted to gadgets that help keep track of activity levels and important measures of health. Leo Gebbie, principal analyst, connected devices, at CCS Insight notes, “Our latest survey of over 2,000 smartwatch users in four Western markets found that two thirds of respondents bought their smartwatch in the past 12 months, demonstrating the rapid growth in the market, and that a wide range of health tracking features were important to people when deciding which device to buy. Heart rate monitoring and sleep tracking stood out as being especially important to smartwatch buyers”.

#### STANDARDS

### MIPI D-PHY V3.0 DOUBLES DATA RATE OF PHYSICAL LAYER INTERFACE

The MIPI Alliance recently announced a major update to its MIPI D-PHY specification for connecting megapixel cameras and high-resolution displays to application processors. Version 3.0 doubles the data rate of D-PHY’s standard channel to 9 Gigabits per second (Gbps), while extending the power efficiency of the specification for smartphone, Internet of Things (IoT) and automotive camera and display applications.

As the first MIPI PHY specification introduced more than 15 years ago, MIPI D-PHY has been broadly implemented as the physical-layer interface for cameras and displays in smartphones because of its cost-effective flexibility, high speed and low power.

Due to these attributes, the specification has also been applied to a wide array of other use cases such as drones, very large tablets, surveillance cameras and industrial robots, as well as automotive applications, including camera sensing systems, collision avoidance radars, in-car infotainment and dashboard displays, with the support of proprietary bridging solutions.

D-PHY v3.0 doubles the specification’s speed to 9 Gbps for the standard channel (and 11 Gbps for short channel), enabling support for the latest ultra-high-definition displays.

In tandem with the boost in data rate, D-PHY v3.0 introduces a Continuous-Time Linear Equalizer (CTLE) on the receiver side of a connection to maintain the interface’s superior power efficiency. D-PHY v3.0 is fully compatible with previous MIPI specs.



# Open Ocean Robotics aims to protect coastlines

*Solar-powered, autonomous boats patrol, collect data*

**BY SOHAIL KAMAL, WEST COAST CORRESPONDENT**



The origin of Open Ocean Robotics can be traced back to Hurricane Vince, the most north-easterly Atlantic hurricane ever. In the midst of this tempest, in a small plywood rowboat, were Julie and Colin Angus. The newly engaged couple spent five months successfully completing the first human-powered row from mainland Europe to North America.

From there, they partnered with National Geographic and Random House, and spent decades exploring remote parts of the world in rowboats, sailboats and white-water kayaks. After these adventures, they started their first boat company, Angus Rowboats, to hone their craft-building skills. Moved by their love and respect for the ocean, they decided to help protect coastal waters from abuses such as oil spills, trafficking, and illegal fishing by starting Open Ocean Robotics in 2019.

Their aim is to protect the oceans using autonomous uncrewed solar-powered vessels to patrol coastal waters to collect data, crack down on illegal activities, detect oil spills, and monitor climate change. With nearly \$5 Million raised from investors and grants, the pair just received another \$300,000 by capturing a top prize at the NexStream 2.0 Tech Challenge.



*Open Oceans Robotics thinks its uncrewed, autonomous and solar-powered boats could be key to understanding our vastly unexplored oceans, enforcing illegal fishing and so much more.*



*The Open Ocean Robotics team stands in front of an uncrewed solar-powered vessel used to patrol coastal waters to collect data, detect oil spills and monitor climate change.*

## Self-righting ability

West Coast Report recently had the opportunity to meet virtually with Julie Angus about uncrewed service vehicles (USVs), how Open Ocean Robotics plan to grow to 500 staff in five years, and the many applications that exist for autonomous, zero-emission boats.

Angus explains that, constructed with composite glass carbon fiber, their 12-foot USV is light enough that two persons can carry it, but big enough to harness sufficient solar energy to be sea-worthy. The craft's design gives it great self-righting ability, while minimizing drag and optimizing energy input. Perhaps, in short, their vessels can become the roving eye of the ocean, as they can be deployed six months at a time.

The firm is headquartered next to the ocean in Victoria, BC, providing direct access to the ocean.





**Julie Angus, CEO of Open Ocean Robotics.**

“This has allowed us to test our boat when we need to, getting instant and actionable insights to constantly improve and develop our product, says Angus. “We also proudly represent Canada as one of the only USV companies in the country.” Canada has more shoreline than any other nation, without a sufficient population to properly patrol and monitor these waters.

#### **Pandemic has hurt**

Open Ocean Robotics’ path hasn’t been without challenges. Starting up a year before a worldwide pandemic forced them to adjust to new funding programs and juggle priorities, especially in the face of parts shortages that any OEM can relate to, explains Angus.

“COVID has been devastating for many of us... For us personally, and many thanks to the help of the government in COVID grants and loans, we have been fortunate enough to advance our technology despite the global pandemic.”

There were even projects that were nearly cancelled, and they had to pivot where necessary. This included offering to conduct trials and projects in domestic Canadian waters.

“There were instances where international projects were at risk of failing, but we planned and found new ways to deliver,” Angus adds. The firm hired remote teams, and leaned on new perspectives in order to communicate and remain agile. Thankfully they source mostly Canadian oceanographic

sensors, and they have relied heavily on virtual meetings to maintain collaborative teamwork during the pandemic.

