

newelectronics

24 September 2019

SMART TRANSPORT • ELECTRONIC DESIGN SHOW PREVIEW • TECHWATCH



FEEDING THE WORLD

How technology is being used to develop and support more sustainable farming

Widest selection of electronic components

In Stock

ORDER WITH CONFIDENCE

MOUSER ELECTRONICS

mouser.co.uk

1,500,000+ PRODUCTS IN STOCK | 7.9 MILLION+ PRODUCTS ONLINE

Semiconductors
Passives
Electromechanical
Power
Circuit Protection
Automation
Connectors
Interconnect
Hyperfast
IoT
Switches
RFID
TMR Magnetic Sensors
RF Directional Couplers
Bipolar Digital Latching Sensor
Logic
Digital Omnipolar
Crystals
Augmented Reality
Earth-Friendly Display
Embedded Cellular
IO-Link
Solenoids
Proximity Sensor
Capacitive Touch
Embedded Computers
Thermocouple Interface
PIR Sensor
SPI Interface
Linear
Ultra Low-Power
Narrowband
Mesh-Networked
Virtual Reality
Keyfob
Isolators
MCUs
RF Evaluation
Dev Boards
RF Antennas
Axis Tilt
Zettabyte Era
I2C
Robotic Process Automation
Microservice Architecture
Resonance Compatible
XCVR
Immersive Experience
Artificial Intelligence
Internet of Things
Na-TECC
3D Alteration
Quantum Computing
Shunt Sense
Touchless
Smart Home Technology
5G Mobile
Energy Harvesting
MotorData Acquisition

YOU INNOVATE!

Infrared Thermopile
Triboelectric
Magnetic Position
Gesture Control
Interconnect
Rectenna
Connected Cloud
Decoupled Network
Hybrid Envelope-Tracking Signal
Re-Entrant Leveraged Design
Embedded Logic
TEGS
Passives
Logic Eco-System
Third-Order Sensor
Clock/Timing
Memory
Filters
SoC
Thermal Management
Class-G Amplifier
Decimated Power-Efficiency
Microwave
Bluetooth
Remote Control
FPGA
DDS
Batteries
Betavoltaics
MIWI Transceiver
Nanogenerators
AMR
Recycling Radiowaves
Ask Receiver
Transformers
Solar
Sensor
2-Way Remote
Simplex Transmission
ADC
Potentiometers
Interface
NFC
Frequency Synthesizers
Oscillators
Low Energy
PMIC
Relays
WPC-Certified
Smart Devices
Capacitors
Electromechanical
Optoisolators
ZigBee
Semiconductors
EMI
Tools
Hardware
Cable

We Make It Easy.



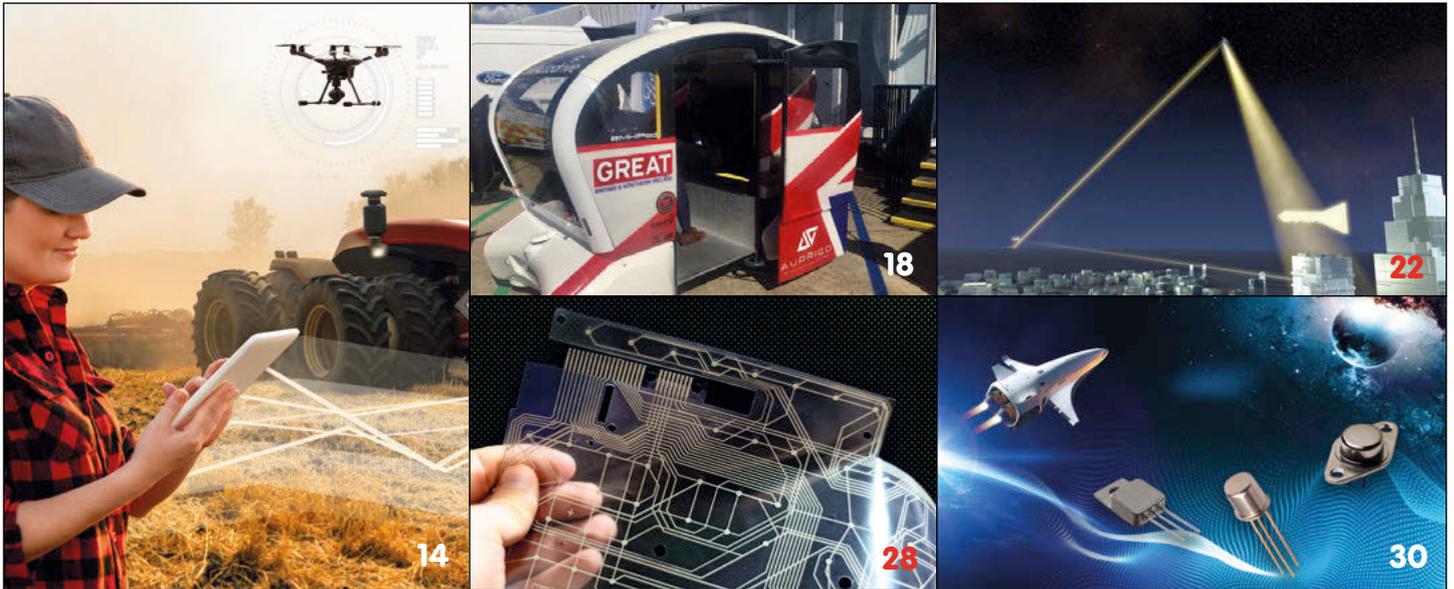
0800 587 0991
DIGIKEY.CO.UK



800+ INDUSTRY-LEADING SUPPLIERS | 100% FRANCHISED DISTRIBUTOR

*A shipping charge of £12.00 will be billed on all orders of less than £33.00. A shipping charge of \$18.00 USD will be billed on all orders of less than \$50.00 USD. All orders are shipped via UPS, Federal Express, or DHL for delivery within 1-3 days (dependent on final destination). No handling fees. All prices are in British pound sterling or United States dollar. Digi-Key is a franchised distributor for all supplier partners. New products added daily. Digi-Key and Digi-Key Electronics are registered trademarks of Digi-Key Electronics in the U.S. and other countries. © 2019 Digi-Key Electronics, 701 Brooks Ave. South, Thief River Falls, MN 56701, USA

New Electronics' weekly eZine features the latest blogs, news, articles and more. To register for your copy, go to www.newelectronics.co.uk



COVER IMAGE: scharfsinn86/stock.adobe.com

COMMENT 5

Is the UK lagging behind the world's other advanced economies in the shift to automation?

