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Contents

4  Gone in 60 seconds — five ways next-gen ultrafast-charging EV batteries are about to change everything
14  Get smart: the factories of the future
18  Nine technology predictions for 2018
22  ‘Invisible glass’ has almost no surface reflections
28  ‘Air-breathing’ sulfur battery provides low-cost energy storage
33  Design unveiled for a silicon quantum computer chip
36  Enabling fastener torque auditing and certification
41  The rise of the digital twin
42  Glass study could lead to shatterproof mobile phone screens

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Cover Story

The Advantech Embedded Single Board Computer (SBC) series ranges from 3.5“ PC/104, EPIC and EBX to 5.25” SBC boards. Advantech SBCs offer standard form factors in compact sizes with rugged design, high flexibility and easy expansion capabilities.

The range offers scalable performance from low-power to high-end platforms, fanless designs, compact and low-profile architecture, extended temperature options and longevity. The boards are designed to fulfil applications that demand reliable operation as well as industrial-grade design and quality. Advantech also provides integration services including Advantech WISE-PaaS software (IoT cloud platform), EMI/ESD optimised service and wireless connectivity.

Advantech SBCs can also support WISE-PaaS/RMM, part of Advantech’s WISE-PaaS cloud solution, which focuses on remote device management and monitoring. WISE-PaaS/RMM provides centralised management features including HW/SW status monitoring, remote control and system backup/recovery. It supports server redundancy and hierarchical server management, which increases service reliability and availability. It provides a WISE Agent framework for data acquisition, as well as the RESTful API web services, allowing users to integrate RMM functions with other applications or make further customisations.

WISE-PaaS enhances connectivity for hardware, software, devices and sensors, and helps customers to transform their business by incorporating powerful IoT cloud services.

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GONE IN 60 SECONDS
FIVE WAYS NEXT-GEN ULTRAFAST-CHARGING EV BATTERIES ARE ABOUT TO CHANGE EVERYTHING

Robert A Rango, President and CEO, Enevate Corp*
Electric vehicles are the most revolutionary development in the auto industry since the internal combustion engine. Every day they get more advanced and more popular, with electric cars and plug-in hybrids projected to account for an average of 8% of all cars sold in the United States by 2020.

While that shows tremendous growth in electric vehicles (EVs), you don’t have to be a statistician to notice that this is still a fairly small percentage. EVs are becoming more affordable (although they may not be as affordable as cars with internal combustion engines until the 2020s). Plus, there are great government incentives that make it easy, and at least comparable in price to standard auto sales, for people to switch to EVs. So what’s holding the market back?

In a word: batteries.

Although batteries aren’t the most glamorous part of an electric vehicle, they are the most important. They’re also the biggest stumbling block today to growing the EV market, thanks to the range anxiety they produce. Drivers with electric cars generally have to plug in overnight to maintain their 100-plus-mile range. Considering that most Americans drive just about 30 miles a day, that’s a full eight-hour charge at home overnight every week, as opposed to taking five minutes to refuel roughly every 10 days. If you notice your battery is low at work or while on a road trip, refuelling for so many critical hours can be a scary proposition. And if you don’t have a 240 V outlet with an accompanying parking space for lengthy charging at home, life with an EV can be pretty inconvenient. While the numbers are getting better, that’s still the kind of math that keeps people tethered to their gas-powered cars.

But a big change is on the horizon: a new generation of batteries that can get a significant charge in five minutes. Five minutes is what it takes to run into a convenience store for a washroom break and a coffee refill.

What put us on the verge of this ultrafast-charging revolution? Silicon-dominant lithium-ion (Li-ion) batteries, like the ones that use the technology from Enevate. The next generation of EVs that use these new batteries could hit the market as soon as three years from now. These batteries use silicon in place of graphite in the battery anodes and are a huge step up from the traditional Li-ion batteries currently on the market. They are lighter and safer and can operate even in the coldest temperatures.

Most significantly, though, silicon soaks up approximately 5 to 10 times more energy than graphite, and does so much faster. With a silicon-dominant Li-ion battery, in just 15 minutes you’ll get a full charge. In five minutes, you’ll get a significant charge that will last for days. In fact, in 60 seconds, you can charge a large battery enough to go up to 50 miles.

That is a game changer.

Here are five ways that EVs stocked with next-generation ultrafast-charging batteries will soon change everything.

1. **EVs will get 200-plus miles on a five-minute charge**

Right now, the fastest an EV can gather a significant charge is 45 minutes. That’s due to the Tesla Supercharger, which can get a Model S with an 85 kWh battery to 80% charge in that time. That’s not terrible if you’re lucky enough to find a supercharging station and don’t mind waiting for an opening. (In Los Angeles, ground zero for Teslas, there are only four such stations.) But when you think about it, 45 minutes is still a lot longer than most of us want to spend at a gas station or lunch counter. Just about every long-distance driver is happy to stop every few hours for a five-minute bathroom break, though. Ultrafast-charging silicon-dominant EV batteries are poised to make this the new norm in EV charging.

2. **EVs will go further**

Range anxiety, even if overblown, is a serious problem with EVs. Even when an EV panel or battery fuel gauge says it has 99 miles to go, many people have trouble trusting any number in the double digits because variables like hills or drops in temperature can quickly suck up those extra miles. But next-generation ultrafast-charging batteries can extend the range in both of these cases.
For one thing, silicon-dominant batteries have higher energy density, which provides more battery capacity and range for the same battery size. Also, silicon-dominant ultrafast-charging batteries are minimally affected by cold climates. When an electric or hybrid vehicle goes downhill or triggers regenerative braking, an ultrafast-charging battery can absorb the energy very quickly at high currents, ultimately giving back 10% to 15% of expended energy. With a silicon-dominant battery in cold climates, electric vehicles can provide up to 20% longer range.

3. More affordable EVs
A smaller battery that can be ultrafast-charged along the way would be less expensive both in EV purchase price and trip value. Most of the cost of an electric vehicle is in the battery: the bigger the battery, the higher the price. If you could create a smaller and lighter battery pack that charges ultrafast and has a higher energy density, there would be no need for a huge battery. It’s a shift in mindset; a smaller battery pack may need to be recharged more often, but only in short ultrafast charges rather than overnight.

EVs installed with an ultrafast-charging battery would also be easier on the wallet when it comes to fuelling. Right now we are accustomed to paying about $50 to gas up a car for 300 miles. For a far less expensive charge, you can go the same range with a next-generation EV. Consider Tesla again: even now, the company says that supercharging costs just $15 in electricity to drive from Los Angeles to the Bay Area, a trip that is approximately 380 miles.

4. A dramatic change in EV charging infrastructure
With a nearly full charge in five minutes that gives you a significant amount of range, ultrafast-charging EVs will be able to race through charging hubs just like they were typical gas stations. Ultrafast charging is expected to increase the number of EVs served in a station by five to eight times, so we might actually see a reduction in the number of dedicated public charging stations and a rise in quick-charge spots. Any parking lot can become a charging station, because it’s a lot easier to distribute electricity than gasoline (the electric grids are already in place).

Right now, though, commercial building owners are reluctant to add too many charging stations at parking spots near their properties because cars have to stay in them for such a long time to charge. If cars could charge up in just a few minutes, workplaces and public destinations might be more willing to set up stations, not only for their employees and consumers but also for delivery trucks, ride-share services and any other commercial vehicle that needs a quick boost.

More ultrafast chargers mean more people can charge their cars in more places, which will help stimulate the market for electric vehicles. It will also further open this market to the 58% of Americans who don’t have access to an EV plug, whether it’s in an overnight charging location or at home in their garage or carport. Short charging times, longer range, more affordable EVs and more prevalent and efficient charging stations will lead to more EV sales.

5. EV fleets just might spike in popularity
This all just might lead to significant investments in fleets of autonomous EVs, which are now hindered by their need to charge for hours. Currently, EV fleets have to be sizeable because so many vehicles, with their large batteries, have to sit at chargers for significant periods of time. If fleets had EVs with ultrafast-charging next-generation batteries and chargers, these vehicles would need less time at the chargers. A greater number of EVs could be rotated through the chargers on a quicker cycle, allowing for fewer fleet vehicles necessary to surpass the older generations’ productivity. Overall cost for a smaller yet more industrious fleet of EVs might suddenly become more appealing.

Ultrafast-charging EVs would greatly reduce range anxiety for long-distance trips and long commutes, and make them attractive to just about everybody. In other words, more people will buy the next generation of EVs if they know they can accomplish everything listed above.

It seems reasonable that mass adoption will only take place when these vehicles are considered to be the first choice in a household, said Edward Tuttle, managing principal at Analysis Group, a private economics consultancy.

The mix of next-generation ultrafast-charging EV batteries and more ultrafast-charging options, combined with longer-range and more affordable EVs, has enormous potential for the US. We could finally be on the brink of the kind of EV revolution that was once the stuff of science fiction. From now on, carmakers will be thinking in terms of more efficient batteries instead of bigger batteries. And that’s going to make all the difference.

For more information, visit www.enevate.com.

*Bob Rango has more than 33 years of technology and leadership experience. Before joining Enevate, he was executive vice president and general manager of Broadcom’s multibillion-dollar mobile and wireless group, where he led a team that captured No.1 global market share positions in Wi-Fi, Bluetooth and GPS chips. Prior to that, Bob held executive roles at Lucent Microelectronics and Agere Systems. Early in his career he was an engineer at AT&T Bell Labs. Bob is a board member at multiple public companies and holds a master’s degree in electrical engineering from Cornell University and a bachelor’s degree in electrical engineering from State University of New York at Stony Brook.*

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MINI-ITX MOTHERBOARD

Advantech has introduced the AIMB-205 Mini-ITX motherboard based on the latest Intel H110 chipset and the latest 6th and 7th generation Intel Core I, Pentium and Celeron processors, supporting non-ECC DDR4 2400 MHz memory with capacities up to 32 GB. It is designed with multiple high-speed I/O for high connectivity and USB stability enhancement and comes bundled with Advantech’s value-added software suite WISE-PaaS/RMM for remote device management, making it suitable for self-service applications such as ATMs, kiosks, vending machines and more.

The product builds on the 170 x 170 mm Mini-ITX form factor with high connectivity and multiple high-speed I/O including 4 x USB 3.0, 10 x USB 2.0, 2 x SATAIII and 1 x PCIe x16. For expansion, it supports 1 x full-size MiniPCie (colay mSATA) and 1 x M.2 (B key, type: 2242) on the top side of the board for easy Wi-Fi, 3G/LTE and storage module installation. It comes with dual PCI Express-based Gigabit Ethernet ports (Realtek RTL8111G), delivering up to 1000 Mbps of bandwidth for network-intensive applications.

The device has eight serial ports on board, including one RS232 5 V/12 V (by jumper selection) and one RS232/422/485 (via BIOS selection), offering users the convenience of connecting to devices without additional external power supplies. It is designed with an onboard amplifier (6 W stereo). Its I/O connectivity, especially with 14 x USB and 8 x serial ports, provides ample connection possibilities for self-service applications such as kiosks, and for ATM system integrators to link and manage multiple peripherals.