“First, believe in yourself. People sometimes overestimate what they can do in a day, but underestimate what they can achieve in a year, or two years, or even a lifetime,” Angus shares. “And, surround yourself with people that believe in you, will cheer you on, and never give up on you

because those are the people you want in your corner.” **EP&T**

*To learn more about how they provide real-time data analytics to monitor, protect, and more sustainably operate on our ocean, go to [openoceanrobotics.com](http://openoceanrobotics.com).*



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# 'Lighter' AI delivers a new era of IoT

*Artificial intelligence can play an important role in making IoT devices more intelligent, intuitive*

BY NICK ROMANO, CEO, DEEPLITE

➔ The Internet of things (IoT) is all about connected devices, and these devices can exist in many different settings – industrial, medical, consumer/home, transportation and more. The number of potential IoT devices is enormous as IoT becomes more popular and widely adopted over time. According to Statista, there are approximately 21.5-billion interconnected devices in the world.

However, IoT devices are often known for having simple, single-use functions. For example, a sensor on

a machine on a factory floor that captures data from the machine and transmits it to a remote location for processing. While effective, it does a simple task and nothing more – there is no additional intelligence added.

Artificial intelligence (AI) can play an important role in making IoT devices such as cameras, medical sensors or smart security systems, drones etc. more intelligent and intuitive, going beyond simple tasks by capturing and analyzing data, making decisions and then taking action.

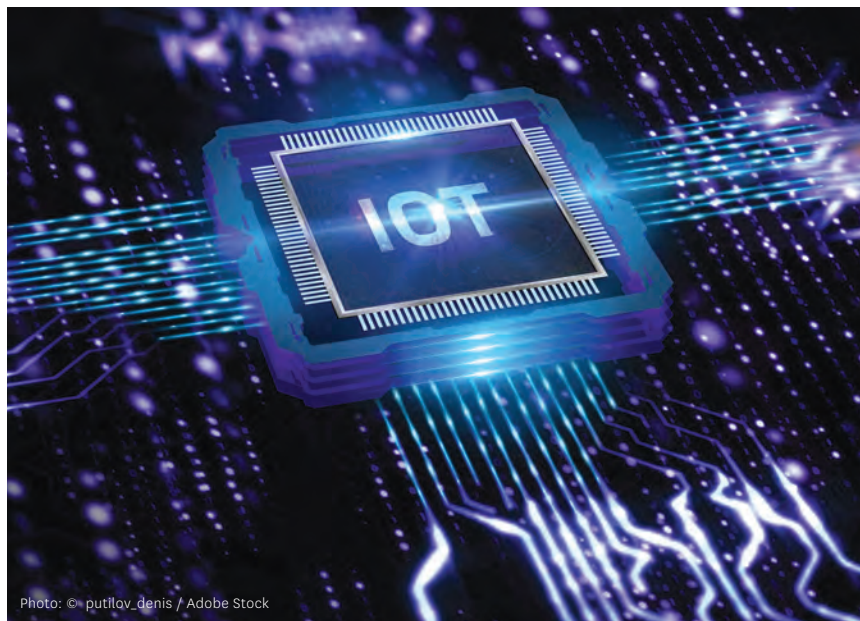


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## AI

Can play an important role in making IoT devices such as cameras, medical sensors or smart security systems more intelligent, intuitive.

The challenge, however, is that AI needs a great deal of computing power, memory and energy to do its complex analysis to make these decisions. While this is fine in a data center with a lot of computer power, this comes with its own limitations. If the AI is in a data center, the cloud and the solution must have connectivity to the internet, so there could be delay in the decision process as data moves back and forth from the device to the cloud and back. Also, if the data is sensitive, there could be privacy-related issues. Therefore, to truly unlock the next frontier of IoT we need to move the AI decision making process from the data center to the device itself, so decisions can be made instantly where the action happens – what we call the “edge.” So, how do we get AI out to the edge, where it can drive more IoT applications?

Today, there are new platforms that can transform AI, specifically deep neural networks (DNNs) to make it smaller, faster and less power consumptive than its original form. By using

Photo: © BuffaloBoy / Adobe Stock



Internet of things

# IOT



such platforms, AI teams can focus on training their models for accuracy, in other words better decision making, and then optimize the AI model so it can be deployed into constrained hardware at the edge – all without

compromising the original accuracy. In essence, we need to fit the AI into the real world, not the other way around. Computer vision, meaning using cameras to capture image information, is a great example of how you can use AI

**21**  
**BILLION**

interconnected  
devices globally

at the IoT edge. Mini cameras can be placed in a number of different applications and scenarios. For example, a dashboard camera is now being used by trucking companies to improve speed control and safety. The camera reads the speed limit on road signs, notifies the driver and triggers a breaking mechanism in the truck if it is exceeding the posted speed limit.

However, to make this system a reality, the challenge was transforming an AI model that was first too large and unable to run on the CPUs already deployed in (customers') trucks. Once the AI was transformed into a smaller, lighter and less power consumptive form factor, it opened the door to using it on the speed control system and allowing trucking fleets to utilize it on a widespread basis. As the transportation industry moves toward greater use of smart, technology-assisted and even autonomous vehicles, this type of AI-driven smart camera technology could play a critical role in the future of transportation.

Another great example is in smart manufacturing, which is utilizing IoT to enable automated factories with less reliance on inspections by humans. Deep learning AI models can be used for various classification, detection and segmentation-based applications such as automated optical inspection, defect detection and more. This can help a manufacturing company scan product samples for defects, using AI-driven smart cameras that have been trained to identify both good and bad product samples and flag them immediately. This type of AI system can work on a 24 x 7 basis without being prone to fatigue or human error, and can prevent defective products from ever leaving the plant.