NEWS

Nano Dimension develops 3D printed capacitors using its DragonFly additive manufacturing system **7**

CEVA unveils the NeuPro-5, an innovative AI reference processor architecture for edge devices **8**

Cadence launches first complete electrical-thermal co-simulation solution for use across electronic systems **10**

Qualcomm's annual State of Play report identifies the key drivers behind consumer audio purchases **12**

COVER STORY 14

Feed the world

Without costing the earth in the process, how is technology being used to develop and support more sustainable farming? By Neil Tyler

SMART TRANSPORT 18

Redefining transportation

The field of transportation is facing the biggest shake up since the internal combustion engine was invented, according to Michael Seren

EMBEDDED SYSTEMS 20

Bringing order to diversity

As requirements have evolved so too have the standards associated with VITA and PCIMG. By Stephan Leng

TECHNOLOGY WATCH 22

Entangled secrets

Quantum experiments point the way not only to more secure communications but to a new commercial reality, as Chris Edwards explains

EMBEDDED SOFTWARE 25

Limiting software complexity

What do you have to consider when measuring software complexity? By Frank Büchner

BOARD TECHNOLOGY 28

Time to break free

Why designers need to start looking seriously at breaking away from traditional design, according to David Haboud

DESIGN PLUS 30

New space and beyond

Traditional packaging still has a role to play from deep space to new space. Rob Coleman explains

ELECTRONICS DESIGN SHOW PREVIEW



INTRODUCTION **35**

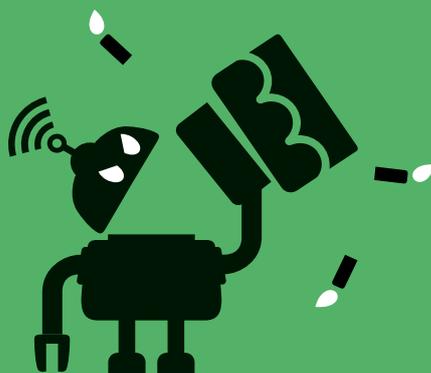
CONFERENCE AND WORKSHOPS **36**

EXHIBITOR INFORMATION **39**

LIST OF EXHIBITORS **66**

MISSION STATEMENT

'New Electronics keeps designers and managers abreast of the latest developments in the world's fastest moving industry'



**Birthday party.
Boy gets smart toy robot.
Robot gets hacked.
Cake ruined. Party ruined.
The end.**

Has the UK too few robots?

FAR FROM ROBOTS TAKING OUR JOBS, IS THE UK'S FAILURE TO INVEST IN AUTOMATION PUTTING JOBS AND PROSPERITY AT RISK?

According to a report from the Business, Energy and Industrial Strategy (BEIS) committee, the UK is falling behind other advanced economies in using automation and robots in the workplace.

While most of the talk around automation has tended to focus on the risks robots pose to a growing number of industry sectors, this group of MPs suggests that a failure to embrace technology is actually putting jobs, businesses and regional economies at risk.

The problem appears to be many-fold and in no small part due to the Government's decision to cut support and its failure to encourage investment in automation.

According to Rachel Reeves, the committee chair, the danger for the UK economy is not that we have too many robots in the workplace but that we have far too few.

She argues that the government has failed to provide the leadership needed to help drive investment in automation and robot technologies and, as a result, the UK is falling behind its competitors.

In 2015, the UK had 10 robots for every million hours worked, compared with 131 in the US, 133 in Germany and 167 in Japan. By 2017, the UK represented just 0.6% of industrial robotics shipments.

Those figures are certainly disappointing but could be mis-leading. In the UK smaller businesses predominate and don't tend to need the numbers of robots associated with the larger manufacturers that exist in Germany or the US.

However, that failure to invest is not just amongst manufacturers, other sectors are failing to embrace a technology that is set to revolutionise how they will operate and that is a concern.

Change is coming and Britain needs to embrace automation. That means investing in skills and training and supporting British businesses and universities to collaborate and innovate.

Automation has a critical part to play in the progressive economic development of our economy and society. People need to better understand how automation can help support and improve current jobs, and look beyond the current focus on the threat it is said to pose.

Opinion is divided. There are optimists and pessimists as to how automation will impact how we work. But one thing is for sure, change is coming and its scale and scope will be unprecedented.

Neil Tyler, Editor (neil.tyler@markallengroup.com)



“When it comes to automation one thing is for sure, change is coming and its scale and scope will be unprecedented.”

POINT PHONE

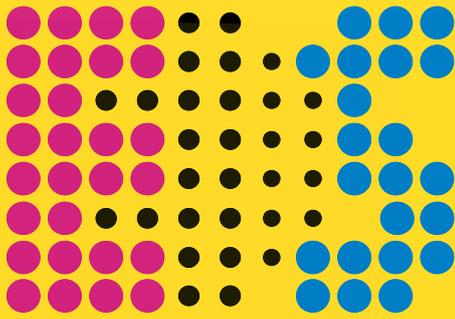


SCAN



DISCOVER MORE...

www.engineeringdesignshow.co.uk



ENGINEERING DESIGN SHOW

LARGEST UK EVENT



DEDICATED
TO DESIGN
ENGINEERING

16-17 OCTOBER 2019

RICOH ARENA
COVENTRY



200
EXHIBITORS

27+
CONFERENCES

33+
WORKSHOPS

NOW
REGISTER



Ping this advert to life with REYDAR

Download the free REYDAR app and scan this page to find out more about EDS 2019.

Reydar requires a minimum of iPhone 6S using iOS 11.0 or a compatible Android phone using 8.0 Oreo to run. Some Android devices need a QR scanner.



HEADLINE SPONSORS



newelectronics

Editor Neil Tyler
neil.tyler@markallengroup.com

Contributing Editors Chris Edwards
John Walko
editor@newelectronics.co.uk

Art Editor Andrew Ganassin
andrew.ganassin@markallengroup.com

Illustrator Phil Holmes

Sales Manager James Creber
james.creber@markallengroup.com

Publisher Peter Ring
peter.ring@markallengroup.com

Managing Director Jon Benson
jon.benson@markallengroup.com

Production Manager Nicki McKenna
nicki.mckenna@markallengroup.com

New Electronics editorial advisory panel

Trevor Cross, chief technology officer, Teledyne e2v

Pete Leonard, electronics design manager, Renishaw

Pete Lomas, director of engineering, Norcott Technologies

Neil Riddiford, principal electronics engineer, Cambridge Consultants

Adam Taylor, embedded systems consultant

ISSN 0047-9624 Online ISSN 2049-2316

Annual subscription (22 issues):

UK £108, Overseas: £163, Airmail: £199.

New Electronics, incorporating *Electronic Equipment News* and *Electronics News*, is published twice monthly by MA Business, Hawley Mill, Hawley Road, Dartford, DA2 7TJ. T: 01322 221144 E: ne@markallengroup.com

Moving on?

If you change jobs or your company moves, please contact circulation@markallengroup.com to continue receiving your free copy of *New Electronics*



A MARK ALLEN GROUP COMPANY

www.markallengroup.com

© 2019. All rights reserved. No part of *New Electronics* may be reproduced or transmitted in any form, by any means, electronic or mechanical, including photocopying, recording or any information storage or retrieval system, without permission in writing from the Publisher. The views expressed do not necessarily represent those of the editor of *New Electronics*. Advertisements in the journal do not imply endorsement of the products or services advertised.

Please read our privacy policy, by visiting <http://privacypolicy.markallengroup.com>. This will explain how we process, use & safeguard your data

Printed by Pensord.



When you have finished with this magazine please recycle it.

Capacitors 3D printed

NANO DIMENSION HAS DEVELOPED 3D PRINTED CAPACITORS USING ITS DRAGONFLY ADDITIVE MANUFACTURING SYSTEM. **NEIL TYLER** REPORTS



Nano Dimension has developed 3D printed capacitors using the company's DragonFly additive manufacturing system. These capacitors have been embedded in the body of the additively manufactured printed circuit boards (PCBs), saving both space and eliminating the need for assembly.