The unit incorporates a USB power on/off control via a GPIO and USB voltage regulator design that ensures stability in systems operations. This makes it suitable for ATM, kiosks and vending machines, which often connect to many USB devices at the same time. Powered by the latest 7th and 6th generation Intel Core processor, the product delivers a 4K graphic performance through Intel HD Graphics. It supports two independent displays, either in clone mode or extended mode using VGA, DVI-D, LVDS (or eDP) and DisplayPort 1.2, and the output resolution for DisplayPort 1.2 is up to 4K2K, offering high-quality graphics and imaging.

AIMB-205 bundles with Advantech’s IoT WISE-PaaS/RMM value-added software framework, which helps users monitor, control and manage their devices remotely in real time. WISE-PaaS/RMM offers a system data recovery function powered by Acronis and a system protection function powered by McAfee to ensure good operation and security protection, making it suitable for the banking industry or any other kind of embedded application.

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OPTICALLY CLEAR, FLAME-RETARDANT RESIN

Electrolube’s UR5641 is an optically clear polyurethane resin that has been developed to meet the increasing demands from LED manufacturers for an optically clear, flame-retardant resin.

The two-part, semi-rigid encapsulation resin cures to provide a flexible, protective and aesthetically pleasing covering over the luminaire elements. The aliphatic chemical nature of the cured resin is naturally resistant to the yellowing effects of UV light, making it useful for a range of outdoor as well as indoor applications. The resin is also scratch resistant and offers high resistance to weather, acids and alkalis, water and mould growth.

Due to a carefully selected blend of components, a durable, low-viscosity system is achieved, which can be used for a wide variety of applications. The resin has a wide operating temperature of -40 to +120°C and thermal conductivity of 0.20 W/mK.

The resin is flame retardant and UL94 V-0 approved, making it suitable for the protection of LED luminaires exposed to hazardous atmospheres, such as emergency lighting or lighting intended for installation in ATEX rated/zoned environments.

Electrolube
www.electrolube.com.au

MULTITEST PLATFORM

The Viavi/JDSU MTS-2000 Multi Test Platform with FiberComplete module is suitable for field technicians looking to perform traditional fibre qualification tests such as bidirectional insertion loss (IL), acceptance testing and general maintenance on metro and PON-based FTTx networks. It is available for rent from TechRentals.

With fewer connections and disconnections, automatic continuity check and an intelligent fault finder, the product is said to reduce testing times. It minimises training and collects measurements using a single connection port that combines a fully automated process with easy-to-read results.

The powerful system comes with a power meter, a fibre inspection probe and an optical time domain reflectometer (OTDR) module. It will measure optical return loss (ORL) and simplify troubleshooting in FaultFinder mode.

The instrument also has onboard automated rbn test sequences. It tests 1310, 1550 and 1625 nm wavelengths (λ) at 37, 35 and 35 dB dynamic range (respectively).

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HANDS-FREE TRANSLATION TECHNOLOGY DEVELOPED

Korea’s Electronics and Telecommunications Research Institute (ETRI) has developed Zero UI automatic interpretation technology, enabling hands-free language translation.

In recent years, the performance of automatic interpretation programs has improved thanks to deep-learning technology. However, most programs required users to touch their smartphone screen before speaking, with the results provided on the screen or through the speaker. This does not enable free conversations, due to slow speed and intermittent interruption, preventing the service from being widely employed.

Zero UI (zero user interface) interpreter technology allows users to look at the face of the person they are talking with, simply wearing a Bluetooth headset and speaking into the attached microphone. Their smartphones automatically detect the languages being spoken, then translate and transmit the conversation between participants. Communication flows almost as quickly as a normal conversation.

ETRI achieved this breakthrough by employing two core technologies, which were subsequently approved as the international standard by the International Organization for Standardization in July 2017 (ISO/IEC 20382-2:2017). The ‘two-channel voice processing technology’ separates the voice detecting channel and the voice input channel, while ‘barge-in technology’ enables voice recognition any time — even when in the middle of playing a synthesised voice.

These new technologies are also expected to result in fewer interpretation errors, especially in noisy places, as each speaker’s voice directly goes into his or her own microphone. They are thus forecast to have significant value at international events.

“This is significant in that the new technology brings us a step closer to genuinely lowering the language barrier in the era of globalisation,” said Sang-hun Kim, a project leader at ETRI.

ETRI plans to test drive its language interpretation technology at the upcoming Winter Olympics in PyeongChang, South Korea. The institute also plans to conduct additional research on users’ habits and technical issues to ensure adaptation to diverse changes.

SEMICON SOUTHEAST ASIA COMING TO KUALA LUMPUR IN 2018

SEMICON Southeast Asia (SEMICON SEA), a conference connecting people, products, technologies and solutions across the electronics manufacturing supply chain, will be held in Kuala Lumpur next year. Running from 8–10 May 2018, the event will take place in the newly constructed Malaysia International Trade and Exhibition Centre (MITEC).

Over the past three years, SEMICON SEA has served as a comprehensive platform for the electronics industry in the Southeast Asia region. The region has been described by event organiser SEMI as a world-class electronics manufacturing hub with end-to-end R&D capabilities.

“The growth of SEMICON Southeast Asia is attributed to the rapid expansion and robust growth of the electrical and electronics (E&E) sector across Southeast Asia, with companies emerging as world leaders in mobile, automotive, medical and Internet of Things (IoT) supply chains,” said Ng Kai Fai, president of SEMI Southeast Asia. “As one of the high-growth markets in the region, Malaysia contributes 44% of the total manufacturing output and 26% of the total gross domestic product of the region and is forecasted to generate approximately US$382 billion in exports in 2018.”

SEMICON SEA 2018 will connect decision-makers from the industry, demonstrate new advanced products and provide up-to-date market and technology trends. Under the theme ‘Think Smart Make Smart’, the event will feature three themed pavilions, five country pavilions, keynote presentations and forums that will address critical trending topics within the semiconductor ecosystem.

The conference will feature a supplier search program to encourage cross-border business matching as well as a technology start-up platform which will bring together Southeast Asia technology entrepreneurial resources. In conjunction with SEMICON SEA 2018, the event will also include the SEMICON University Programme, which aims to encourage and promote STEM interest amongst young talent, and will also include a job fair.

With more than 85% of the exhibition space already sold, SEMICON SEA 2018 will represent companies from Southeast Asia, China, Taiwan, Europe and the US. More than 300 companies will exhibit and as many as 8000 visitors from 15 countries are expected to participate. Sponsors include Carl Zeiss while partners include Malaysia Investment & Development Authority (MIDA), Malaysia Convention & Exhibition Bureau (MyCEB), Malaysia External Trade Development Corporation (MATRADE) and Surface Mount Technology Association (SMTA).

To register for SEMICON Southeast Asia 2018 or to explore exhibiting opportunities, visit www.semiconsea.org/.
GRAPHENE OXIDE BATTERIES UNDER DEVELOPMENT

With the help of a $3.45 million Cooperative Research Centre Project (CRC-P) grant, researchers at Swinburne University of Technology and Flinders University are partnering with Australian industry to commercialise batteries based on graphene oxide (GO).

Collaborating with ASX-listed First Graphene and Victorian manufacturer Kremford, the researchers aim to make inroads into the production of a new super-capacity GO-powered battery — an alternative to the emerging lithium-ion battery (LIB) technology. The project seeks to advance the GO-based supercapacitor, which is said to have energy density, flexibility and environmental sustainability ahead of traditional batteries.

Graphene is the lightest, strongest, most electrically conductive material available and has been predicted to generate revolutionary new products in many industry sectors. Unfortunately, unreliable quality and poor manufacturing processes have so far prevented an industrial graphene market.

Now, researchers at Swinburne’s Centre for Micro-Photonics are working on a commercially viable, chemical-free, long-lasting safe GO-based supercapacitor which offers high performance and low-cost energy storage capabilities. Meanwhile, First Graphene has entered into a research agreement with Professor Colin Raston’s research group at Flinders University to improve GO processing and production.

“This project aims to develop the manufacturing specifications for the commercial production of a graphene oxide (GO) supercapacitor with the ‘look and feel’ of a LIB but with superior performance across weight, charge rate, life cycle and environmental footprint factors,” said Professor Raston.

“The production of GO from graphite ore, without generating lots of waste, is an important part of this collaborative project.”

GRAPHENE RESEARCH HUB OPENS AT UNIVERSITY OF ADELAIDE

The ARC Research Hub for Graphene Enabled Industry Transformation was officially opened at the University of Adelaide last week, in a move that is expected to deliver major economic and scientific benefits to both the state and the nation.

The Research Hub supports research and development around new applications and industries based on graphene in a partnership between universities and industry partners. Originally announced in May 2016, it has been funded by the Australian Government through the Australian Research Council’s Industrial Transformation Research Hubs scheme with a $2.6 million grant, with industry partners contributing over $3 million.

Described by some as the miracle material of the 21st century, graphene has unique properties and is so thin that one gram of graphene can cover the size of a football oval. It is produced from graphite, which is mined from the ground. South Australia has the largest deposit of high-quality graphite in Australia, at 200 million tonnes.

“Graphene is a single layer of carbon atoms that holds unrivalled material properties — it’s the thinnest, strongest, lightest material known, with the greatest surface area, and the best electrical and thermal conductivity properties of any other material, as well as being flexible, water repellent and non-toxic with some antibacterial properties,” said Professor Dusan Losic, director of the Research Hub.

“It has the potential for new disruptive technology that will change our lives and create new industries, the same as silicon did 60 years ago.”

The Research Hub will develop high-value products and innovative solutions for industries as diverse as agriculture, mining, construction, medical technologies and defence. The Adelaide research group are already working on a new generation of fire-retardant products, construction materials, protective coatings for defence and industrial applications, and new electrical devices and super-batteries.

The Hub also has a training component with a cohort of postgraduate students and postdoctoral researchers.

The University of Adelaide will lead the new ARC Research Hub with collaborators at Monash University, the University of Melbourne and the University of South Australia. The commercial partners are Archer Exploration, Ziltek, Qingdao Huagao Graphene Technology, First Graphene and Cleanfuture Energy Australia.

“The aim is that our research will transform industry and support Australian businesses to embrace cutting-edge innovation and technologies that deliver high-value returns and build new industries,” said Professor Losic. “We have a vision of South Australia becoming the ‘Graphene Valley’ of Australia.”
RUGGED NETWORK SWITCH
Keeping devices connected in all operational environments, no matter how harsh or extreme the elements, is important to help ensure safety and mission success. Crystal Group’s RCS7150 network switch is designed to meet this specific need, delivering a rugged system with robust enterprise-level capabilities.

Available in a 12-port configuration, the switch delivers up to 240 Gbps stacking bandwidth, up to 68 Gbps full duplex switching capacity and up to 51 maximum packets per second (Mpps) forwarding capacity. The 24-port configuration delivers up to 480 Gbps stacking bandwidth, up to 132 Gbps full duplex switching capacity and up to 98 Mpps forwarding capacity.

The intelligent, scalable switch is based on the Ruckus ICX 7150 Series stackable switch, with a 9.75” depth available in 12- and 24-port configurations. Housed in a rugged, lightweight and compact enclosure — a choice of transit case or 19” rack with strain-hardened, aircraft-grade aluminium — it is designed to survive harsh environments, including extreme temperatures or high shock and vibration.

The rugged network switch supports IPv6 routing, offers plug-and-play functionality and is compatible with industry command line technology, enabling the integration of multiple units into a single logical unit addressable with a single IP address.