In all, to make AI on the edge a reality for connected devices in IoT, (AI) optimization is the key. New advancements in AI-driven optimization are making Deep Neural Networks faster, smaller and more energy efficient – and helping move AI from the cloud and data centers to the edge. This can open up significant opportunities for IoT systems, making connected devices smarter and more effective in a number of different areas that can ultimately make our everyday lives better. **EP&T**



Photo: © wladimir1804 / Adobe Stock



**Nick Romano** is CEO of Deeplite, a startup company whose mission is to enable AI for everyday life. Deeplite is headquartered in Montreal and has an office in Toronto. <https://www.deeplite.ai>





# Analog compute is the key to powerful, yet power-efficient, AI processing

*The power advantages come from being able to perform massively parallel vector-matrix multiplications with parameters stored inside flash memory arrays*

**BY TIM VEHLING, SENIOR VICE-PRESIDENT, PRODUCT & BUSINESS DEVELOPMENT, MYTHIC INC.**

➔ As artificial intelligence (AI) applications are becoming more popular in a growing number of industries, the need for more throughput, more storage capacity and lower power is becoming increasingly important. At the same time, machine learning models are growing at an exponential rate. With these models, traditional

digital processors struggle to deliver the necessary performance with low enough power consumption and adequate memory resources, especially for large models running at the edge. This is where analog computing comes in, enabling companies to get more performance at lower power consumption in a small form-factor that's also cost-efficient.

The power advantages of analog compute at the lowest level comes from being able to perform massively parallel vector-matrix multiplications with parameters stored inside flash memory arrays. Analog compute with flash storage is also referred to as analog compute in-memory. Tiny electrical currents are steered through a flash memory array that stores

reprogrammable neural network weights, and the result is captured through analog-to-digital converters (ADCs).

By leveraging analog compute for the vast majority of the inference operations, the analog-to-digital and digital-to-analog energy overhead can be maintained as a small portion of the overall power budget and a large drop in compute power can



be achieved. There are also many second-order system level effects that deliver a large drop in power; for example, when the amount of data movement on the chip is multiple orders of magnitude lower, the system clock speed can be kept up to 10x lower than competing systems and the design of the control processor is much simpler.

### Solves issue of memory bottleneck

Today's digital compute approaches focus on optimizing for peak benchmarks and have only delivered incremental advances to chip architectures. Analog compute offers a much better alternative for high-end edge AI requirements. Analog compute solves the issue of the memory bottleneck, while also offering major advantages in system-level power, performance, and cost. From the perspective of performing all of the math operations for high performance AI, analog compute systems have the best power efficiency both in the short run and long run.

Using analog compute processors for edge-AI applications is a great option for many different use cases. For example, drones equipped with high definition cameras for computer vision (CV) applications can require running complex AI networks locally to provide immediate and relevant information to the control station. Processors that use analog compute make it possible to deliver powerful AI processing that's also extremely power-efficient so companies can deploy these networks on the drone for a wide range of CV applications. These applications include monitoring agricultural yields, inspecting critical infrastructure such as power lines, cell phone towers, bridges and wind farms, inspecting fire damage and examining coastline erosion.

### Factories become more automated, interactive

Manufacturing is another industry that is ripe for AI transformation. Most factories today are largely automated and many have deployed computer vision (CV) to optimize production

lines, which has significantly increased efficiency and driven down costs. Today we're seeing factories become even more automated with interactive human-to-machine processes. AI-powered collaborative robots are working alongside humans to make factories a much safer environment and become even more productive. Industrial robots are also using CV to inspect products on the production line in real time, such as inspecting cereal boxes before they are shipped off to grocery stores.

Another example of an industry that can benefit from analog compute is enterprise. In many applications edge data are moving to the cloud where data centers run neural networks at scale across all their data streams. Companies can use AI processors to support a broad range of neural networks and deploy them into existing infrastructure, helping to cut the cost of ownership. Since neural network inference is compute-intensive and power-hungry, traditionally it has required costly hardware, advanced cooling infrastructure, and kilowatts of power. Analog compute in-memory based processors are extremely power-efficient and scalable so they can easily fit into companies' existing infrastructure.

Additionally, security cameras and surveillance solutions are a great example of an application ideal for AI and analog compute. In current systems, cameras capture images of people and objects and send that information to a command center for visual analysis; this is where the uneasiness comes with being monitored constantly. A better alternative is to have cameras that use trained AI algorithms to detect specific sequences – accidents, crimes, or other events – and only send the footage of potential security incidents for analysis. This approach delivers the safety and security the public desires while providing the privacy all of us expect. Cameras today are already equipped with computer vision techniques. To reach the

next level of safety and privacy, high performance edge-AI capabilities in the camera will be required for traffic monitoring, incident detection, facial recognition, and many more applications to come in the future.

Analog compute is the ideal approach for AI processing because of its ability to operate using much less power at a higher speed with faster frame-rates. The extreme power efficiency of analog compute technology will let product designers unlock incredibly powerful new

features in small edge devices, and will help reduce costs and a significant amount of wasted energy in enterprise AI applications. **EP&T**



Founded in 2012, Mythic has developed a unified hardware and software platform with its Analog Compute Engine (Mythic

ACE) to deliver enhanced power, cost, and performance that removes digital barriers preventing AI innovation at the edge. <https://www.mythic-ai.com>

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# Can a future city be 'smart' enough to power itself?