Described as a breakthrough in the additive manufacturing of electronics, extensive testing with capacitors of different 3D dimensions have shown consistent results with statistically validated data.

According to the company, repeatability results show less than 1% variance. The technology uses the same dielectric and metal traces as in the additively manufactured PCB yielding capacitors with a capacitance range from 0.1nF to 3.2nF.

These results are based on over 260 tests with 30 different additively manufactured capacitors dimensions.

By integrating capacitors using additive manufacturing, electronics designers and manufacturers will be able to avoid what is often a time consuming, multi-step assembly process, as the DragonFly is able to print the entire capacitor and PCB in one job - reducing the fabrication time and overcoming many of the challenges imposed by traditional production techniques.

Additively manufacturing capacitors, within the inner layers of circuits, can also free up space to meet the market trend towards miniaturisation and flatness of electronic devices.

"The test results show that with the DragonFly system our customers can achieve repeatability comparable to that of traditional processes in short run manufacturing of capacitors using 3D printing," said Amit Dror, CEO of Nano Dimension. "Along with high accuracy, miniaturisation and space saving on the board, these are key factors in the electronics production process and next generation electronics applications."

Unlocking a smartphone with earbuds

A team of scientists at the University at Buffalo is developing a biometric tool that uses modified wireless earbuds to authenticate smartphone users via the unique geometry of their ear canal.

According to Zhanpeng Jin, associate professor in the Department of Computer Science and Engineering in the UB School of Engineering and Applied Sciences, EarEcho is a modified wireless earbud that can authenticate smartphone users via the unique geometry of their ear canal.

A prototype of the system has proved roughly 95% effective.

When a sound is played into someone's ear, the sound propagates through and is reflected and absorbed by the ear canal - all of which produces a unique signature that can be recorded by the microphone.

"It doesn't matter what the sound is, everyone's ears are different and we can show that in the audio recording," said Jin. "This uniqueness can lead to a new way of confirming the identity of the user, equivalent to fingerprinting."

The information gathered by the microphone is sent by the earbuds' Bluetooth connection to the smartphone where it is analysed.

Theoretically, users could rely on EarEcho to unlock their smartphones, thereby reducing the need for passcodes, fingerprints, facial recognition and other biometrics.

However, Jin sees its greatest potential use in continuously monitoring a smartphone user. EarEcho, which works when users are listening to their earbuds, is a passive system, meaning users need not take any action, such as submitting a fingerprint or voice command, for it to work, he said.

Such a system, he argued, would be ideal for situations where users are required to verify their identity such as making mobile payments. It could also eliminate the need to re-enter passcodes or fingerprints when a phone locks up after not being used.



Configurable, high-frequency sub-PMICs

Dialog Semiconductor has introduced a power management product family of four new sub-PMICs that offer best-in-class transient response and in-circuit digital programmability, in a small form factor.

The devices are intended for ARM Cortex based multi-core application processors and high-performance SoCs, FPGAs and GPUs, enabling developers to fit a 6 to 10 Amp power solution into limited board areas of next-generation devices.

The family have been designed to drive higher efficiency without sacrificing functionality, simplifying complex system sequencing with digital programmability and configurability. They can support a single output up to 6 Amp/10 Amp or dual outputs up to 3 Amp/5 Amp per output, making it suitable for the latest 7nm based SoCs.

The sub-PMICs can run from a single cell Li-ion battery, 3.3V or 5V power supplies. The I2C interface enables dynamic voltage control to optimise power savings and performance, while the fault protection features also provide overvoltage, overcurrent and thermal shutdown protection.

“Designers continue to face new challenges with each passing year, when it comes to power consumption and system size but are often forced to trade one feature for another,” said Scott Brown, VP Marketing of Dialog’s Advanced Mixed-Signal Business Group. “These new devices are addressing these challenges head on which continue to demonstrate Dialog’s leadership within configurable power management solutions.”

AI reference processor

CEVA UNVEILS AI INFERENCE PROCESSOR ARCHITECTURE FOR EDGE DEVICES. **NEIL TYLER REPORTS**

The NeuPro-S, unveiled by CEVA, is the company’s second-generation AI processor architecture for deep neural network inferencing at the edge.

CEVA has also introduced CDNN-Invite API, a deep neural network compiler technology that is able to support heterogeneous co-processing of NeuPro-S cores, together with custom neural network engines, in a unified neural network optimising run-time firmware.

The NeuPro-S, along with CDNN-Invite API, is intended for any vision-based device with the need for edge AI processing.

It has been designed to process neural networks for segmentation, detection and classification of objects within videos and images in edge devices and includes system-aware enhancements that deliver significant performance improvements. These include support for multi-level memory systems to reduce costly transfers with external SDRAM, multiple weight compression options, and heterogeneous scalability that enables various combinations of CEVA-XM6 vision DSPs, NeuPro-S cores and custom AI engines in a single, unified architecture. This enables NeuPro-S to achieve on average, 50% higher performance, 40% lower memory bandwidth and 30% lower power consumption than CEVA’s first-generation AI processor.

Addressing the growing diversity of application-specific neural networks and processors, the CDNN-Invite API allows the incorporation of customer’s designed neural network engines into CEVA’s Deep Neural Network (CDNN) framework.

CDNN will then holistically optimise and enhance networks and layers to take advantage of each of the CEVA-XM6 vision DSP, NeuPro-S and custom neural network processors. The CDNN-Invite API is already being adopted by lead customers who are working closely with CEVA engineers to deploy it in commercial products.

Commenting Ilan Yona, Vice President and General Manager of the Vision Business Unit at CEVA, said: “The NeuPro-S architecture addresses the root causes of the growing challenges in data bandwidth and power consumption in these devices. With our CDNN-Invite API, we are reducing the entry barriers for the growing community of neural network innovators, allowing them to benefit from the breadth of support and ease of use our CDNN compiler technology offers.”



CDNN



NeuPro™
by CEVA

Plans to build high-definition micro-LED matrix solution

Nichia and Infineon Technologies are collaborating in the development of a high-definition (HD) light engine with more than 16,000 micro-LEDs for front light applications.

Unlike current HD solutions, the new device will provide high resolution light to the entire field of view of the driver.

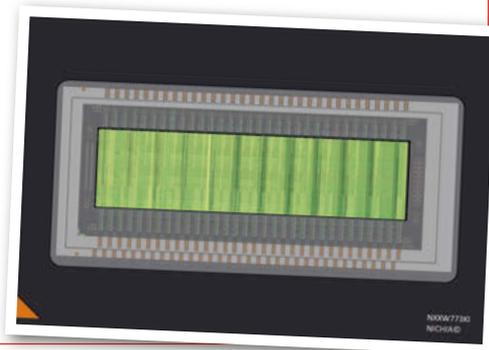
“Our new LED matrix light will offer a resolution about 180 times as high as that of comparable solutions on the road today,” said Kanji Bando, Head of the Advanced R&D Center at Nichia. “This will pave the way for new and improved safety features and

enhance driving comfort.”

HD light can be used to warn the driver of hazards by highlighting people or objects on the roadside. It can also project markings on the road – for example, in order to help the driver navigate through a construction site. And established features such as the glare-free high beam or bending lights run more precisely and smoothly.