Both configurations are available in a 1U form factor and weigh 3.63 kg. Mounting for the unit complies with the EIA-310 19” rack standard using Delrin glides or a fixed mount. The rugged switches are designed for extended temperature ranges between -40 and +55°C.

Metromatics Pty Ltd
www.metromatics.com.au

LED BULKHEAD
Marl’s 084 Series LED Bulkhead features robust housing that supports a multicluster of high-intensity, sunlight-readable LED elements and integral circuitry designed to facilitate operation at a range of voltage options.

The bulkhead features voltage input of 24 VAC/DC, 110 VAC/DC and 230 VAC. The polycarbonate lens provides good wide-angle viewing for signals and indicator illumination. It has an operating temperature of -40 to +85°C and a life expectancy of 90,000 h (10 years).

The high-intensity LEDs are available in red, amber, green, blue and cool white. Wall or pole mounting options are available. Benefits include high optical performance, vibration resistance, vandal resistance and low heat generation.

The unit is sealed to IP67, making it suitable for outdoor use and harsh environments. The rail-approved version of the bulkhead includes two individual LED circuits.

The product is suitable for a wide variety of applications, including perimeter lighting, security lighting, path lighting, architectural lighting, driveway lighting, industrial lighting, construction lighting, stair lighting and tunnel lighting, as well as rail ‘end of line’ buffer stop lighting and rail barrow crossing indication (rail-approved version).

Aerospace & Defence Products
www.aerospacedefenceproducts.com.au

USB INTERFACE
The SYSTEM 8 SmartSwitch is a fully programmable, 2-channel USB interface designed to operate exclusively with ABI Electronics’ SYSTEM 8 Ultimate software and test equipment.

Consisting of a hardware plug-and-play module that connects to a full-size USB port, the product provides two channels that can take on up to four switch inputs. These inputs can be provided by standard triggering mechanisms such as foot or hand switch, safety buttons, conveyors and compatible sensors.

The operator can configure how each input should be interpreted by ABI’s software through a built-in, user-friendly control panel available in SYSTEM 8 Ultimate.

Setting up the SmartSwitch is simple. A list of possible actions and commands associated to ABI’s test instruments, applications and the TestFlow Manager is embedded in the SmartSwitch Control Panel. When used within a TestFlow, the SmartSwitch set-up will be recorded and recalled automatically the next time the user runs the same TestFlow file.

The product enables the user to keep their eyes on the PCB while performing a test. They can activate the device when they are ready to move on.

The interface can be used to interact with existing SYSTEM 8 instruments as well as the TestFlow Manager. Users can create, save and recall configuration profiles for the most used SYSTEM 8 instruments.

The product enables stop/start data acquisition without the use of a mouse. Events can be easily triggered once cables and probes have been positioned correctly.

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GET SMART
THE FACTORIES OF THE FUTURE

Lauren Davis

With a new year comes new hope for the promises of Smart Industry — a phenomenon that is revolutionising manufacturing in ways we could previously only dream of. To learn more about this trend, What’s New in Electronics spoke with Sapna Mongia, Head – Smart Grids and Metering, South Asia, Power and Discretes, from semiconductor supplier STMicroelectronics (ST).

Smart Industry, Industry 4.0, the Fourth Industrial Revolution... what exactly is this thing that has the world’s engineers so excited? Mongia defines Smart Industry as “the vast deployment of sensors, actuators and processing capabilities, together with the collection and analysis of the data they produce, to monitor and report on the critical points in industrial environments, to increase efficiency, reduce costs and move from preventive to predictive maintenance”. She added that it encompasses a number of key trends, including:

• next levels of automation with distributed control;
• safer working environments and new man-machine interaction models;
• higher energy efficiency for industrial machinery;
• the capture and use of manufacturing data;
• the application of artificial intelligence and machine learning.

Smart Industry includes high-growth application areas such as factory automation, industrial robots and industrial lighting, according to Mongia — areas which ST is well acquainted with through its large range of motor control ICs, industrial analog ASICs, sensors, actuators and microcontrollers. Applications include building control, manufacturing and process automation, medical electronics, military and civil aerospace, test and measurement, power and energy, security and video surveillance, and industrial 3D printers.

One of the key benefits of Smart Industry is improved factory automation, with Mongia stating, “Initiatives such as Industry 4.0 and the Industrial Internet of Things (IIoT) are defining the next phase in the digitisation of the manufacturing sector towards better efficiency, flexibility and safety.

“Smart, aware machines are creating new ways for man and machine to interact in the factory,” she added.

Furthermore, with improved factory automation comes improved power management — a particularly important development as, according to Mongia, “The industrial sector uses over 50% of the power generated by a country.”
A growing focus on energy saving and increased labour safety is thus opening up new opportunities for industrial system developers, stated Mongia. “System designers are addressing these evolving challenges using advanced semiconductor power technologies and their derived system-oriented power-saving and efficient products,” she said.

Smart Industry’s reliance on semiconductors means ST is able to provide the factory and process automation industry with an extensive product portfolio, ranging from Arm Cortex-M-based microcontrollers to memories, discrete power products, analog ICs, MEMS sensors and actuators, and more. The company’s industrial power supplies meanwhile enable energy-saving, high-power density and lower standby-power design solutions.

Another significant part of Smart Industry is robotics, specifically motion control. As explained by Mongia, “Motion control is used everywhere that a motor is involved in moving something. Whether this is for huge turbines or tiny medical robot arms, the basic principles are the same, and the motion control circuitry must deliver performance and power optimised to the application.”

In addition, the importance of power management cannot be understated, with Mongia noting that electric motors consume up to 70% of the power used in a typical factory. Thus, she said, “Advances in motion control are focused on driving motors with optimal performance and power efficiency.

“Improvements can be made through a focus at all points in the power distribution, consumption and harvesting cycle involved in motor control,” Mongia added. “As an example, existing machinery can be retrofitted with new — and more efficient — inverters and power management boards.”

Mongia noted that ST has particular expertise in advanced motion control, offering solutions for various applications. Examples include washing machines that use variable-speed motor-control technology to reduce power consumption powered by devices like ST’s STCH02 and Viper0P. Advanced Motion-Control Chips such as ST’s STSPIN820 IC meanwhile enable stepper-motor-based robots to achieve smoothness and silence, with small size, precision and low power consumption.

Finally, it would be remiss of us to talk about industrial robotics without mentioning 3D printing, which has “greatly enhanced accuracy and throughput in recent years”, according to Mongia.

“3D printers can produce parts with complex shapes, quickly and accurately, and are becoming more and more affordable, for consumer and professional uses from prototyping to production,” she added.

The STSPIN820 IC is particularly notable for its high-speed inputs and precise micro-stepping algorithm, enabling it to turn a motor by a fraction of a degree to move a 3D printer’s head at a speed of more than 500 mm/s. This submicron precision allows it to create parts quickly and with good surface finish, as well as to control precise movements like sample loading, capping/decapping and storage/retrieval in next-generation clinical automation systems.

So which industry sectors should be looking to ST and other suppliers to improve their factory automation? Mongia stated that “all factories are reasonable targets for improved factory automation”, and are set to benefit as a result.

“Factories of the future will be more environmentally friendly and productive and they will also be much more flexible and better able to respond to changes in demand and low-volume production requirements,” she said.

“As a supplier with over 30 years’ experience in developing products for factory automation and industrial applications, ST is among the leaders in designing and manufacturing products that help make Smart Industry a reality, today.”

STMicroelectronics Pty Ltd
www.st.com
ETHERTHE TESTER

The Viavi SmartClass Ethernet Tester is a compact and battery-operated instrument which provides 1 G electrical and optical interfaces. It is available for rent from TechRentals.

The easy-to-use Ethernet/Internet Protocol (IP) tester is suitable for frontline technicians who support Metro Ethernet networks. It is used by technicians for the installation, turn-up and maintenance of Ethernet and IP services in the field.

The tester is suitable for basic physical layer cable testing, Layer 2 (L2) and Layer 3 (L3) traffic generation, and full RFC2544 Ethernet testing. It also determines maximum throughput, latency, frame loss rate, back-to-back frames and jitter.

Applications of the tester include performance assessment of Carrier Ethernet services, activation and maintenance of metro Ethernet networks, deployment of active Ethernet (point-to-point) access services, switched networks and quality of service (QoS) verification.

TechRentals
www.techrentals.com.au

FANLESS MEDICAL EMBEDDED PC

iEi Integration’s HTB-100-HM170 quad core embedded medical PC is powered by Intel’s 6th Generation iCore processor. Featuring a fanless design to reduce noise output, the product is equipped with a waterproof top cover to prevent any damage from high-grade cleaning products or any spills that may occur. It is designed to be used in the hospital environment — such as ICU, operating room or emergency room — to fulfil various surgical requirements.

The PC comes with a specially designed cable cover that protects the unit from dust and liquid ingress, which allows medical staff to easily manage all the cables from the I/O ports and makes the cleaning process more convenient in medical environments. In addition, the device supports isolated COM ports and flexible expansion so that a video capture card can be installed for medical image inspection.

The product comes with a flexible mounting bracket which can be oriented 180°, allowing the unit to be easily changed from desktop to wall mount. The grounding pin design can prevent the PC from generating static charge to vital devices that are connected to patients, and avoid current damage from other devices.

ICP Electronics Australia Pty Ltd
www.icp-australia.com.au

ENCLOSURES WITH IP69K PROTECTION

ROLEC’s technoPLUS pole-mounted enclosures are now available with optional IP69K protection, safeguarding electronics from high-pressure and high-temperature jet washing.

The enclosures are designed for challenging indoor and outdoor locations. Each case features a dedicated bracket for horizontal or vertical mounting on poles and masts.

The enclosures are rated to IP66 as standard (IP67 and IP69K optional) and moulded from UV-stable ASA Luran (UL 94 HB). Each enclosure is pre-moulded with screw ports for the mounting bracket so no machining is needed. They can be installed ‘lid closed’ to help protect the seal and the electronics.

Retaining straps hold the recessed lid in place if it does need to be opened, which is useful when the enclosures have to be installed at height or in other difficult locations. Hinged lid trims conceal the fixing screws to deter tampering and provide further protection against the weather.

The enclosures are available in five sizes ranging from 130 x 90 x 70 mm to 270 x 170 x 90 mm. The standard colour is light grey and custom colours are available on request. Accessories include a pole/mast attachment and an internal mounting plate.

ROLEC can supply the enclosures fully customised with additional holes for push-buttons, displays, connectors and cable glands. The cases can be silk-screen printed with users’ legends and logos.

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www.rolec-enclosures.com.au
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Keysight Technologies takes a look at key technology trends and offers insights and predictions for 2018.

1. Blockchain grows up
Blockchain, the technology behind cryptocurrencies like Bitcoin, is poised for adoption in a wide range of applications that will greatly benefit from its inherent security. Smart, secure contracts based on blockchains will emerge in industries from finance and real estate to education and health care. Even mature industries are likely to begin to adopt permissioned or private variants of this technology as a way to validate compliance with international process standards.

2. Software is everywhere, really
Visualisation technology has driven a revolution in large-scale networked computing, enabling the rapid emergence of cloud architectures that offer radically new approaches to delivering value. As this trend accelerates in the networked computing world, the broad application of this concept to electronic systems will enable new breakthroughs in application performance and value. Traditional approaches will be disaggregated and reassembled in new ways to optimise the combination of high-performance customised hardware and the flexibility of software.