*The current progress in the cordless charging landscape draws a hopeful blueprint*

**BEHROOZ ABIRI, CO-FOUNDER & CHIEF TECHNOLOGY OFFICER, GURU WIRELESS INC.**



When talking about the smart city of the future, all the elements one can think of sum into a keyword, connectivity. Whether they are driverless spaceship taxis or full self-functioning skyscrapers, the advancements that make a city smarter are supported by connected networks of information, technology interfaces and infrastructure. Humans have actually been working for centuries to construct a city that can better respond to residents' needs and increase their quality of life from safety, convenience, living conditions and other key aspects. As the world walks into the fourth industrial revolution to embrace the convergence of digital and physical environment, this goal becomes closer in reach.

One of the first steps is to build upon digital interfaces, enabling high-speed internet and installing Internet of Things (IoT) devices to collect and utilize responsive data from residents' everyday life. As of March 2021, there are more than 10 billion active IoT devices worldwide, and that number keeps rapidly growing. As cities implement more intelligent devices and IoT-enabled infrastructure components, the electricity demand will be enormous and delivering stable power is crucial.

IoT devices usually contain three major units that require electricity. The total energy consumption varies on the collective demand from each unit, which includes sensors for data collecting or actuators for performing a task,

the processing units and the Machine to Machine (M2M) communications units that support data exchange between different networks. The last one is usually the biggest variable because this unit can cause intensive energy use if the device is involved in active data exchanging tasks.

For smart city IoT devices particularly, this unit usually functions 24/7, exchanging massive volumes of live data between a central smart web and a local facility - for example, the smart utility meters. The meters attached to the building are also connected to a smart energy grid to share the live usage of water and electricity so the utility companies can better monitor the energy consumption.

## **Limited battery lifespan requires replacement, recharge**

Many IoT and Industry 4.0 applications use a 3V coin cell as the power source because it costs less and provides a stable supply, but the drawbacks of batteries are also significant.

The limited life spans of batteries require constant replacement or recharge, which can cost an unimaginable amount of human and financial resources, especially if the devices are located in hazardous areas with limited access. Another drawback is the environmental unsustainability that will inevitably appear with the growing demand and usage of batteries. Both disadvantages can largely hinder the maturity of a smart

## IoT

Devices collect and utilize responsive data from resident's everyday life.

city. Therefore, it is vital to find an alternative powering solution at this transitional stage. The conversation of powering should also go beyond building traditional public charging outlets or creating longer lifespan batteries but dive into real innovations among powering technologies.

## **Why we need an alternative to Qi charging**

Wireless powering is not a strange concept to the market. The term has frequently appeared in advertisements of contact wireless charging pads, buckets and other consumer electronics. However, most of the devices and technologies available in the market today, such as Qi charging — the most common wireless charging protocol — are using magnetic induction technology that has existed in the industry for almost 60 years. It functions with two built-in charging coils in the device and in a transmitter. Even though as the most used wireless charging protocol, the limitation of induction charging is obvious: distance. The distance between the device and the transmitter needs to be within a few centimeters to realize induction charging.







Looking at some emerging wireless powering technologies, one innovation that stands out is smart radio frequency (RF) lensing, a technology that transmits power between two destination points without using any wires or physical induction pads in between. By using millimeter-wave (mmWave) to deliver electric power through the air, this RF lensing technology can transmit power nearly as fast as via wires to multiple devices simultaneously from

## OTA

True over-the-air powering can be realized by using mmWave RF lensing technology.

many feet away, realizing true over-the-air (OTA) powering.

Even though an ideal solution is still under development and not yet available on the market, the current progress in the cordless charging landscape draws a hopeful blueprint. A smart city of the future needs a digital ecosystem that can provide a sustainable power supply to support digital interfaces and technology hardware updates. The world is still

discovering future possibilities and the exploration in the science of power should be an ongoing agenda. **EP&T**



*GuRu Wireless Inc. is a millimeter-wave (mmWave) technology company in Pasadena CA that develops products for business and people who want to stop running wires, changing batteries, or plugging things in. <https://guru.inc>*



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**Making Connections that Last**



# Why IoT display is the way forward for Covid-safe spaces

*Public safety innovations are more important than ever*

BY YNVISIBLE

Recent developments in IoT display are helping companies to innovate to come up with smart med-tech solutions that will impact public safety by helping keep public spaces free from the threat of Covid-19 and other viruses. Read on to find out how IoT display technology is paving the way to a safer future in light of the recent Covid-19 pandemic.

What is the issue when it comes to infection control?

Germs are notoriously hard to limit. A single sneeze sees droplets of mucus and saliva travel up to 100 miles per hour, spreading as far as 27 feet away (over half the length of the average public bus). And while viruses such as the common cold and flu remain present on surfaces for up to 24 hours, studies show the Covid-19 virus can remain present on surfaces such as doorknobs for as long as 9 days. This makes it much more challenging to control, particularly on high touch surfaces in public spaces, such as public transport, restaurants and workspaces.

So, how will IoT displays help people stay safe from Covid-19?

In recent years, there have been major advancements in the area of IoT display. Emerging display technologies, such as electrochromic displays, now offer low-cost, ultra-low-power printed display solutions that can be easily produced at mass, opening up the possibilities for how this technology can be used in practice.

Innovative companies, such as Agiler, are working in collaboration with Ynvisible, a printed display solutions provider and manufacturer, to develop cost-effective solutions to infection control. Ensuring that public spaces are sterile and that the general public is able to verify this.

In the case of Agiler, its technology will work by creating a small device that is easily affixed to a flat surface, which tells the general public whether that surface has been effectively sterilised or not. Inside the device will be a sensor that responds when it comes



into contact with sterilisation methods. Once sterilised, the device display will update to display that the surface is now safe and sterilised against viruses such as Covid-19.