The HD light engine will employ micro-LED technology from Nichia and a new driver IC from Infineon and will contribute to reducing design and production complexity for car manufacturers as any adaptations

can be programmed digitally in the factory or activated by the driver as a function on demand.





SAFE
RELIABLE
SECURE

TRUSTED SOFTWARE FOR EMBEDDED DEVICES

For more than 35 years the world's leading companies have trusted **Green Hills Software's** secure and reliable high performance software for safety and security critical applications.

From avionics and automotive, through telecoms and medical, to industrial and smart energy, Green Hills Software has been delivering proven and secure underpinning technology.

To find out how the world's most secure and reliable operating systems and development software can take the risk out of your next project, call 01844 267 950 or visit www.ghs.com/s4e



Cadence launches Celsius Thermal Solver

COMPANY UNVEILS FIRST COMPLETE ELECTRICAL-THERMAL CO-SIMULATION SOLUTION FOR USE ACROSS ELECTRONIC SYSTEMS. **NEIL TYLER** REPORTS

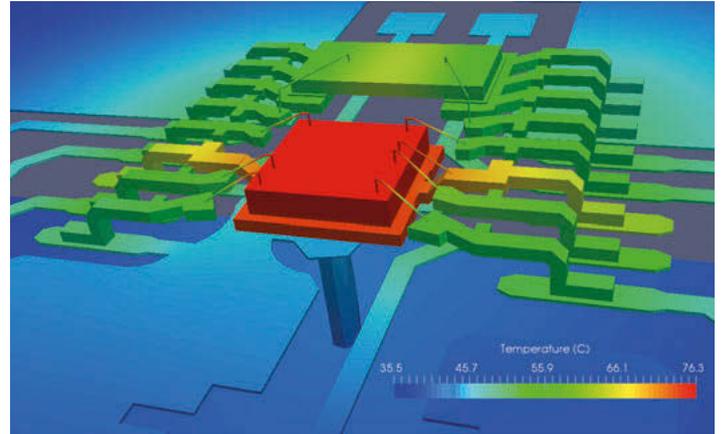
Cadence Design Systems has introduced the Celsius Thermal Solver, described as the first complete electrical-thermal co-simulation solution intended for electronic systems from ICs to physical enclosures.

Following the launch of Clarity 3D Solver earlier this year, the Celsius Thermal Solver is the second product in Cadence's new system analysis initiative.

Based on a proven, massively parallel architecture that delivers up to 10X faster performance than legacy solutions, the Celsius Thermal Solver integrates with Cadence IC, package and PCB implementation platforms enabling new system analysis and design insights. It is intended to help empower electrical design teams to detect and mitigate thermal issues early on in the design process and cut down the number of development iterations.

The Celsius Thermal Solver combines finite element analysis (FEA) for solid structures with computational fluid dynamics (CFD) for fluids, enabling complete system analysis in a single tool.

Engineering teams will be encouraged to use the Celsius Thermal Solver in conjunction with the Clarity 3D Solver, Voltus IC Power Integrity and Sigrity technology for PCB and IC packaging. It will mean that engineers will now be able to combine electrical and thermal analysis and simulate the flow of both electricity and heat for a more



accurate system-level thermal simulation than is currently the case with legacy tools.

The Celsius Thermal Solver performs both static (steady-state) and dynamic (transient) electrical-thermal co-simulations based on the actual flow of electrical power in advanced 3D structures, providing visibility into real-world system behaviour.

It is also able to accurately simulate large systems with detailed granularity for any object of interest and is the first solution capable of modelling structures as small as the IC and its power distribution, together with structures as large as the chassis.

Commenting Tom Beckley, senior vice president and general manager, Custom IC & PCB Group at Cadence said: "Following the successful launch of our Clarity 3D Solver earlier this year, the Celsius Thermal Solver helps our customers overcome the crucial challenge of system design and analysis of thermal effects and furthers Cadence's expansion into new system domains."

Arm Flexible Access extended to include research

Earlier this year, Arm announced the availability of Arm Flexible Access making it easier to access and license Arm technology for semiconductor design.

This innovative engagement model was intended to give silicon design teams more freedom to experiment, evaluate and innovate by initiating projects and fully designing their SoCs before having to license IP, paying only for what they use at production.

Arm is now looking to build on this and to strengthen the company's long-standing commitment to academia and research with Arm Flexible Access for Research.

This new program will provide the research community with access to a wide range of cutting-edge IP without any fees or costs, using a simple click-through end-user licensing agreement (EULA), providing accelerated access to Arm IP.

Through the company's dedicated Research Enablement and Collaboration

team, Arm already provides access to IP and tools to enable innovative projects and establish collaborations with institutions around the world. In addition, the Arm University Program and Arm Education Media provide educators and students with the resources they need to accelerate learning through market-leading education materials and technologies.

Building on this foundation of academic offerings, Arm Flexible Access for Research looks to give academic researchers greater freedom to experiment and explore the possibilities available with real-world,

commercially proven IP.

The IP available through Arm Flexible Access for Research has been carefully selected with the needs of academics and researchers in mind, and will include the majority of processors within the Arm Cortex-A, -R and -M families, along with access to complete RTL subsystems and tools which will open up new innovation opportunities for research projects.

Alongside the enhanced portfolio of IP and tools, Arm is also developing an online community, Arm Research SoC Labs, to help academic researchers share their designs and gain feedback to help inform their research. As part of this open-access design ecosystem, academic researchers will be able to increase the visibility of their projects and designs, and benefit from the work of other research teams around the world.

Arm Flexible Access for Research is expected to be available in early 2020.



Quality and performance meet low-power innovation for embedded designs

congatec simplifies IoT with embedded form factors based on 8th Gen Intel Core U-series processors

With three optimized form factors for designers to choose from, congatec delivers a simpler, efficient way to harness the benefits of 8th Gen Intel Core U-series processors for IoT. These products draw from congatec's deep expertise in embedded and industrial design to offer an enriched feature set, along with long product availability, hardware and software customization, and value-added design support. As a result, OEMs and ODMs can build high-performing solutions with less development time and cost.

Performance at the edge

Specially designed for embedded use conditions in which space and power are limited, 8th Gen Intel Core U-series processors provide high performance for edge devices with up to four cores. This enables a wide range of designs at 15W TDP, configurable down to 12.5W.

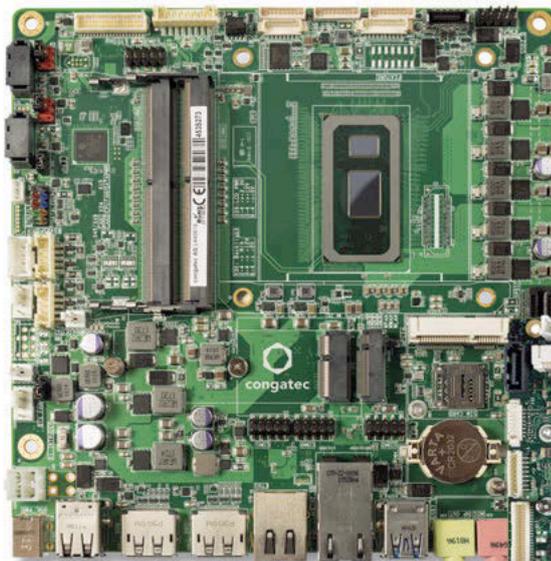
congatec products based on these processors deliver high-quality visual, audio, and compute capabilities with integrated graphics and high-definition media support.

congatec products based on 8th Gen Intel Core U-series processors also

help bring artificial intelligence (AI) to more places. With high processing and integrated graphics performance, combined with the optimized distribution of OpenVINO toolkit, these processors improve inference capabilities like facial recognition, license plate recognition, people counting, and fast and accurate anomaly detection on manufacturing lines.