3. CMOS enables the commercialisation of the mmWave spectrum
As cost-effective CMOS pushes to higher and higher frequencies, it promises to enable the widespread utilisation of the mmWave spectrum for consumer applications from 5G to autonomous vehicles. The traditional home of secure government communication and research is opened up to a wide variety of commercial applications, unlocking a new universe of ‘new’ bandwidth.

4. Rapid expansion of hybrid photonic ICs to support high-speed communications and computing applications
Power requirements associated with traditional electrical/optical data transfer interfaces in data centres are fast approaching a practical limit. To economically exceed a 25.6 Tbps transfer rate in future data centre switches, new packaging technologies will emerge that will enable the integration of a wide range of photonic and switch ICs. Although widespread commercial deployment of this technology is not likely until 2020, aggressive R&D in this area is predicted in 2018.
5. Commercialising space
Private enterprises are rapidly changing how humans will explore and utilise space. In the past, central governments funded, owned and controlled satellites, and dominated how space was utilised. Despite some significant technical challenges, companies, playing by commercial rules, will push forward with the aggressive launch and operation of spacecraft and commercial satellite networks that will deliver new applications, from real-time weather imaging and ubiquitous global internet access to consumer space travel and asteroid mining.

6. Schrödinger’s cat is calling
There will be major advances in secure long-distance communication. Harnessing the physical phenomena described in quantum mechanics will, in theory, enable completely secure communications over very long distances. Quantum communication holds the potential to be virtually unsusceptible to tampering or eavesdropping. Should anyone attempt to intercept or modify this type of communication, both the sender and intended recipient would be notified of a security breach.

7. AR/VR emerges from gaming
Expect developer kits to be broadly available which will promote the creation of new applications beyond gaming. Robust ecosystems will develop around them in manufacturing, operations, service and support, and training, since augmented reality will greatly improve communications in complex environments where human judgment is required.

8. Autonomous vehicles will arrive, but expect challenges
There has been a great deal of progress in the development of driverless cars, but the industry will evolve beyond solving technology challenges to addressing practical implications such as regulatory issues (fuel, safety, communications, insurance and legal). Moral challenges will need to be addressed, such as responsibility for accidents with implications for insurance and legal matters, before autonomous vehicles become commonplace. How do you assign responsibility when a machine is driving? The industry needs regulations and standards to deal with these issues.

9. Electric vehicle adoption
Advances in powertrain, control systems and battery technology bring electric vehicle ranges closer to those of traditional combustion engine-powered cars. Their adoption will exceed expectations, increasing competition, driving infrastructure development and lowering costs. In support of this virtuous cycle, wide-bandgap semiconductor technology (eg, gallium nitride, silicon carbide) investments will enable breakthroughs in form factor and power efficiency, further accelerating the trend.

Keysight Technologies Australia Pty Ltd
www.keysight.com

Simplify the design of your low-power Liquid Crystal Display (LCD) devices. The PIC16LIF19197 family of 8-bit microcontrollers gives you the ability to drive up to 360 LCD segments while incorporating battery-friendly features. Thanks to the integrated charge pump, these MCUs are capable of driving 5V LCD displays while being powered at 3.3V. They also feature a 12-bit ADC with Computation (ADC0), which automates sensor interface functions that previously required software routines. The wide range of pin count and memory options ensure a perfect fit for your next LCD design.

Key Features
- Up to 26 KB Flash program memory and 4 KB RAM
- 12-bit ADC, up to 45 channels
- Integrated LCD control for up to 360 segments
- Available in 28 to 64 pins
- Easy setup with MPLAB® Code Configurator (MCC)

Contact Information
Microchip Technology Australia
Email: auscustinquiry@microchip.com Phone: +61 (2) 8868-6733

www.microchip.com/8bitLCD

Simplify Your Low-Power LCD Designs
MCUs That Do More

WWW.ELECTRONICSONLINE.NET.AU		 JANUARY/FEBRUARY	2018														19
VECTOR NETWORK ANALYSER
Copper Mountain Technologies has introduced the R180 handheld one-port VNA, which provides lab-grade performance measuring S11 from 1 MHz to 18 GHz. The compact design of the VNA (cable and antenna analyser) allows it to connect directly to the DUT, improving measurement accuracy by eliminating instability introduced by test cables. The R180 can be controlled and powered through a USB-C port or through an external 5 VDC power supply. The unit delivers results in a wide variety of measurement formats, including time domain measurement. The standard configuration R180-02 incorporates an N-type male test port connector.
Clarke & Severn Electronics
www.clarke.com.au

NB-IoT UPLINK AND DOWNLINK MEASUREMENTS
Anritsu has announced the availability of the NB-IoT Uplink Tx Measurement software and NB-IoT Downlink Waveforms package supporting 3GPP RF measurement tests for NB-IoT devices. Installing the NB-IoT options in the MT8870A Universal Wireless Test Set enables evaluation of communications equipment with built-in NB-IoT functions as well as tests of the RF Tx characteristics of modules. Additionally, a fully automatic measurement application is provided for controlling measuring instruments and chipsets at prototyping and mass-production testing. These application software packages can be used to simplify test program creation and automate measurement, cutting users’ test software development man-hours by about 90%.

Narrowband IoT (NB-IoT) is the latest standard of wireless technology that has been developed to support IoT devices and services. NB-IoT offers several advantages, including improved power consumption, extended in-building coverage, improved security and privacy features. But to be able to meet to growing demand for NB-IoT modules, chipset vendors are looking at cutting the cost of manufacturing by improving measurement efficiency. Anritsu has worked closely with chipset vendors to develop a turnkey system supporting fully automatic measurement. These latest options make full use of optimisation technology developed as a manufacturing solution for 2G/3G/4G terminals and have been developed as a multidevice test solution for cutting measurement costs per device as far as possible.

The MT8870A is a universal wireless test set designed for the mass production of wireless communication devices, including 2G/3G/LTE/LTE-A, W-LAN, Bluetooth, GPS and FM technologies. Up to four high-performance test units can be installed in one main chassis, with each unit performing completely independent parallel measurements to evaluate up to four wireless communications devices simultaneously.

Installing the developed NB-IoT measurement software in the MT8870A supports fast and easy 3GPP NB-IoT RF tests, including power, frequency, modulation accuracy and Rx sensitivity.
Anritsu Pty Ltd
www.anritsu.com

TUNING KNOBS
OKW Gehäusesysteme has extended its COM-KNOBS series of tuning knobs. The knobs’ existing covers, with a colour choice of modern pastel shades and in black, have been joined by four more covers in a metallic look, made of an ABS material. The matt chrome finish provides the knobs with an elegant appearance. The knobs are characterised by an aesthetic design and good operation due to their collet fixture. With this fixture, the knobs are mounted from the front, ensuring a firm fit on the shaft.
The knobs are available in the two colours: Nero and Volcano. Different knob sizes are available, each offering room for a matching push-on cover. Each variant can also be obtained with a recess for an additional marking element.
Among possible applications, the series is suitable for rotary potentiometers with round shaft ends in accordance with DIN 41591 in measurement and control engineering, communication, medical and laboratory technology, heating and air conditioning, health care, fitness and building. The tuning knobs can also be modified to meet users’ requirements, eg, mechanical processing for interfaces or for printing with a logo.
ROLEC OKW Australia New Zealand P/L
www.okw.com.au
WATER-RESISTANT PRESSURE SENSOR

STMicroelectronics has released its latest miniature pressure sensor, the LPS33HW. Resistant to chemicals like chlorine, bromine and salt water, it is suitable for pool or sea swimming, and will also resist soaps or detergents used when showering or cleaning.

The product helps OEMs get their products to the store shelves quickly by recovering soon after the stresses of manufacturing. Other sensors can require up to seven days to regain maximum accuracy after coming off the production line, but devices containing the LPS33HW are ready for action in less than half that time. This is due to the sensor’s high-performance built-in processor and the formula of its water-resistant gel filling.

In addition to smart consumer devices like wearables, other equipment including industrial sensors and utility meters can also benefit from the robustness and high measurement accuracy of the device. The 10 bar pressure sensor can withstand being submerged up to 90 m, and the low RMS pressure noise of 0.008 mbar allows apps like an altimeter, depth gauge or weather monitor to deliver consistent and stable results. The sensor accuracy drifts by less than ±1 mbar per year.

When soldered to a circuit board during product manufacture, the accuracy is affected by less than ±2 mbar, and returns to normal after less than 72 h — quicker than similar water-resistant pressure sensors, according to the company. The product comes in a 3.3 x 3.3 x 2.9 mm cylindrical metal package suitable for use with O-ring seals.

STMicroelectronics Pty Ltd
www.st.com
‘INVISIBLE GLASS’ HAS ALMOST NO SURFACE REFLECTIONS

Most of today’s electronics devices are equipped with glass or plastic covers for protection against dust, moisture and other environmental contaminants. But as useful as these displays are, they are also responsible for a major nuisance for the modern-day screen addict: glare.

Now, scientists at the Center for Functional Nanomaterials (CFN) — a US Department of Energy facility at Brookhaven National Laboratory — have demonstrated a method for reducing the surface reflections from glass surfaces to nearly zero by etching tiny nanoscale features into them. Their work has been published in the journal Applied Physics Letters.

Whenever light encounters an abrupt change in refractive index (how much a ray of light bends as it crosses from one material to another, such as between air and glass), a portion of the light is reflected. The researchers’ nanoscale features have the effect of making the refractive index change gradually from that of air to that of glass. As a result, reflections are reduced so much that the glass essentially becomes invisible.

To texture the glass surfaces at the nanoscale, the scientists used an approach called self-assembly, which is the ability of certain materials to spontaneously form ordered arrangements on their own. In this case, the self-assembly of a block copolymer material provided a template for etching the glass surface into a ‘forest’ of nanoscale cone-shaped structures with sharp tips — a geometry that almost completely eliminates the surface reflections. Block copolymers are industrial polymers (repeating chains of molecules) that are found in many products, including shoe soles, adhesive tapes and automotive interiors.
The researchers had previously used a similar nanotexturing technique to impart silicon, glass and some plastic materials with water-repellent and self-cleaning properties, and anti-fogging abilities, and also to make silicon solar cells antireflective. The surface nanotextures mimic those found in nature, such as the tiny light-trapping posts that make moth eyes dark to help the insects avoid detection by predators and the waxy cones that keep cicada wings clean.

“This simple technique can be used to nanotexture almost any material with precise control over the size and shape of the nanostructures,” said Atikur Rahman, a former Brookhaven Lab postdoc and co-author on the paper. “The best thing is that you don’t need a separate coating layer to reduce glare, and the nanotextured surfaces outperform any coating material available today.”

“We have eliminated reflections from glass windows not by coating the glass with layers of different materials but by changing the geometry of the surface at the nanoscale,” added co-author Andreas Liapis. “Because our final structure is composed entirely of glass, it is more durable than conventional antireflective coatings.”

To quantify the performance of the nanotextured glass surfaces, the scientists measured the amount of light transmitted through and reflected from the surfaces. In good agreement with their own model simulations, the experimental measurements of surfaces with nanotextures of different heights show that taller cones reflect less light. For example, glass surfaces covered with 300 nm-tall nanotextures reflect less than 0.2% of incoming red-coloured light (633 nm wavelength). Even at the near-infrared wavelength of 2500 nm and viewing angles as high as 70°, the amount of light passing through the nanostructured surfaces remains high — above 95 and 90%, respectively.