Due to using an electrochromic display, the device will not need a power source, as it consumes very little power. For example, a single coin cell battery could power an electrochromic display for up to 50 years. Therefore, the device would need very little maintenance once installed. Making it a simple plug and play solution usable by many.

## **What will be the impact of this emerging tech?**

As the world still grapples with the devastating effects of the Covid-19 outbreak, and scientists warn that new variants are likely to bring further public health challenges, public safety innovations are more important than ever. In fact, scientists say the widespread Delta strain is up to 60% more transmissible

than the Alpha strain first detected in the UK in late 2020.

The sooner that innovative applications that help limit the spread of Covid-19 are released into the market, the better governments, the public sector and businesses will be able to manage the virus and take quick action to remedy infected spaces.

It's clear given recent global events that more investment is needed in innovative solutions that address some of the greatest challenges of our time. People want to not only feel safe, but to know that they are safe from the threat of Covid-19, and they are now looking for that much-needed reassurance as we go about life with Covid-19. **EP&T**

*Ynvisible is a leader in emerging printed and flexible electronics. The firm develops and manufactures interactive electrochromic display solutions that are ultra-low-power and can be deployed at scale.*

<https://www.ynvisible.com>



# Evolving force guided relays for Industry 4.0



*Automated manufacturing processes are the foundation to eventually integrate digital technologies*

**BY CHRISTIAN NETSCH, PRODUCT MANAGER AT TE CONNECTIVITY**



Industry 4.0 is not possible without increasing the rate of automation in industrial facilities, ranging from synchronized machine operations, robot movements and material flows in between. Automated manufacturing processes are the foundation to eventually integrate digital technologies. A more technical definition refers to the interoperability of machine-to-machine capabilities, deep learning from manufacturing processes and greater control over technology. While there are countless benefits to automation — including faster production, decreased human labor, and workplace efficiencies — how does it impact safety?

As rates of automation increase and Industry 4.0 demands become greater, the need for automated processes require risk mitigation plans and implementing safety protocols into the logic controls.

## **Safety prerequisite**

Force guided relays are central to any conversation regarding functional safety — as their inherent function is to enable safe operation — even if the relay has a malfunction. The critical role played by force guided relays has been around since their invention in the mid 1970s, but their application uses have evolved with Industry 4.0. Force guided relays provide assurance that an application will move into a safe state, protecting humans

and equipment from harm in case of error.

This is accomplished with antivalent contacts, which perform executive opposites of each other. One contact is normally open and the other is normally closed — both cannot be open or closed at the same time and always the relay must enable a min. of 0.5mm (0.20 inch) contact gap of the antivalent contacts. This forces technology to perform the correct movement, otherwise it will not be allowed to move, thereby protecting the equipment and everything around it.

Depending on the logic used by the end customer, relays force applications to shut down completely or pause or slow down into a degraded motion path, both defined as a safe state. The complexity of the application determines the number of input and output channels the relays need. Ultimately, force guided relays ensure safety in industrial contexts by preventing technology from moving against pre-programmed logic.

## **Evolving Industry 4.0 needs**

This smart electromechanical principle makes force guided relays an optimal safety solution for industrial applications and has not changed since its invention 45 years ago. However, the way a force guided relay today is being designed and produced is constantly developing. For example, their reliability in monitoring circuits with a low signal voltage level has been improved. Also,

the component design and processes to minimize particles inside the relays have changed over time, which is nowadays reducing the risk of contact welding, if dust is accidentally coming near the working air gaps.

The decentralized controls and work centers of the factory of the future often require miniaturized product designs and are driving also for force guided relays the need for smaller form factors. Energy saving is not just environmentally friendly, but inventing relays with lower coil power consumption to drive the relay allow better heat dissipation and therefore higher PCB component density. Which is beneficial, if more sensors are being used to monitor a process, but the available space for the now more complex safety relevant controls is smaller.

## **Global safety standard**

Besides technology, also the safety awareness and the duty to mitigate risks has changed. Driven by obligatory safety standardization for machinery, elevator or robotic applications, its proliferation in many dangerous processes has sped up the usage of force guided relays over the last 30 years. Starting mostly as European standards, functional safety is today globally mandatory for designing and exporting industrial machinery and robotics, which provides a positive outlook for the demand and further need for force guided relays. **EP&T**





## SYNC CABLE ASSEMBLIES SERVE 5G MOBILE NETWORKS

### NAI

Steady Link Series-S GPS & Sync Cable Assemblies have been designed to provide high precision FTSP performance for use with Nokia AirScale wireless systems and cellular installations, and to accommodate the growing demand for 5G mobile networks. Units accommodate a variety of 5G applications, from Small Office/Home Office (SOHO) to airports, commercial enterprises and even deep rural villages. Interconnects support the challenges of the rapidly developing Internet of Things (IoT) for high-capacity networks with simultaneously connected devices and low latency.

➤ <https://www.nai-group.com/nai-introduces-new-steady-link-series-s-gps-sync-cable-assemblies>

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### MICROCHIP TECHNOLOGY



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➤ <https://www.microchip.com/en-us/product/PM6200>

## PROTOCOL TEST CASES VERIFY 5G NEW RADIO DEVICES

### KEYSIGHT TECHNOLOGIES



S8704A Protocol Conformance Toolset can be used to submit the first protocol test case for verifying 5G new radio (NR) devices that support release 16 (Rel-16) features to 3GPP. Device vendors can accelerate verification of designs that support 3GPP Rel-16 features. Many mobile operators are expected to implement 3GPP Rel-16 capabilities to improve coverage, capacity, latency, security, power consumption, mobility and reliability. Supports transportation, private 5G, industrial internet of things (IIoT).