The conga-TC370 featuring 8th Gen Intel Core U-series processors comes in a 95 x 95 mm COM Express compact module. It is a great match for fanless and completely sealed systems that must deliver high performance at 15W.



Congatec single-board computers (SBCs) come in either a 3.5-inch board or thin Mini-ITX form factor. They are ready-to-use embedded platforms that offer rugged designs, 24/7 operation, and a long-term availability of 10+ years.



Robust connectivity, I/O, and memory

System designers can tap into a broad range of connectivity—including Intel Gigabit Ethernet, PCIe* Gen 3, and USB 3.1—to quickly move data from devices to wherever it needs to go. Streamline performance by connecting cameras, displays, and other peripherals to the same system, and overcome data transfer bottlenecks with

support for the latest Intel Optane memory technology and DDR4-2400 SDRAM.

Consolidation at the edge

congatec's innovative Real-Time Systems Hypervisor takes advantage of the high performance and virtualization technologies available with 8th Gen Intel Core U-series processors. This helps consolidate

data and applications by running multiple operating systems concurrently on a single device with support for both real-time operating systems (RTOS) and general-purpose operating systems (GPOS) like Microsoft Windows, Android, and Linux. This powerful and cost-effective software solution enhances system design flexibility, enables new functionalities, and helps reduce overall BOM and integration costs.

Embedded features from congatec

Embedded use cases often require more than the standard functionality of an office computer. The congatec BIOS/UEFI platform was designed especially for these applications. It includes an onboard microcontroller to fully isolate most of the embedded features—such as system monitoring, multistage watchdog, and the I²C bus—from the x86 core architecture. This results in higher embedded feature performance and overall system reliability.

Earlier this month, at IFA in Berlin, Qualcomm released its annual State of Play report. The report, based on a survey of 6,000 smartphone users in the US, the UK, China, Japan, India, and Germany is intended to provide insight into the evolving demands of global audio consumers, as well as highlighting the trends that are driving the audio technology industry.

“Consumer audio is an exciting and rapidly evolving space and our report highlights that great sound quality remains vitally important to consumers, and that the majority now believe they can get ‘as good as wired’ sound with Bluetooth connectivity,” said James Chapman, vice president and general manager, voice, music & wearables business unit, Qualcomm.

According to Chapman, the report highlighted the rapid adoption of truly wireless earbuds and smart speakers.

“These are categories that are underpinned by the innovations our customers are bringing to market using Qualcomm’s technologies, such as Qualcomm aptX audio, active noise cancellation and superior connectivity,” he said.

The report found that consumers are keen that their audio devices do much more than simply play music and want to see the integration of new features like voice assistance, cellular, and low-latency audio streaming.

“All of these are seen as priorities,” explained Chapman, “but at the same time consumers want to see battery life of their devices extended and sound quality improved.”

According to the report, many consumers said that they would be willing to pay for next generation audio products that support a smarter and more immersive listening

Consumer audio priorities

QUALCOMMS’S ANNUAL STATE OF PLAY REPORT HAS IDENTIFIED THE KEY DRIVERS BEHIND CONSUMER AUDIO PURCHASES. **NEIL TYLER** REPORTS

experience. It also suggested that the industry was at a tipping point with the shift from wired to wireless overall accelerating.

“The audio world is undergoing an accelerated evolution toward the ultimate freedom offered by truly wireless earbuds, with greater convenience, personalisation and choice,” said the report.

“Consumer audio is an exciting and rapidly evolving space.”
James Chapman

Among the ‘State of Play’ report’s key findings were that sound quality was a top-ranking purchase driver for 65% of global consumers, with 63% of headphone shoppers saying high-resolution audio quality was important.

In addition, 64% of smart speaker shoppers said sound quality was most important to their purchase decision and 78% of soundbar and home theatre shoppers

said superior sound quality really mattered to them.

The report also found that extended battery life was a top-ranking purchase driver for 61% of consumers surveyed in 2019, up from 47% in 2018. The report highlighted this sharp increase and said that it reflected a shift in preference towards wireless and the freedom that it offered users.

The survey found that 52% of respondents

said they would prefer to receive Bluetooth wireless headphones bundled with their next phone.

Thirty five percent of consumers surveyed said they already owned a smart speaker or smart soundbar, and an additional 23% plan to buy one in the next 12 months.

In addition, 78% of consumers said that they’d be willing to pay more for a smart or wireless speaker that supports their desired features.

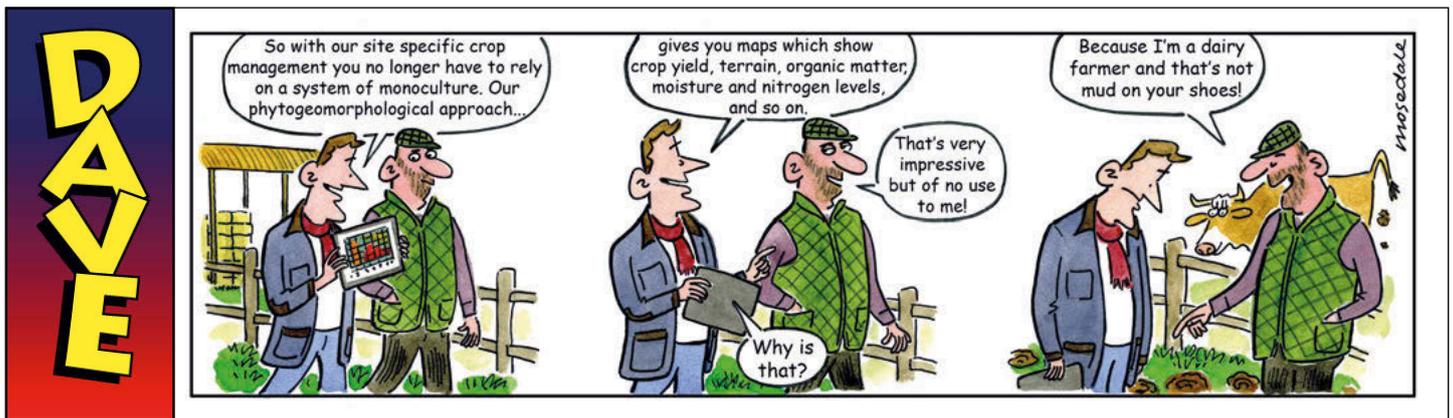
Both context aware smart headphones and augmented hearing features i.e. language translation, were identified as interesting features by the survey.

However, the report also found that attitudes towards security and privacy were proving a barrier to smart speaker purchases, having overtaken poor sound quality in last year’s report.

The report found that 60% of wireless headphone use takes place in noisy environments, and 63% of users said that they cared about Active Noise Cancellation (ANC) as a feature.