In another experiment, they compared the performance of a commercial silicon solar cell without a cover with a conventional glass cover, and with a nanotextured glass cover. The solar cell with the nanotextured glass cover generated the same amount of electric current as the one without a cover. They also exposed their nanotextured glass to short laser pulses to determine the intensity at which the laser light begins to damage the material. Their measurements reveal the glass can withstand three times more optical energy per unit area than commercially available antireflection coatings.

The ultratransparent nanotextured glass was thus found to be antireflective over a broad wavelength range (the entire visible and near-infrared spectrum, or 450–2500 nm) and across a wide range of viewing angles — and it could do a lot more than improve the user experience for consumer electronic displays. It could enhance the energy-conversion efficiency of solar cells by minimising the amount of sunlight lost to reflection. It could also be a promising alternative to the damage-prone antireflective coatings conventionally used in lasers that emit powerful pulses of light, such as those applied to the manufacture of medical devices and aerospace components.

“We’re excited about the possibilities,” said CFN Director Charles Black, corresponding author on the paper. “Not only is the performance of these nanostructured materials extremely high, but we’re also implementing ideas from nanoscience in a manner that we believe is conducive to large-scale manufacturing.”
DC MOTORS WITH INTERNAL ENCODER AND MOUNTING BRAKE

Specifically designed for the agriculture industry, KAG’s IP67 rated 12 and 24 VDC motors have an incremental encoder built inside the motor body.

The first motor in the series is the 80 x 172 mm, 250 W brushed permanent magnet motor, assembled with 81 mm IP67 gearheads. The IP67 gearhead range has a large reduction range to select from facilitating torque production of up to 180 Nm.

The internal magnetic encoder sits behind the motor commutator, has two channels and can be run on either 5 or 24 VDC. Mounting the encoder internally has the advantage of freeing up the motor rear shaft, where an external holding brake can be fitted.

The units have a B56 brake that, combined with gearing, can provide the 180 Nm of torque also for holding the load in place on the unpowered condition. Future versions will have the option of either power-activated or -deactivated holding brakes and will feature a sealed enclosure for harsh environments.

maxon motor Australia Pty Ltd
www.maxonmotor.com.au

MCU KIT

The Cypress Semiconductor PSoC 6 BLE Pioneer Kit is based around the company’s PSoC 6 MCU, purpose-built for the Internet of Things (IoT). The MCU delivers the ultralow power, high performance and built-in security features that the IoT devices of the future are likely to demand.

The MCU uses an ultralow-power 40 nm process and offers flexible power modes to help IoT devices run longer on one charge. Flexible dual-core ARM Cortex-M architecture enables optimisation of system power consumption and high-performance processing.

The MCU supports independent, hardware-based trusted execution environments for IoT security. Featuring flexibility and ease of use, the PSoC MCU architecture is said to enable visionary designs.

The PSoC 6 BLE Pioneer Kit includes the following: the dual-core ARM Cortex-M4 and Cortex-M0+ PSoC 63 MCU with BLE 5.0; a 2.7” e-ink display shield board with onboard digital microphone and thermistor; an onboard BLE antenna; 512 Mb high-speed Quad-Spi NOR Flash; an EZ-PD CCG3 Type-C system for power delivery; a CapSense linear slider, touch buttons and proximity sensors; an onboard programmer/debugger; an RGB LED; and two push-button switches. It is compatible with Arduino Uno shield boards.

Digi-Key Electronics
www.digikey.com

ULTRATHIN SUPERCAPACITOR

The Murata DMH Series supercapacitor delivers high power with a low equivalent series resistance (ESR) of 300 mΩ at 1 kHz. The capacitor also provides a high peak voltage of 4.5 V and exhibits stable output characteristics over a wide operating temperature range of -40 to 85°C.

The supercapacitor offers more than 100 times the energy storage than ceramic capacitors and electrolytic capacitor, according to the company, with a longer work life than ordinary secondary batteries. Featuring an ultrathin profile of 0.4 mm, the supercapacitor is designed for peak power assist such as wearables, medical patches, e-paper devices, smart cards and other space-constrained mobile devices, helping to increase output and power stability.

In addition to peak power assist applications, such as LED flash, audio circuits and power amplifiers, engineers can incorporate the supercapacitor into designs for high-power back-up and energy-harvesting applications.

Mouser Electronics
www.mouser.com
INDUSTRIAL ENCLOSURES

The Bocube series of industrial enclosures from BOPLA are said to be innovative and versatile. There are few individual parts, which simplifies assembly, and the use of single-sort plastics without injected metal parts makes recycling easy. The enclosures are made of polycarbonate UL 94-V0, making them weather resistant and suitable for outdoor use.

Electronic enclosures are not only used in protected indoor rooms — they are often exposed to wind and weather, eg, when used in agriculture, traffic or the field of renewable energies. This is where the polycarbonate UL 94-V0 enclosures can demonstrate their abilities. Wind, weather, changing temperatures and above all ultraviolet radiation cannot affect this material, which also has good mechanical characteristics. All this ensures that the electronics inside are protected against the effects of weather.

Made of the flame-retardant or self-extinguishing materials ABS and polycarbonate UL 94-V0, the enclosures feature uncomplicated assembly and a range of features and components. There are 19 enclosure sizes and two lid and colour variants, making it possible to create 114 different enclosures for electronic components. Hinged catches in many different colours permit visual matching to the user’s corporate design and also the development of interesting lighting effects by the use of LEDs mounted underneath the hinged catches. The lids have an area which is recessed by 2 mm for the fitting of input devices such as membrane keypads (exception: B 080805, 0.5 mm). They can be opened to the left or right, as required, which makes it easy to assemble and access the electronics.

The enclosures provide space for scored PCBs and rectangular mounting panels, which can be installed in both the lid and the base. Rectangular front panels can be fitted in the base by means of distance bolts. Generously sized free areas ensure sufficient space for the installation of cable glands, D-sub connectors and other connectors.

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Scan the code to discover our full spectrum of superior Thermal Management and electro-chemical solutions.
A supplier should consult the relevant labelling notice/s to identify the requirements that apply to each product that is being supplied in Australia. A supplier must ensure a product complies with all applicable requirements (legislative instrument) before supplying that product to the Australian market.

The Electrical Equipment Safety System
The Equipment Safety Rules outline the processes required to address the legislative requirements of the Electrical Equipment Safety System. They do this by providing a framework which defines the processes, and the roles and responsibilities of key parties.

Failure by a Responsible Supplier to discharge their obligations under the EESS will result in the imposition of significant penalties and possible de-registration.

ACCC specifies:
Compliance programs help owners and managers to become more aware of the day-to-day operations of their business, therefore reducing the risk of supplying unsafe and non-compliant products.

There are a number of benefits to introducing a product safety compliance program to your business, including:

• clearly identifying the operational requirements of your business to meet the law;
• reducing your risk of product failure and injury to consumers that may also result in litigation;
• reducing your risk of supplying non-compliant products that can result in court action and penalties;
• providing records of controls and business systems;
• providing a set of procedures that improve efficiency in managing your business;
• minimising repetitive complaints from consumers.

If you would like to know more about our services or would like to discuss your requirements please contact us on +61396455933 or compliance@comtest.com.au

References

Comtest Laboratories Pty Ltd
www.compliancefolder.com.au

SPONSORED CONTENT
COMPLIANCE & TECHNICAL FOLDER MANAGEMENT

When supplying any electrical or electronic products that operate using any voltage onto the Australian market, there are many requirements that need to be considered. One such requirement is the keeping of records and compliance documentation.

Compliance Folder Management Pty Ltd (CFM) is the expert when it comes to assisting our clients with all their ongoing documentation and compliance obligations.

CFM have been assisting both local and international clients to meet compliance requirements for over 20 years. CFM works closely with clients to audit, store and maintain their documentation to comply with ongoing compliance and record keeping, in line with:

• the ACMA regulatory framework for all electronic products;
• the Electrical Equipment Safety System (Electrical Regulations); and
• ACCC recommendations.

We can assist with new or existing products that are to be supplied onto the Australian market by:

• reviewing test reports and associated documentation;
• acting as an Agent for international suppliers;
• registering products on ERAC’s EESS database;
• organising any additional testing through an appropriate test laboratory;
• applying on behalf of the client for Certificates of Conformity and Suitability from an Accredited Certifier;
• storing compliance folders;
• managing compliance and technical folders by monitoring time frames and confirming with clients any changes that may need to be made to the compliance or technical folders in order to remain up to date and/or compliant;
• assisting and/or managing product recall processes and requirements — working with the client and government agencies to minimise any potential impact.

The ACMA regulatory framework for products supplied to the Australian market includes regulatory arrangements covering:

• telecommunications customer equipment and customer cabling;
• radiocommunications devices;
• electromagnetic compatibility (EMC) performance of electrical and electronic devices, vehicles and devices with internal combustion engines;
• electromagnetic energy (EME) from radio transmitters.

Each of the four regulatory arrangements incorporates a legislative instrument, referred to as a labelling notice. The labelling notices identify the applicable technical standards and testing, record-keeping and labelling requirements for products supplied into Australia.

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The equipment safety rules outline the processes required to comply with all applicable requirements (legislative instrument) before supplying that product to the Australian market. A supplier must ensure a product complies with all applicable requirements (legislative instrument) being supplied in Australia. A supplier should consult the relevant labelling notice/s to identify the applicable technical standards and testing, record-keeping requirements for products supplied into Australia.

The high-quality motors feature all stainless steel laser-welded flanges and body, with a stainless-steel large dimension preloaded ball bearing system and a hardened stainless steel shaft. They integrate into the maxon modular system with a range of encoder and gearbox selections, allowing engineers to create a dedicated mechatronic solution for each application.

The range uses the latest production technologies offered by maxon motor’s manufacturing facility in Korea, making them suitable for general automation, power tools, seat actuators and process control machinery. Maximum speeds of 15,000 rpm and selectable winding configurations add versatility, allowing for use on 12, 24 and 48 VDC systems. This is in addition to torque levels over 100 mNm from a 30 mm-diameter motor.

maxon motor Australia Pty Ltd
www.maxonmotor.com.au

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LTE CAT M1/CAT NB1/EGPRS MODULE
BG96MA is a global version of the BG96 LTE Cat M1/Cat NB1/EGPRS smart module, supporting multimode technologies with a maximum data rate of 375 Kbps downlink and uplink. It features ultra-low power consumption and provides pin-to-pin compatibility with Quectel LTE module EG91/EG95, Cat NB1 (NB-loT) module BC95, UMTS/HSPA module UG95/UG96 and GSM/GPRS module M95.

With an SMT form factor of 22.5 x 26.5 x 2.3 mm and a high integration level, the product enables integrators and developers to easily design their applications by taking advantage of the module’s low power consumption and mechanical intensity. Its LGA package enables fully automated manufacturing for high-volume applications.

A rich set of internet protocols, industry-standard interfaces (USB/JART/I2C/Status Indicator) and abundant functionalities (USB drivers for Windows XP, Windows Vista, Windows 7/8/8.1/10, Linux and Android) extend the applicability of the module to a wide range of M2M applications, such as wireless POS, smart metering, tracking, etc.

Elecom Electronics Supply
www.elecomes.com

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WINDOWS CE-BASED PAC
The IWS PAC series is a WinCE 7.0-based InduSoft PAC from ICP DAS. It is claimed to make connectivity for the Internet of Things and mobile devices easy.