➤ <https://www.keysight.com>

## MCU FAMILY ACHIEVES PSA LEVEL 2 CERT TO SECURE IOT DEVICES

### INFINEON TECHNOLOGIES

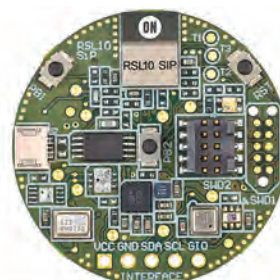


PSoC 64 microcontrollers (MCUs) standard secure family of devices achieved the Arm Platform Security Architecture (PSA) Level 2 certification, which includes a laboratory evaluation of the PSA Root of Trust (PSA-RoT) to provide evidence that devices can protect against scalable software attacks. The evaluation labs use vulnerability analysis and penetration testing of the PSA-RoT to establish if the nine security requirements of the PSA-RoT Protection Profile have been met.

➤ <https://www.cypress.com/products/psoc-64-microcontrollers-arm-cortex-m4m0>

## CAMERA BRINGS INTELLIGENT SENSING TO IOT PLATFORM

### AVNET



Avnet has connected the on-semi RSL10 Smart Shot Color Camera to the cloud via its IoTConnect Platform, to create a framework that helps OEMs develop end-to-end IoT solutions. Solution demonstrates how real-time images can be captured and seamlessly transmitted to the cloud over Bluetooth Low Energy so that they can be interpreted to manage devices, set alerts and make decisions. The camera provides the imaging (eyes) and the communication/connectivity (Bluetooth Low Energy), while IoTConnect provides the means to link this information to the Cloud so that it can be interpreted, manipulated, and learning (AI) can be performed.

➤ <http://Avnet.com/lotwithon>

## OPEN-SOURCE WIRELESS GPS/GNSS HARDWARE SERVES IOT, AUTONOMOUS DESIGNS

### SEPTENTRIO



Mowi (mosaic wireless) open-source resource for GPS/GNSS module receivers combines Septentrio mosaic-X5 or mosaic-H module receiver with a dual-mode Bluetooth and integrated Wi-Fi from the well-known ESP32-WRover program-mable module by Espressif Systems. It is an addition to the already existing mosaicHAT board, designed on the Raspberry Pi platform. The project is available as open-source, thus empowering the community to easily fit autonomous or robotic systems with communication and highly accurate and reliable GNSS positioning technology.

➤ <https://github.com/septentrio-gnss>

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28MG non-magnetic RF thru-hole (lead) inductor series is suitable for use in medical imaging equipment and other applications where magnetic materials must be avoided. Devices address the market need for non-magnetic inductors that could achieve inductance values of up to 18μH for use in magnetic resonance imaging (MRI) equipment, specific types of X-ray equipment and other applications where the presence of magnetic materials could compromise system performance. The performance range provided by the 60 discrete parts within the product series includes Inductance from 1.2μH to 18μH, DCR Ohms from 0.079 to 4.15 and Current rating mA dc from 315 to 2400.

➤ <https://www.gowanda.com>



## 1W CURRENT SENSE RESISTORS SERVE IOT, ROBOTICS

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CSSH0805 all-metal chip resistor provides 1W power rating, resistance values down to 0.5 milliohm and TCR ranging from 50 ppm to 100 ppm. The high power, low value combination allows device to be used for designs that normally require a 1206 or 2010 size current sense resistor, saving significant pcb space. The robust device delivers stable electrical and environmental performance under a wide range of industry standard tests. Product delivers high power capability, stability, low resistance values, and accuracy.

➔ <https://www.digikey.ca>

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➔ <https://www.amphenolrf.com>

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➔ [www.centralsemi.com/applications](http://www.centralsemi.com/applications)

## SMART ELEMENT STATIONS MEET I/O NEEDS

PHOENIX CONTACT



Phoenix Contact Axioline Smart Element stations consist of either a controller or bus interface module, one or more base units and any combination of available smart elements to

meet I/O needs. Digital and analog smart elements are configuration-free for simplified integration. Special function elements may require some basic configuration which can be accomplished using the freeware Startup+ configuration software. If additional I/O signal types are not available in smart elements, standard Axioline F I/O modules can be added to backplane.

➔ <https://www.phoenixcontact.com>

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ROHDE & SCHWARZ



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measurement accuracy. Unit meets the most stringent requirements for certification measurements in line with CISPR, EN, MILSTD-461, DO160, and FCC. With its FFT-based time domain scan, product captures and weighs disturbance spectra in virtually no time. Unit's realtime spectrum analysis capability with spectrogram function permits a detailed analysis of disturbance signals and their history. MultiView mode delivers a straightforward display of results, even for multiple operating modes.

➔ <https://www.rohde-schwarz.com/ca>

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➔ <https://www.connectpositronic.com/>

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Peel-A-Way Removable Terminal Carriers reduce printed circuit board (pcb) assembly time by eliminating hand-loading of socket terminals and pins. Available in virtually any pattern to match your existing board layout – simply solder to the pcb and peel away the polyimide film carrier. Suitable for socketing heat sensitive devices and board-to-board mating. Product replaces hand-loading

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➔ <https://www.masterbond.com/newsrelease/mastersil-153ao>

operations and enables complete solder joint inspection. Product is easily customized with multiple terminal styles.