Other findings included: 53% of consumers rated Voice UI as a feature of interest for wireless headphones, while 73% of users expected their portable/wireless speaker to be able to play music at a very loud volume without distortion or loss of audio quality.

While brand loyalty was a major factor in their buying decisions, consumers said that they would be willing to shop around to get the features they most wanted.



CDS1



Configurable Display Switch

- Configurable Input System
- Full Size Touchscreen
- Round shaped OLED Display
- Plug and Play

01296 319 000
sales@schurter.co.uk
CDS1.schurter.com

SCHURTER
ELECTRONIC COMPONENTS



Telegärtner

UK LIMITED



Cat.6A 10 GBE 500 MHz fully shielded 4PPoE design capable REAL-TIME RE-EMBEDDED



MANHATTAN SKYLINE

PicoCoreMX8MM - Compact ARM COM with NXP i.MX 8MM

The PicoCore™ Computer On Module product family has a new member, based on the NXP i.MX 8M Mini ARM® CPU, called PicoCoreMX8MM. The small size of 35 x 40mm only makes the module an ideal partner for compact housings. The module was designed for low power consumption and is very well suited for secure cloud connections.

The i.MX 8M Mini is NXP's first embedded multi-core heterogeneous applications processor.

PicoCoreMX8MM features:

- NXP i.MX 8M Mini
- Cortex-A53 Dual/ Quad Core & Cortex-M4
- TFT MIPI-DSI, alternative LVDS
- 2D, 3D and Video HW acceleration
- Touch (4 wire-/ PCAP Touch) via I2C
- Up to 8GB LPDDR4 RAM/ 512MB SLC NAND Flash or 32GB eMMC
- Audio Line In/Out, Mic, Headphone (I2S also)
- USB 2.0 Device, USB 2.0 Host
- Gigabit Ethernet, PCIe, MIPI CSI
- 2x SPI, 4x I2C, 4x serial, (CAN)
- I/O, PWM, 2x SDIO (SD-Card)*, RTC*
- 5V with 3W typ.
- 0°C - +70°C
- WLAN/BT DualBand
- 2x100pin, 1.5mm to 3mm stacking height
- Available up to 2028



Manhattan Skyline Ltd.

Unit 5, Bracknell Business Centre, Downmill Road,
Bracknell, Berkshire RG12 1QS, UK

www.mansky.co.uk
Tel: 01344 307733

DataVoice

Beyond Standards

AMJ-S Module 2G - The new dimension in connecting hardware with large headroom and ruggedness

- Telegärtner has optimised and redesigned its AMJ-S Module especially for very demanding applications that have to guarantee high reliability in extremely tough environments.
- The reworked module boasts outstanding robustness against mechanical and electrical influences.
- The multiple shielding connection in the mating face guarantees constant high level shielding making the module particularly robust to vibrations, swings and electrical noise fields.
- The transmission characteristics of the module significantly exceed those laid down by the IEC 60603-7-51 design standard and the ISO/IEC 11801 building cabling standard, thereby providing significantly higher reserves.
- The AMJ-S 2G withstands unforeseeable critical loads without any problems: despite strong external electrical influences or increased stress reliable transmission is thus guaranteed.
- The contact set is tested beyond the requirements of the standard with respect to thermal shock and moist heat exposure in a total of 1000 mating cycles.
- The robustness of the AMJ-S Module 2G significantly exceeds that specified in the standards. 4PPoE testing of unintentional mating and unmating under electrical load also goes beyond these requirements.

www.telegartner.co.uk/contact

Telegärtner UK

Unit 1 - A1(M) Business Centre
151 Dixons Hill Road
Welham Green, Herts. AL9 7JE

Tel: +44 1707 636600
Fax: +44 1707 636638

E-Mail: sales@telegartner.co.uk



Feeding the world

Without costing the earth in the process, how is technology being used to develop and support more sustainable farming? By **Neil Tyler**

As one of the world's biggest industries agriculture, like many other sectors, has been experiencing rapid change in the past 10-20 years. New advances in technology are impacting processes and the supporting infrastructure, as the industry looks to embrace more sustainable farming practices.

At the heart of these advancements is the need to improve global food production in the face of a growing population, and to do so without recourse to using ever greater amounts of chemicals and pesticides.

Concepts such as biotech, the digital twin and precision agriculture all offer real potential in addressing some of the problems facing the industry.

Biotech is being used, for example, to better monitor crops while 'optimisation software' is being deployed to check crop health as

well as to alter plant DNA, creating crops that will be immune to a host of diseases. Increasingly, farmers and scientists are looking at new forms of farming and are embracing concepts such as artificial intelligence (AI) and machine learning, plant genomics, the use of analysis software, drones, cameras and targeted lighting to boost crop yields.

Microsoft is leading the technology sector's charge into the sector and is experimenting with a wide range of technologies. Its agricultural specialists are working on more efficient growing techniques and it is developing tools for farmers that will enable them to track growth data, weather conditions, customer transactions and actual food orders.

To date, the predictions that they are coming up with are around 90% accurate, so that almost everything

the farmer is planting is now being consumed with very little waste.

Microsoft is one of a growing number of electronics companies that are working in the agricultural space. Another is Murata, which recently announced the launch of a highly accurate soil sensor that contains three sensors in one package.

The device enables growers to increase the yield and quality of crops while reducing both water and fertilizer usage.

The soil sensor is being deployed with partners all over the world, with one example being the collaboration with Vietnam's Can Tho University.

Begun in 2017, this project has involved conducting field trials of a soil monitoring system to observe the condition of agricultural land in Vietnam's Mekong Delta region, which is subject to growing levels

of salinity due to the infiltration of seawater during the dry season. Salt damage can have a severe impact on the agricultural environment and has become an increasing problem due to the severity of droughts and floods in the region.

Murata has developed a small 13cm sensor that's able to measure the condition of agricultural land, and to channel water with high precision. It is now also possible to analyze the environmental conditions more accurately, which makes it possible to achieve improvements and prevent salt damage to rice paddies and orchards, reducing the risk of salt and sulfur contamination of agricultural land and water channels. The sensor is helping to create a mechanism to comprehensively manage fertilizers, crops and irrigation systems.

The sensor is able to monitor two types of electrical conductivity (EC), temperature and the moisture content of the soil, enabling growers to achieve more effective fertilizer timing, and the water content of the soil similarly enables more accurate and timely watering. By being able to use water intelligently, this valuable resource is not wasted, helping the environment.

In the project, the wireless transmitter-receiver system used consists of a gateway, a router and several sensor nodes. The sensing data is accumulated in the cloud and from that high-precision analysis of conditions is possible.

The use of technology is becoming increasingly widespread and some experts believe that upwards of 50% of farms are now in the process of, or planning to, invest in concepts such as precision farming and the use of digital technology

AI and agriculture

AI, automation, and innovative monitoring devices are all being looked at as ways in which farming can be improved, whether that's in terms of plant seeding and

spacing, growth management, water disbursement, as well as harvesting and packaging.

As Andy Griffiths, Head of Value Chain Sustainability for Nestle in the UK and Ireland explained to an audience at this year's COGX in London, "There is certainly growing evidence that climate change is having an impact and agriculture is just one of a growing number of sectors that are going to have to limit their impact on the environment. Technology is one way of delivering on those goals.