The panel PC combines a RISC-based CPU board and TFT LCD touch screen to create a ruggedised flat panel computer for a variety of control and HMI applications. It provides a variety of I/O, including Gigabit Ethernet, USB port, RS232 and RS485.

The operating system is pre-installed in the onboard Flash memory. Remote I/O expansion is available using Ethernet I/O modules, RS485 I/O modules, Wi-Fi and ZigBee wireless I/O modules. Designed for panel mount installation, the front panel is NEMA 4/IP66 rated and can withstand sprayed water, humidity and extreme dust.

The product has a 7″10.4″/15″ LCD with resolution of 800 x 480/800 x 600/1024 x 768. Operating over a wide -10 to +60°C ambient temperature range, the fanless unit has no moving parts.

Other features include: InduSoft Runtime inside; support for Modbus, OPC, TCP/IP client/server; DCON driver for ICP DAS I/O modules provided; a Cortex-A8 (1 GHz or 720 MHz) CPU; and a resistive touch panel.

ICP Electronics Australia Pty Ltd
www.icp-australia.com.au
One of several laboratory battery cell designs used in the research. Image courtesy of Felice C. Frankel under CC BY-NC-ND 3.0

Seeking to reduce the cost of storing renewable energy on the grid, US scientists have created what they describe as an ‘air-breathing battery’ — powered by sulfur, air, water and salt — that can store twice as much energy as a lead-acid battery. Their work has been published in the journal *Joule*.

One of the criticisms of renewable energy is its variability — there are times when a cloud goes in front of the sun or the wind dies down — and so being able to store this energy is essential for uninterrupted energy flow. At the moment, the coupling of energy storage to renewable generation is in its infancy, with a very small percentage of solar and wind energy successfully stored — in systems that cost a minimum of US$100/kWh to run and can function only in certain locations.

Responding to the US Department of Energy’s ‘5-5-5’ grid storage goal (five times more energy density, at one-fifth of the cost, accomplished in five years), researchers at the Massachusetts Institute of Technology (MIT) sought to create a low-cost storage unit. Led by Yet-Ming Chiang, the team took an interest in the potential of sulfur — a widely available, energy-dense by-product of natural gas and petroleum refining — as the core anode in what they hoped would be a lightweight and inexpensive battery.

The next challenge was finding an inexpensive liquid cathode material that remained stable while producing a meaningful charge. On a shortlist of candidates was a compound called potassium permanganate which, if used as a cathode material, is ‘reduced’ — a reaction that draws ions from the anode to the cathode, discharging electricity. However, the reduction of the permanganate is normally impossible to reverse, meaning the battery wouldn’t be rechargeable.

First author Zheng Li decided to persist with the idea, and as expected the reversal failed. However, the battery was in fact recharging, due to an unexpected oxygen reaction in the cathode, which was running entirely on air.
"I said, ‘Wait, you figured out a rechargeable chemistry using sulfur that does not require a cathode compound?’,” said Chiang. “That was the ‘ah-ha’ moment.”

Using that concept, the researchers created a type of flow battery where electrolytes are continuously pumped through electrodes and travel through a reaction cell to create charge or discharge. The battery consists of a liquid anode (anolyte) of polysulfide that contains lithium or sodium ions, and a liquid cathode (catholyte) that consists of an oxygenated dissolved salt, separated by a membrane.

Upon discharging, the anolyte releases electrons into an external circuit and the lithium or sodium ions travel to the cathode. At the same time, to maintain electroneutrality, the catholyte draws in oxygen, creating negatively charged hydroxide ions. When charging, the process is simply reversed. Oxygen is expelled from the catholyte, increasing hydrogen ions, which donate electrons back to the anolyte through the external circuit.

“This battery literally inhales and exhales air, but it doesn’t exhale carbon dioxide, like humans — it exhales oxygen,” said Chiang.

“What this does is create a charge balance by taking oxygen in and out of the system.”

Currently the size of a coffee cup, the prototype battery has a total chemical cost of about $1/kWh — or 1/30th the cost of competing batteries, such as lithium-ion batteries, and only slightly lower energy density. Scaled-up systems could be used to store electricity from wind or solar power for multiple days to entire seasons, for about $20–$30/kWh. The ability to discharge over months is especially important the further one ventures from the equator, where the amount of sunlight varies more widely from summer to winter.

So what are the downsides? One complication is that the amount of electrical charge that can be stored depends on the amount of liquid in the anode and cathode. This means the battery needs to take up more space than what is traditionally used; however, the cost of the materials offsets that drawback.

The researchers are also working on making their storage battery more efficient, driving down costs of the battery architecture and increasing its lifespan — it can currently operate for up to 1500 hours, but that’s far from the 5- to 20-year lifespan it would require in practice. They are also considering how best to scale their prototype and where to commercially test their product.

Overall, Chiang is extremely excited about creating what could be the first technology to compete, in cost and energy density, with pumped hydroelectric storage systems, which provide most of the energy storage for renewables around the world but are very restricted by location.

“The energy density of a flow battery like this is more than 500 times higher than pumped hydroelectric storage,” he said. “It’s also so much more compact, so that you can imagine putting it anywhere you have renewable generation.”
Explosives manufacturer invests in motor control technology

An Eastern European explosives manufacturer is set to receive an Allen-Bradley CENTERLINE 2500 motor control centre (MCC) from Rockwell Automation. Acquired on behalf of the manufacturer by Auto Control Systems (ACS), the MCC features the complete Rockwell Automation Connected Components range, including E300 Electronic Overloads and PowerFlex 525 and 753 drives, all on an Ethernet backbone.

The explosives manufacturer called on International Explosives Equipment (IEE), an Australian company that designs and builds equipment for the bulk explosives sectors, to provide the mechanical design and hardware for the manufacturing plant. ACS is the automation provider for IEE and was responsible for delivering the automation and electrical components of the plant. IEE, ACS and the end user collaborated on the programming requirements for operating the production facility incorporating a high level of safety, automation and control.

“Customers’ requirements are changing and they are looking for motor control solutions that can integrate with their existing systems and provide advanced diagnostic capabilities,” said Andrew Taylor, engineering & operations manager at ACS. “The CENTERLINE 2500 meets these requirements and provides an efficient and effective solution.”

As the MCC will be operating in an explosives plant, ArcShield protection was included in addition to the Rockwell Automation Connected Components. ArcShield helps to reduce arc flash hazards and provides increased protection against electrical arcing faults.

The MCC also features IntelliCENTER technology, which enhances the intelligence of the MCC by using built-in networking to capture information that can be used for predictive maintenance, process monitoring and advanced diagnostics. Connecting motor control devices over Ethernet allows operators to realise the benefits of the Connected Enterprise by monitoring and analysing operations from anywhere at any time.

“The international certification via IEC61439 combined with ArcShield protection helped the customer to feel relaxed in the knowledge that they are purchasing a superior product, which provides the highest levels of protection for their operations staff,” said Taylor.

ACS leveraged its engineering expertise to incorporate several custom selections, including a light and power distribution chassis, PLC tier including dual CompactLogix controllers and Stratix switches, and custom heat trace control cubicle. All motor control equipment has an external hardware interface module to display performance information at the front of the MCC.

“Working together, we were able to provide an IEC-certified product with the safety of ArcShield,” said Taylor. “The entire MCC is housed within a 40-foot high-cube shipping container complete with segregated control room and laboratory. The container is designed to be transported direct to the customer’s premises ready for wiring and installation.”

Working with system integrators that have the experience and capability to help customers leverage the safety and intelligence available within the CENTERLINE 2500 MCC is a key focus for the Rockwell Automation System Integrator program. ACS has a well-established competency in motor control and software to help customers understand and implement these intelligent capabilities in a way to help generate value for their organisations.

“This is an important milestone in our relationship with ACS and gives us the flexibility to address market requirements in providing comprehensive type tested, intelligent MCC solutions that can be locally customised and supported by a competent LV MCC Recognised System Integrator with backing from our factory,” said Michael Massey, Rockwell’s state manager for Western Australia.

Rockwell Automation Australia
www.rockwellautomation.com.au
BLDC motors as frameless kits.


The EC frameless flat motor is a high performance, high torque BLDC motor. It is designed to be incorporated into specially adapted outer bodies that serve as both: the motors supporting structure and the torque carrying device. The motor is available with 12 V, 18 V, 24 V, 36 V and 48 V windings and comes with matching position or speed control devices. Closed loop feedback is supplied via integrated sensors and full mounting instructions with examples are provided. maxon motor Australia | 1, 12-14 Beaumont Rd. Mt Kuring-Gai NSW 2077 | www.maxonmotor.com.au | Tel +61 2 9457 7477

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EVALUATION KIT

The WICED CYW43907 evaluation kit, from Cypress Semiconductor, offers engineers a product that is said to reduce time to market when producing production-ready Internet of Things (IoT) designs.

The evaluation kit is based on the Cypress CYW43907 system-on-chip (SoC). The wireless SoC combines dual-band 802.11n (2.4 and 5 GHz) Wi-Fi with a 32-bit ARM Cortex-R4 application microcontroller subsystem. The SoC features 2 MB of SRAM along with a several standardised interfaces, including Ethernet (RMII/MII), UART, SPI/QSPI and I²C.

The evaluation board has an operating voltage of 3.3 V and features an RJ45 Ethernet connector, an onboard PCB antenna, an external antenna connector, an onboard programmer and debugger, and a microSD card slot. The board also offers Arduino Uno-compatible headers, allowing designers to prototype additional hardware capabilities through off-the-shelf Arduino shields for sensors and other peripherals.

The evaluation kit is supported by Wireless Internet Connectivity for Embedded Devices (WICED) Studio, a software development kit (SDK) targeting IoT that includes libraries and code examples for Wi-Fi, Bluetooth and combination connectivity in a single integrated development environment (IDE). The target wireless applications for the development platform include home automation, medical, health and fitness, audio and Industrial IoT.

Mouser Electronics
www.mouser.com

1.25 MM CONNECTORS

Harwin’s Gecko (G125 series) connectors provide a low-profile, dual-row, cable-to-board and board-to-board interconnect solution, suitable for stacking and cable mating in areas where PCB real estate is at a premium.

With space and weight a consideration for many applications, the connectors are designed to offer high performance in a miniature package with pin spacing of 1.25 mm and up to 50 contacts per connector. The connectors also accommodate 2A per contact.

Tested to allow high performance in extreme conditions, the Gecko family can operate within a wide temperature range (-65 to +150°C) and resist vibration (10 to 2000 Hz, 20G), shock and acceleration (both 50G) due to Harwin’s four-finger Copper Alloy Contact.

They can withstand high numbers of mating cycles and are available with or without latches fitted for extra security of connection. They are made of futureproofed materials (halogen-free, PFOS-free, SVHC-free) and are RoHS compliant.

Clarke & Severn Electronics
www.clarke.com.au
As research teams worldwide explore ways to design a computer chip that can integrate quantum interactions, UNSW engineers believe they have found the solution.

The researchers have designed a novel architecture, described in the journal *Nature Communications*, that allows quantum calculations to be performed using existing semiconductor components, known as CMOS (complementary metal-oxide-semiconductor) — the basis for all modern chips. It is thus feasible that their hypothetical quantum computer chip could be manufactured using mostly standard industry processes and components.