➔ <https://www.advanced.com/products/peel-a-way-removable-carriers>

## REVERSIBLE FLOW FANS DELIVER DIRECTIONAL FLOW, SPEED CONTROL

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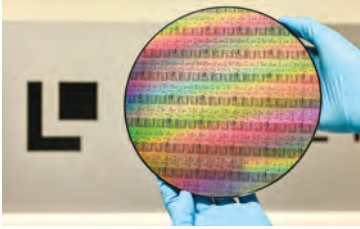
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➔ <https://www.orionfans.com/reversible-flow-fans>



## SEMICONDUCTORS

### SEMI PLAYERS FORM CAPACITY FOUNDRY IN EUROPE



LIGENTEC, a pioneer in high-performance, low-loss, silicon nitride photonic solutions, has partnered with specialty semiconductor producer X-FAB Silicon Foundries to form a large-scale supply of integrated photonic devices or photonic integrated circuits (PICs).

Working with light instead of electrons, PICs are expected play a key role in tomorrow's infrastructure for communication, biosensing and transportation.

"Silicon nitride offers superior performance to manage the light in the chip circuitry, with unprecedented low propagation losses and high-power handling," states Michael Zervas, co-founder of LIGENTEC.

### ON SEMI TO BUY GTAT

OnSemi, supplier of intelligent power and sensing technologies, has entered into a definitive agreement to acquire GT Advanced Technologies, producer of silicon carbide (SiC). Founded in 1994, GTAT has significant experience in crystalline growth, including SiC. SiC is a key material for next-generation semiconductors that provide technical benefits in SiC power switching devices, significantly improving system efficiency in electric vehicles (EVs), EV charging and energy infrastructure.

### INFINEON, PANASONIC ACCELERATE GAN DEVELOPMENT

Infineon Technologies AG and Panasonic Corp. have signed an agreement for the joint development and production of the second generation (Gen2) of their proven gallium nitride (GaN) technology, boosting efficiency and power density levels. The performance and reliability combined with the capability of 8-inch

GaN-on-Si wafer production mark Infineon's strategic outreach to the growing demand for GaN power semiconductors. In accordance with market requirements, Gen2 will be developed as 650V GaN HEMT. The devices will allow for ease of use and provide an improved price-performance ratio, targeting, amongst others, high- and low-power SMPS applications, renewables, motor drive applications.

For many designs, gallium nitride (GaN) offers fundamental advantages over silicon. The outstanding specific dynamic on-state resistance and smaller capacitances compared to silicon MOSFETs qualify GaN HEMTs for high-speed switching. The resulting power savings and total system cost reduction, operation at higher frequencies, improved power density, and overall system efficiency make GaN a very attractive choice for design engineer.

### NXP AND MICROEJ CROSSOVER MCUS FOR WEARABLES



MicroEJ, provider of software enablement solutions for IoT and embedded devices announced its collaboration with NXP Semiconductors to provide a dedicated MICROEJ VEE on-device platform based on NXP's i.MX RT500 MCU focusing on ultra-low-power, security and market leading user interfaces.

NXP's i.MX RT500 crossover MCU, coupled with MICROEJ VEE platform, offers an industry-specific integrated solution for holistic low-power management and small footprint while providing enhanced performance.

## ACQUISITIONS

### TE INVESTS IN LAIRD ANTENNAS BIZ

TE Connectivity (TE) has signed a definitive agreement to acquire the antennas business from Laird Connectivity, a leading provider of wireless modules, IoT devices and antennas.

The deal complements TE's broad connectivity product portfolio, particularly in antenna and wireless solutions for Internet of Things (IoT) devices and Edge Access, while expanding the firm's engineering and manufacturing footprint and strengthens TE's presence in several attractive market segments. "I am excited to welcome the Laird antennas team to TE," said Sudhakar Sabada, SVP & GM of TE's data and devices business. "This acquisition is a critical milestone in our strategic vision to expand in the high-growth Edge Access and IoT markets."

### IEWC BUYS CABLCON

IEWC has announced its acquisition of Cablcon, an industry-leading supplier of custom broadband cabling and fiber and copper connectivity solutions, in a strategic move that continues IEWC's dynamic growth in the North American telecom, central offices and data center markets.

"Cablcon's long history of success in telecommunications makes them a compelling addition to the IEWC team as we expand our support of telecom in North America," said IEWC CEO Mike Veum. "This deal, in addition to our acquisition of telecom supplier Jupiter Communications last year, reinforces IEWC's commitment to become a leading connectivity solutions provider for telecom and data centers throughout the world, with a focus on North America."

### MICROCARE ACQUIRES CERTOL INT'L



MicroCare, LLC a global supplier of critical cleaning fluids and materials used in the electronics, medical device manufacturing, has acquired Certol International, a Denver, based maker of specialty cleaning and disinfecting products.

Certol has a 40-year history of providing EPA registered high performance surface disinfectants and specialty cleaners engineered for use in dental offices, medical offices, and hospital settings. The firm also makes specialty products

used in industrial, marine and consumer cleaning applications.

### THERMALTRONICS OPENS 2ND US FACILITY

Thermaltronics USA Inc. has opened its second facility in the US. Based in Ormond Beach, FL, the facility will feature a custom designed showroom for solder robots, as well as other soldering equipment. It is large enough to serve as future stocking location for US customers/distribution.

The location also serves as a regional office/demo room/warehouse. The goal is to provide a southeastern demonstration room and processing lab for robotic soldering applications. Longer term, Thermaltronics may consider warehousing products for US distribution.