"We are seeing a surge in innovation and a big jump in investments in new and emerging technologies. We are witnessing the 4th Industrial Revolution and agriculture is at the heart of this new digital age."

According to Griffiths, the farming community is embracing innovation and we are seeing rapid developments in new forms of farming. He pointed to the Harper Free Hectare (HFHa) project that's being run by the Harper Adams University, which has received funding from Innovate UK.

The project is intended to create a hands-free farm and was started in 2016 with the aim of becoming the first farm in the world to not only grow and tend crops without operators, but to harvest the crop too. So far it has succeeded in working through two successful cropping cycles.

It has now begun a new three year project that will look to grow three different combinable crops across

"We are seeing a surge in innovation and a big jump in investments in new and emerging technologies. We are witnessing the 4th Industrial Revolution and agriculture is at the heart of this new digital age."

Andrew Griffiths

35 hectares with the team looking to address a number of issues from soil compaction and precision application, to solving problems associated with fleet management and swarm vehicle logistics and navigation.

According to Kit Franklin, Senior Agricultural Engineering lecturer, "We want the farm to become a test bed for agricultural innovation. Once the farm is established, we'll be encouraging companies to come and test and evaluate their technologies."

"This project is a glimpse into how we will be producing food in the future," said Griffiths, "and will contribute to reducing our carbon footprint."

The Small Robot Company is one of a growing number of companies that are looking to develop and use agricultural robots alongside artificial intelligence.

"Our focus is on delivering precision farming at a level that has never previously been possible," explained Sarra Mander, the company's CMO. "Our AI driven technology allows for a level of autonomy, accuracy and detail that now makes it possible for smaller farms to be profitable. Eventually, we see each process being automated.

"We use robots and AI and apply them to farming to make it both more efficient and sustainable. Small robots are able to carry out field work – to feed, weed and seed crops – and can do so by cutting the use of chemicals by as much as 95 percent."

The company is developing a 'Farming as a Service' business model. Farmers pay a per hectare subscription fee for a robotic service that comprises of a crop and soil monitoring robot (Tom); a precision spraying and laser weeding robot (Dick); Harry which delivers precision planting and Wilma which is the operating system.

The food sector is heavily exposed to climate change so, according to Griffiths, it needs to find effective ways to work right

Below: The Harper Free Hectare project looks to create a hands-free farm



across the value chain and that will involve better land management and technology has a direct role to play there too.

“Nestle has been working around the globe to empower suppliers both large and small.

“Whatever the crop, we are looking to find better ways to support farmers as they look to develop their businesses. We carry out risk assessment and advise them on the type of technology they should be using and investing in. There is no silver bullet, but if you can aggregate demand in one particular area then you can achieve investment at scale, with the benefits that can bring.”

The use of data will be fundamental to improving farming, helping to make it both more efficient and sustainable going forward and as more farms embrace this it will be possible to aggregate data collected nationally, to provide even greater levels of accuracy.

The benefits of more accurate farming means that the industry can move from ‘farming by averages’ to a situation in which it is possible to have data specific to individual plants; to map weeds; and to better prevent and contain bacterial infections.

“Farming models are shifting,” according to Mander, “but there remains a need for subsidies and financial help for farmers.

“If you are able to identify a problem early, you can reduce the need for chemicals. But precision farming also means that different crops could be grown alongside one another, which will enable farms to move away from mono-cultural practices,” Mander suggests.

Vertical farming, a topic that New Electronics addressed in a recent issue, is certainly benefitting from precision farming techniques. The use of data science means that companies are able to produce crops without the need for sunlight or soil. The food is being grown in a safer environment, protected from unstable



weather patterns and as the vertical farm concept develops it can be taken and deployed anywhere.

“We need to get people to invest in ecosystems,” said Griffiths. “As a large global business we have been able to help farmers to use technology and data. We need to increase biodiversity and by using data we can provide a degree of insight as to how farmers can work more efficiently.

“The challenge is the amount of data that is being produced and the fact that a lot of that data is one dimensional – you’re looking at soil quality or water quality - and you need to be able to understand the overall impact of these various components. That can prove to be challenging.”

Automated farming remains some way off. A lot of the technology has yet to be fully tested and in many cases farmers will require human interaction.

Research suggests that when farmers use technology, in particular robots, costs fall by an average of 60 percent, while revenues are up by an average 40 percent. However, while farmers are embracing technology many are worried as to how technology

could end up impacting their farms.

The technology under development today will change the nature and role of the farmer but it will also power greater creativity and improve land management. We’ll see robots capable of interacting not just with people but with animals too and, vitally, provide a crucial tool in developing and supporting more sustainable farming that is able to feed the world, but without costing the earth in the process.

Farmers are faced with the challenges of climate change. Cities are growing and looking at new ways to source produce to cut down on the need for transportation greenhouse gas emissions.

The food industry is changing and what customers want to buy and be served is changing too, whether that is food that is less carbon-intensive to produce, or is simply healthier.

Farmers, in response, will need to rethink their business models and how they farm. They’ll achieve that by embracing new technologies but that will mean that farming will be very different from what it was in the past.

“If you are able to identify a problem early, you can reduce the need for chemicals. But precision farming also means that different crops could be grown alongside one another, which will enable farms to move away from mono cultural practices.”
Sarra Mander

Access our biggest ever range from industry leading brands

- In stock, ready to despatch
- Electronic design to maintenance
- Excellent local customer service
- NIC and customised products quoting

KLEIN TOOLS

Honeywell

OMRON

NXP

ON Semiconductor

maxim integrated.

Panasonic

KEYSIGHT TECHNOLOGIES

multicomp PRO

MEYCAL

Life is On Schneider Electric

ST

CK

VISHAY

RENESAS

MICROCHIP

ROHDE & SCHWARZ

FLUKE

Tektronix

TE

molex

Weller

Farnell.com



Messe München

Connecting Global Competence

November 12–15, 2019

Time for new impossibilities.

productronica 2019. The world's leading trade fair for electronics development and production.

Accelerating Your Innovation.