“Creating a microprocessor chip with a billion operating devices integrated together to work like a symphony — that you can carry in your pocket! — is an astounding technical achievement, and one that’s revolutionised modern life,” said Andrew Dzurak, director of the Australian National Fabrication Facility at UNSW and program leader at the Centre of Excellence for Quantum Computation and Communication Technology (CQC²T).

“With quantum computing, we are on the verge of another technological leap that could be as deep and transformative. But a complete engineering design to realise this on a single chip has been elusive. I think what we have developed at UNSW now makes that possible. And, most importantly, it can be made in a modern semiconductor manufacturing plant.”

Menno Veldhorst, lead author on the paper, was a research fellow at UNSW when the conceptual work was done. Now a team leader in quantum technology at QuTech in the Netherlands, he said the new design charts a conceivable engineering pathway towards creating millions of quantum bits, or qubits.

“Remarkable as they are, today’s computer chips cannot harness the quantum effects needed to solve the really important problems that quantum computers will,” said Veldhorst. “To solve problems that address major global challenges — like climate change or complex

**Artist’s Impression of a silicon CMOS architecture for a spin-based quantum computer. Illustration: Tony Melov.**
diseases like cancer — it’s generally accepted we will need millions of qubits working in tandem. To do that, we will need to pack qubits together and integrate them, like we do with modern microprocessor chips. That’s what this new design aims to achieve.

“Our design incorporates conventional silicon transistor switches to ‘turn on’ operations between qubits in a vast two-dimensional array, using a grid-based ‘word’ and ‘bit’ select protocol similar to that used to select bits in a conventional computer memory chip. By selecting electrodes above a qubit, we can control a qubit’s spin, which stores the quantum binary code of a 0 or 1. And by selecting electrodes between the qubits, two-qubit logic interactions, or calculations, can be performed between qubits.”

A quantum computer exponentially expands the vocabulary of binary code used in modern computers by using two principles of quantum physics: entanglement and superposition. Qubits can store a 0, a 1 or an arbitrary combination of 0 and 1 at the same time. Just as a quantum computer can store multiple values at once, so it can process them simultaneously, doing multiple operations at once. This would allow a universal quantum computer to be millions of times faster than any conventional computer when solving a range of important problems.

But to solve complex problems, a useful universal quantum computer will need a large number of qubits, possibly millions, because all types of qubits we know are fragile, and even tiny errors can be quickly amplified into wrong answers.

“So we need to use error-correcting codes which employ multiple qubits to store a single piece of data,” said Dzurak. “Our chip blueprint incorporates a new type of error-correcting code designed specifically for spin qubits, and involves a sophisticated protocol of operations across the millions of qubits. It’s the first attempt to integrate into a single chip all of the conventional silicon circuitry needed to control and read the millions of qubits needed for quantum computing.”

There are at least five major quantum computing approaches being explored worldwide: silicon spin qubits (UNSW’s approach), ion traps, superconducting loops, diamond vacancies and topological qubits. The main problem with all of these approaches is that there is no clear pathway to scaling the number of quantum bits up to the millions needed without the computer becoming a huge system requiring bulky supporting equipment and costly infrastructure.

However, by relying on the silicon spin qubit approach — which already mimics much of the solid-state devices in silicon that are the heart of the US$380 billion global semiconductor industry — the UNSW design shows how to dovetail spin qubit error-correcting code into existing chip designs, enabling true universal quantum computation.

Unlike other groups, CQC²T’s quantum computing effort is focused on creating solid-state devices in silicon, from which all of the world’s computer chips are made. The centre is not just creating ornate designs to show off how many qubits can be packed together; rather, it is aiming to build qubits that could one day be easily fabricated — and scaled up.

“It’s kind of swept under the carpet a bit, but for large-scale quantum computing, we are going to need millions of qubits,” said Dzurak. “Here, we show a way that spin qubits can be scaled up massively. And that’s the key.”

In August 2017, the UNSW team struck an $83 million deal between UNSW, Telstra, Commonwealth Bank and the Australian and NSW Governments to develop, by 2022, a 10-qubit prototype silicon quantum integrated circuit — the first step in building the world’s first quantum computer in silicon. This came almost two years after Dzurak and Veldhorst first showed how quantum logic calculations could be done in a real silicon device, with the creation of a two-qubit logic gate — the central building block of a quantum computer.

“Those were the first baby steps, the first demonstrations of how to turn this radical quantum computing concept into a practical device using components that underpin all modern computing,” said UNSW Dean of Engineering Mark Hoffman. “Our team now has a blueprint for scaling that up dramatically.

“We’ve been testing elements of this design in the lab, with very positive results. We just need to keep building on that — which is still a hell of a challenge, but the groundwork is there, and it’s very encouraging. It will still take great engineering to bring quantum computing to commercial reality, but clearly the work we see from this extraordinary team at CQC²T puts Australia in the driver’s seat.”

Artist’s impression of the architecture of a silicon CMOS chip for a spin-based quantum computer; above is mostly standard CMOS components, and below the quantum bits in operation. Illustration: Tony Melov.

The UNSW silicon quantum chip team. Photo: Grant Turner/UNSW.
SERVER MEMORY

Advantech’s SQRAM-DDR4-2666 server memory delivers high performance and is fully compatible with Intel Xeon scalable platforms (known as Purley). The series comes in various form factors such as RDIMM (SQR-RD4N), ECC DIMM (SQR-SD4N, SQR-UD4N) and unbuffered SODIMM (SQR-SD4N) in 8/16/32 GB capacities. It is designed for IoT and high-performance computing applications such as data centres, workstations, surveillance and more.

Advantech’s next generation of DDR4 modules offer high speeds of 2666 MT/s, which represents an 11% improvement from previous 2400 MT/s versions. With efficient power consumption of 1.2 V and a high capacity option of 32 GB, the series meets heavy workload requirements for IoT and high-performance computing applications.

All modules are designed with original Samsung and Hynix IC chips and are compatible with other server platforms featuring Intel Xeon processors. Designed to handle heavy workloads such as big data processing, analysis and management, the series optimises server platform performance for data centres and workstation applications.

The memory modules have undergone rigorous testing to ensure consistency and quality that complies with the JEDEC standard, and have compatibility with other Advantech computing platforms. They have passed strict burn-in test criteria for wide temperature operation and vibration as well as screening tests, which are an essential requirement for critical server applications.

The SQRAM SQR-UD4N series is available in 4, 8, 16 and 32 GB capacities. Form factors include UDIMM, MINI DIMM and SODIMM.

Key features include: high speed of 2666 MHz; compatibility with Intel Xeon Platforms; 100% screening test to ensure quality consistency; 30 µ" golden finger; fixed BOM; the adoption of high-quality original chips; and self-management software support.

Advantech Australia Pty Ltd
www.advantech.net.au
An improperly torqued screw can mean the difference between passing certification and product failure. In terms of process verification, measuring resulting bolt loading is an accurate method to ensure your process is applying the necessary torque.

**Gasket and seal integrity validation**

With IP rating compliance becoming the new standard for many consumer products, the need to ensure seal and gasket integrity of the finished product is crucial. Seal failure can have an enormous negative impact on the project, resulting in lost time and money. Incorporating bolt and screw torque auditing into both manufacturing and quality assurance processes helps mitigate and reduce failures from improperly torqued fasteners.

**Third-party repair certification**

Often the ability to advertise repair services, obtain technical drawings and purchase hardware components requires certification from the manufacturer. These certifications will often have the requirement that the repair facility ensure that each screw and bolt have the same torque applied to them as the manufacturer’s design documents indicate.

**Standards compliance and traceability**

Whether you are subject to FAA regulations, FDA regulation, ISO standards or internal standards, verification and traceability of a product’s conformance to specifications is needed to meet federal regulatory requirements. In many of these cases, every critical component down to the torque applied to the fasteners and material the fasteners are made from must be traceable.

For applying torque, calibrated drivers can be used, but this will often still require a physical torque value to be measured for the fastener during quality control tests. Incorporating a driver with built-in torque sensing allows for logging of applied torque to all fasteners and allows for quality assurance to double check critical areas.

The conceptual diagram shown depicts a FUTEK TAT200 Reaction Torque Screwdriver being used to measure the torque applied to a screw.

Whether you are manufacturing a smartphone or a pacemaker, or repairing a watch, you will need to ensure every fastener receives the proper amount of torque. This requires either a torque sensor coupled to or integrated directly into a driver. A display and data logger is also required so that the operator applied to the fastener, while

When you combine torque validation with bolt loading validation you will improve the reliability of your products and develop a clearer picture of the loads applied to your system, ensuring your satisfaction and that of your customer.

Metromatics Pty Ltd
www.metromatics.com.au
AC POWER METER

GW Instek’s GPM-8213 power meter is designed specifically for single-phase AC power supply measurements. Powerful features — including five-digit measurement display, integral measurement function, front/rear panel input terminals and various communications ports — enable clear, convenient measurements.

The product provides as many as 19 power measurement parameters, including voltage, current, frequency, power, crest factor, apparent power, reactive power, power factor, phase angle and total harmonic distortion, as well as voltage/current/power measurement capabilities (reading: ±0.1%; level: ±0.1%).

The device includes a 4” TFT LCD, which works in simple mode and standard mode. Simple mode displays the conventional power meter’s four measurement parameters, to meet clarity requirements for tests during the manufacturing process. Standard mode extends the display to the maximum of eight measurement parameters (two major measurements and six monitor measurements) to satisfy the various measurement application requirements of R&D, design and quality verification.

For DUTs requiring an IEC 62301/EN 50564 standby power consumption test, the device provides the optimum measurement support, including test frequency bandwidth of DC ~6 kHz, the minimum current level of 5 mA (resolution: 0.1 µA), power measurement resolutions (1 µW for minimum current and voltage levels; 1 mW for maximum current and voltage levels), a crest factor reaching 3 (half-range reaching 6) and measurement of total harmonic distortion. For large-voltage/large-current measurement applications of general power measurement, the product provides PT/CT rate function to collocate with external potential transformer or current transformer to meet the measurement requirements.

The RS232C/USB interfaces (virtual COM)/LAN can be used to edit and retrieve programs or the optional GPIB interface (installed by manufacturer) can be selected to meet users’ automatic test system requirements.

GW Instek
www.gwinstek.com
MULTIPLEXED MATRIX SWITCH

ABI Electronics’ range of test, diagnostic and measurement instrumentation is commonly used in the test and maintenance of highly complex systems across a variety of industries and applications worldwide. Now, the company has announced a product which combines the capabilities of both multiplexer and matrix switching topologies.

With the SYSTEM 8 Multiplexed Matrix Switch and modular instrumentation range, users will be able to route signals for design verification and data acquisition applications; run automated functional tests on components and PCBs; measure and compare signals from up to 64 points on a circuit; and make more efficient use of cables, clips and probes. Users can achieve high-level results without the need for programming.

For low-volume operations, the MMS and modular instrumentation range allow many sequential tests to be performed on the board under test without the need to keep unplugging and changing cables. This is said to reduce both test set-up time and execution.

Embedded Logic Solutions Pty Ltd
www.emlogic.com.au

MOTION-CONTROL CHIP

STMicroelectronics’ STSPIN820 is a dedicated stepper-motor driver with 256-microstep resolution. The IC enables stepper-motor-based robots to achieve smoothness and silence, with small size, precision and low power consumption.