With the increase in solder robot enquiries, Thermaltronics needed a southern base to house the entire range of robots, including the in-line version and thereby, provide 'live' demonstrations to potential regional customers. In the future, the company plans to hold seminars and training sessions on hand and robotic soldering application.

### ADDITIVE CIRCUITS GOES BENCH 2 BENCH

Additive Circuits Technologies LLC has acquired Bench 2 Bench Technologies, a Fullerton, CA-based high-performance manufacturer of flexible circuit boards for the medical device markets.

The strategic acquisition of Bench 2 Bench will accelerate market access for the company's proprietary additive technologies and provide ultra-high-density line capabilities to the flexible circuit's market segment. The technology ultimately will allow for smaller, faster, and thinner circuits to meet increasing demands of the overall electronics market.

"Our acquisition of Bench 2 Bench will industrialize the manufacturing of high-definition flexible circuits, allowing these types of products to reach targeted customers in an accelerated manner. ACT's technology embedded into Bench 2 Bench flexible circuit products will provide a truly differentiated product that will address the next-generation technology needs of our customers," said David Torp, ACT's CEO. **EP&T**



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## Playdate Retro Gaming Handheld

BY IFIXIT



These findings are from iFixit, the open source repair guide. The popular online site teaches people how to fix just about any electronic device, and sells the parts and tools to make it possible. For this teardown, the engineers at iFixit tackle the Playdate, a retro gaming handheld.

Playdate doesn't do 5G. It doesn't have a 120Hz screen, a custom chip, or any cameras at all. What the Playdate does have is a crank, an ultra-portable design, and a lot of charm.


The most important things to know about the Playdate are that:

First, it's small. Its screen is like an upgraded classic Game Boy: it's black and white, it's low-resolution, but really crisp and responsive. The buttons are punchy, and the crank has an appealing smoothness to it.

Now, we'll show you how it comes apart.

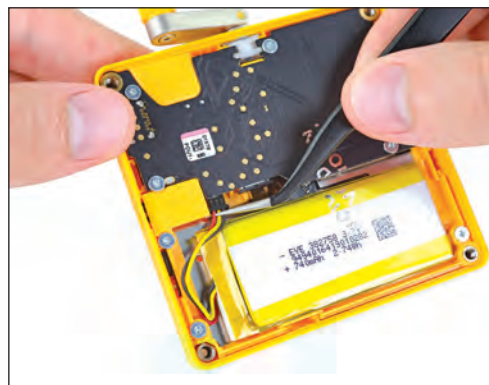
### Some specs for you while we unbox the fun:

- Extremely high resolution (400x240) display—2.7 inches at 173ppi
- 180 MHz ARM Cortex-M7F CPU
- 16 MB of onboard memory
- 4 GB flash storage
- 2.4 GHz Wi-Fi (b/g/n), Bluetooth 4.2, USB-C, headphone jack
- Mechanical crank because why not?
- It's clear they haven't goosed the specs on this thing—but then, if you were obsessing over specs, you've already missed the point.

 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. 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>

**FIG 1**

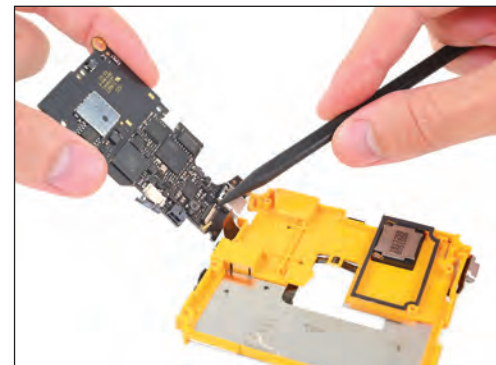
*The battery itself is mildly glued down. Just make sure you don't poke anything flammable with your tweezers. Battery specs? It clocks in at 2.74Wh (740mAh @ 3.7V). That's about 25% of the capacity of an iPhone 12,*



**FIG 2**

*The hidden side of the board contains:*

- STMicroelectronics STM32F746IGK6, an ARM Cortex-M7 based SoC
- 4 GB of Kioxia (formerly Toshiba) THGBMDG5D1LBAIT eMMC NAND flash memory
- 128 Mb of Winbond W967D6HBG low-power SRAM
- 32 Mb of Winbond W25Q32JV serial NOR flash memory
- Analog Devices (formerly Linear Technology) LTC3576 power management IC
- Cirrus Logic CS42L52 audio codec w/headphone/speaker amplifiers
- Espressif Systems ESP32-DoWDQ6 Wi-Fi and Bluetooth SoC



**FIG 3**

*Time to pull the pin on this crank. There's a cylindrical magnet embedded in the shaft. As it cranks, the rotating magnetic field hits the aforementioned Hall-effect sensor, which activates ... something, in your game.*



**FIG 4**

*Here's where our disassembly efforts get gummed up. The display—rumored to be a Sharp Memory LCD—seems firmly glued to the front half of the plastic enclosure.*

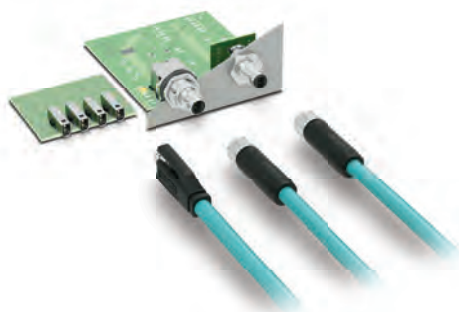


**FIG 5**

*Does it go back together and still work? Indeed it does.*



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