With its high-speed inputs and precise micro-stepping algorithm, the product can turn a motor by a fraction of a degree to move a 3D printer’s head at a speed of more than 500 mm/s, with submicron precision to create parts quickly, or to control precise movements like sample loading, capping/decapping and storage/retrieval in clinical automation systems.

Measuring just 4 x 4 mm, and containing both control intelligence and fully protected power components (rated 45 V and 500 mΩ $R_{DS(ON)}$) for driving the motor, the chip is a tiny all-in-one high-precision controller. Manufacturers of automation equipment can simply place the device on the controller circuit board, with minimal extra parts needed to complete the system. Overcurrent, overtemperature and short-circuit protection are also built in, allowing the device to withstand harsh industrial environments.

Motor-driven medical equipment such as plate handlers, fluid pumps, blood analysers and respirators becomes quieter and more compact, according to the company. It helps simplify motion control for many other types of equipment, including textile and sewing machines, surveillance equipment, cash-handling machines, office and home automation, and point-of-sale (POS) terminals.

STMicroelectronics Pty Ltd
www.st.com

SEALED LED PANEL INDICATOR

Marl’s 612 Series is a professional LED panel indicator featuring a high-intensity LED element (low-intensity options are available). The ruggedised device is fitted with a low-profile smoked lens assembly, providing a wide viewing angle and offering a good on/off contrast ratio. The precision-turned housing is manufactured from aluminium with a high-quality, black anodised finish.

The 6.35 mm (¼″) mounting indicator is available in a range of colour and voltage options, with or without flying leads. Internal circuitry is designed for operation at a range of voltage options and termination is achieved by standard solder pins (wire terminations are available).

Benefits include high optical performance, vandal resistance and sealing specifications in excess of IP67. The internally potted indicator is manufactured with an internal resistor and supplied complete with full mounting hardware.

The lightweight device is suitable for portable applications, sunlight-readable applications, status panel indication, internal applications, and external and harsh environments. It is particularly suitable to military and high-vibration applications, including defence communication equipment, industrial and defence panels, power stations control panels, heavy plant and equipment, theme parks and leisure equipment, and transportation.

Aerospace & Defence Products
www.aerospacedefenceproducts.com.au
ALUMINIUM ENCLOSURE WITH QUICK-RELEASE FASTENER

BOPLA is offering a quick-release fastener as an option for its sturdy Bocube Alu series of aluminium enclosures. The anodised aluminium fastener is available for all eight Bocube Alu sizes and creates an attractive contrast, especially for the dark grey enclosures.

Use of the fastener means it is no longer necessary to unscrew and screw the enclosure in order to open and close it. There is also no need for a tool, because the fastener is operated by hand only. No processing is needed to fit the quick-release fastener to the enclosures.

In order to retrofit existing standard enclosures with the quick-release fastener, simply dismantle the two profiles for the hinged design cover and replace it with the quick-release fastener. When fitted with the fastener, the enclosure provides protection class IP66/67 (when the fastener is closed).

The sturdy electronics enclosures provide mounting space for rectangular PCBs. Features include a recessed front surface for the special protection of electronic components, captive and variably mountable covers, and a special holder for pressure compensation elements in the enclosure bases. The enclosure screws are concealed.

All enclosure components, including the hinges, are made of metal and are captive-connected to the enclosure. Natural-coloured anodised hinges and covers create an elegant contrast to the graphite-grey powder lacquering. Alternatively, the enclosures are available in light grey and the hinges can be supplied in special colours on request.

The enclosures have a high level of mechanical stability, good EMC screening and resistance to chemicals. They are resistant to UV and changes in temperature, so they are suitable for outdoor use in agriculture, traffic or the renewable energies sector.

ERNTEC Pty Ltd
www.erntec.net

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WIRELESS EMBEDDED IoT GATEWAYS

Dytran Instruments has released the Model 5340B2 VibraScout 3D Vibration Measurement System, which includes a USB digital triaxial accelerometer combining a MEMS accelerometer with a microcontroller to create an intelligent sensor.

The product is an innovative solution for fast, portable vibration surveys and data acquisition. Easy-to-install software allows for real-time, three-directional vibration data acquisition (including static inclination) along with real-time temperature monitoring. The system will store acceleration and temperature information; display real-time scrolling plots of acceleration data in min, max and mean; log real-time data to a delimited file for importing into Excel; use auto and smart triggering modes and digital filters to improve signal/noise ratio; and perform real-time compression to fast Fourier transform (FFT).

The accelerometer contains a variable capacitance (VC) MEMS chip (200g range) with USB interface. The user simply has to load the software onto their PC or laptop. The standard USB protocol handles all the sensor communications with the PC; no external power is required for the sensor, simply plug it in to the USB port.

The sensor is hermetically sealed in a titanium housing weighing just 17 g, allowing it to be used in harsh environments from test tracks to field monitoring. The frequency range is 0 Hz (DC) to 1100 Hz. Units can withstand 10,000g shock.

Metromatics Pty Ltd
www.metromatics.com.au

3D VIBRATION MEASUREMENT SYSTEM

Electrolube has launched a non-silicone heat transfer compound known as HTCX_ZF. The high-performance thermal management paste is an entirely zinc oxide (ZnO)-free version of the thermal product HTCX, with improved thermal conductivity, lower oil bleed and lower evaporation weight loss.

Designed for use as a thermal interface material, HTCX_ZF is suitable for applications where the use of zinc oxide is restricted and silicones are prohibited, such as offshore utilities. The RoHS-2 compliant thermal paste is also suitable for applications exposed to varying temperature and humidity conditions.

The stable, non-curing paste enables simple and efficient rework of components if needed. It is recommended where efficient thermal coupling of electrical and electronic components is required and between any surface where thermal conductivity and heat dissipation is important. It offers efficient thermal conductivity of 1.65 W/mK for a range of applications, remaining stable and keeping a low oil bleed percentage through a wide operating temperature range from -50 to +180°C and potentially higher.

The paste can be applied to the base and mounting studs of diodes, transistors, thyristors, heat sinks, silicone rectifiers and semiconductors, thermostats, power resistors, radiators and more. When the contact surfaces are placed together, a firm metal-to-metal contact will only be achieved on 40–60% of the interface, depending on the smoothness of the surfaces. This means that air, which has relatively poor thermal conductivity, will account for the balance of heat dissipation. It offers efficient thermal conductivity of 1.65 W/mK for a range of applications, remaining stable and keeping a low oil bleed percentage through a wide operating temperature range from -50 to +180°C and potentially higher.

The product features highly integrated industrial-grade Wi-Fi and versatile connectivity, including seamlessly integrated Wi-Fi, Ethernet and Bluetooth (BT and BLE) connectivity, with no need to write complex drivers. Dual-band 802.11a/b/g/n Wi-Fi delivers high performance, minimising interference. The industrial-grade design supports long life and ongoing operation in extreme environments, while the Lantronix concurrent Soft AP + Client provides device support and access without disrupting machine field operations.

It enables robust data access and management, with intelligent networking and automatic connection management. The field-tested TruPort Serial and TruPort Socket enable out-of-the-box connectivity locally and over the internet for hundreds of serial machine protocols, while the built-in network communications engine simplifies embedded application development. The product comes with pre-integrated with the Lantronix MACH10 IoT platform, including MACH10 Global Device Manager.

The gateway includes built-in comprehensive device security services, with the enterprise-grade TruPort Security ensuring security of both data-at-rest and data-in-motion. It offers secure connectivity to WPA2-Enterprise Wi-Fi networks, and the secure boot and secure FOTA (firmware over the air) features allow only authorised software to run on the gateway.

Digi-Key Electronics
www.digikey.com

NON-SILICONE, ZINC OXIDE-FREE THERMAL PASTE

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Metromatics Pty Ltd
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MathWorks Industry Manager Philipp Wallner* describes the great advantages to be found in the use of simulation models, given the evolution of mechanical and plant engineering.

Today, developers in the industrial automation space are facing increasingly complex challenges in mechatronic systems, with the proportion of software steadily increasing. Given this, it is important for companies to focus on all three disciplines of mechatronics — mechanics, electrics and software — when developing new machines.

For example, even before the first physical design, a new machine can be completely digitally designed and its full functionality can be checked by virtual test runs. This saves companies time to market, especially in cases where assembly is complicated or costly, such as in an offshore wind farm.

But even after launching and selling the product, a 'digital twin' can still do valuable work. With the capabilities of Industry 4.0, this virtual image of the machine can always be supplied with real-time data from the physical system, thus running in parallel throughout the life of the machine. The data obtained provides valuable information on possible errors or signs of wear, for example if the measured values don’t match the simulated values. This usually provides a first clue for finding causes and troubleshooting. Early intervention can significantly extend the life of the machine and also eliminate costly errors and failures even before they occur.

It is not essential to reproduce the entire system digitally. Even a digital model of a single machine or of certain mechatronic components can significantly increase the efficiency of the entire production chain. Model-based design, with tools like MATLAB and Simulink, has demonstrated success in industries like automotive and aerospace and defence.

As mechanical engineering companies and the industrial automation segment see a growing number of challenges that cannot be solved purely physically, these companies will gravitate towards and see a growing advantage from modelling, simulation and automatic code generation in mechanical and plant engineering. The digital twin will soon become a must-have to survive in the competition.

*As Industry Manager for the industrial automation and machinery field at MathWorks, Philipp Wallner is responsible for driving the business development of this industry segment that comprises energy production, automation components and production machines. Prior to joining MathWorks, Philipp worked in the machine builder industry, where he held different engineering and management positions.
GLASS STUDY COULD LEAD TO

SHATTERPROOF MOBILE PHONE SCREENS

An international study on glass could lead to the development of shatterproof mobile phone screens — a breakthrough (pun not intended) that is sure to result in a collective sigh of relief from clumsy people the world over.

Scientists from Aberystwyth University, the Australian National University (ANU), the Institut de Physique du Globe de Paris (IPGP) and Orléans University have been studying the structure of different types of novel glasses at the atomic level and the way they flow when molten. They have been looking in particular at the structure of alumino-silicate glasses which are used in a range of industrial processes, including the manufacture of screens for handheld devices.

“The glasses we analysed are mostly composed of aluminium and silicon oxides, and can also contain various elements such as sodium, potassium, calcium or magnesium — each element influences the flexibility and resistance of the glass,” said lead researcher Dr Charles Le Losq, from IPGP and ANU. He noted that while glass appears to be structured randomly, it is actually quite ordered at the microscopic level of a few atoms.

“With our new knowledge, industry should be able to alter the glass structure to promote the tiny channels present we have discovered to inhibit propagation of nanometric cracks, to improve the resistance of your cell phone screen to fracture and corrosion,” said Professor Neville Greaves from Aberystwyth University. “This idea is kind of similar to that of drilling a hole at the tip of a crack in a metal sheet to stop the crack in its tracks.”

As part of the research project, the researchers measured the viscosity of molten glass at more than 1000°C and the density of the glass when cooled and formed. The glass’s structure was then simulated by massive computational calculations, enabling the scientists to identify its molecular structure, the exact location of different atoms and the way molten glass flows.

As well as improving glass’s resistance to fractures, the research could lead to better modelling of present volcanic activity and the original formation of Earth and its surface. Another potential application includes the production of highly resistant glasses which imprison radionuclides and could therefore be used to safely store nuclear waste for long periods of time.

The study has been published in the journal Scientific Reports.
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