SEMICON EUROPA
semi

co-located event

Contact: Pattern Limited
Tel. +44 20 3375 8230, info@pattern.co.uk

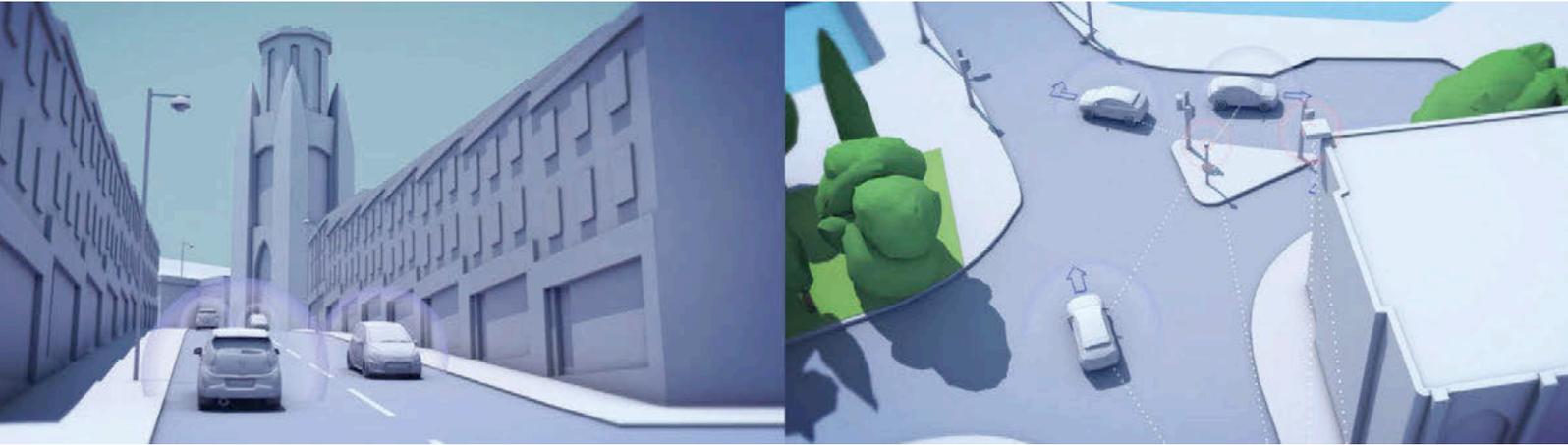


productronica 2019

World's Leading Trade Fair for Electronics Development and Production
November 12–15, 2019, Messe München
productronica.com

Redefining transportation

Tackling congestion and pollution, the field of transportation is facing the biggest shake up since the internal combustion engine was invented. By **Michael Seren**



Presented with an acute need to tackle congestion and greenhouse gas pollution, along with the ongoing objective of reducing road fatalities, the field of road transportation is about to go through what is certain to be the biggest shake up since the internal combustion engine was invented.

With government initiatives, private sector involvement and in-depth academic research, there is no shortage of impetus behind the modernising of transportation.

Increasing density of urban populations is placing ever greater strain onto existing infrastructure and the hope is that technology will mean that resources can be better utilised in order to mitigate these issues.

Based on this, the global market for intelligent transportation systems is expected to grow dramatically over the course of the next 5 years – going from an annual worth of about \$23 billion today to over \$34 billion by 2025 (according to a Global Market Insights study).

There are several key dynamics characterising the smart transportation era. The migration to electric vehicles

(EVs) plus the progression now underway towards heightened levels of autonomy will both be fundamental here. So too will be the supporting vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) network technologies.

It is estimated that during 2018, on average, British drivers lost almost 180 hours stuck in traffic jams. A recent report (compiled by navigation service provider TomTom) saw Edinburgh come out as the UK's most congested city, with commuters facing 40% longer journeys during rush hour than at off-peak times. It was closely followed by London, Hull, Belfast and Brighton.

Despite being recognised as one of the world's foremost exponents of smart city technology, Bristol still suffers from heavy congestion. Having seen an 11% increase in its population over the last decade, it is taking decisive action.

Spearheaded by the University of Bristol, with funding from InnovateUK, the FLOURISH consortium is developing cyber-physical infrastructure that will support connected and autonomous vehicles

Above: The FLOURISH fog computing system for CAVs

(CAVs), and enable more responsive traffic management. For the last 3 years it has been carrying out research into the use of fog-based computing to facilitate the rapid sharing of data between CAVs in relatively close proximity of one another (as well as roadside hardware).

This would eliminate the need for transferring data to and from the cloud, which is simply too slow when time-critical manoeuvres are required. Even with the arrival of 5G, the ultra-low (sub-millisecond) latency aspect of this is still going to be under development for several years before it features in the protocol (plus there will be considerable operational costs to factor in, not to mention security threats).

By taking a fog-based approach, the serious latency and security implications associated with conventional centralised cloud topologies may be avoided. As a result, CAVs will be able to react to any changes in road or traffic conditions in real-time, and make better-informed decisions about what route to follow or what manoeuvres might be called for. With more

awareness of what other vehicles are intending to do (as well as constant updates on their speed and direction), it will be possible for inter-vehicle spacing to be extended and traffic flows to move significantly quicker.

“On-board sensors can only deal with line-of-sight data acquisition. However, by having access to local data transported wirelessly, each CAV will benefit from augmented sensing – gaining a detailed, all-encompassing picture of everything that is happening within the immediate area,” explained FLOURISH’s Professor Roberto Piechocki. “This will enable intention sharing, so other road users are aware of a CAV’s planned manoeuvres. It will also mean that situations affecting traffic movements can be responded to appropriately. These may result in fairly small improvements in vehicle flows at the micro level, but when applied to the macro level the efficiency increases witnessed city-wide could potentially be huge,” he concluded.

Trials are currently underway at the university’s campus, to explore the full scope of possibilities this technology offers. The consortium is then looking to cooperate with telcos and municipalities on creating a platform upon which more effective traffic management systems, and various related microservices, can be implemented.

Meanwhile, in the nations’ capital there are numerous other projects underway. The Transport Research Laboratory (TRL) is tasked with formulating technological and strategic innovations within the transportation sector, then subsequently gauging the impact they will have. Working in conjunction with a series of commercial partners (most notably Cisco), along with Transport for London (TfL) and Loughborough University, it has founded the Smart Mobility Living Lab (SMLL) within the south eastern London borough of Greenwich. When its build phase is completed, at the end of this year, it

will act as a multifaceted testbed in which new transportation concepts can be experimented with.

Instead of the closed environments in which most other tests are conducted, this will allow the amassing of valuable data from within a real-world setting, making use of public routes. The aim is that knowledge gained here will help accelerate public acceptance of CAVs. As Chris Kettell, Chief Technologist at TRL, explained: “Before getting to a point where CAVs are on our roads en-masse, it will be necessary to verify they’re going to operate as expected whatever the scenario. Now microsimulation tools will give you a good idea of what will happen to a road network under a certain set of conditions, but there will be limitations when trying to analyse CAVs to the degree of granularity actually needed.

“What we’re looking to do with SMLL is create somewhere that companies in the automotive sector, technology providers, government agencies and those involved in transport services can all exchange ideas and collaborate with one another,” he continued. “Through this, it will be possible to formulate business plans for future mobility solutions, then prove their validity by direct engagement with the travelling public.”

A little over a year ago Bosch, with backing from TfL, established its London Connectory operation in Shoreditch. Its primary function is to acquire data direct from vehicles as

“On-board sensors can only deal with line-of-sight data acquisition. By having access to local data, each CAV will benefit from augmented sensing.”
 Prof. Roberto Piechocki

they move around the city, in order to combat congestion and air quality problems. Among the activities it is undertaking are ones that look to reduce emphasis on private car ownership and encourage citizens to make greater use of public transport options.

Extensive trials conducted in Greater Manchester on mobility-as-a-service (MaaS) also had this intent. The findings suggest people are willing to dispense with car possession as long as the alternatives available are viable enough. This opens up opportunity for on-demand services. However, the hailing of self-driving taxis to take individuals to work isn’t really going to solve the congestion issues that currently blight many UK cities.

Ridesharing would mean that available CAV capacity may be better utilised; as fewer vehicles will be needed and less miles will be clocked up covering the required number of commuter journeys. Assets could be better deployed, so the places where they are most needed at that particular time are attended to.

This could be a potential minefield too though. Now of course in principle transportation becoming more demand driven sounds ideal, but given that across the UK (particularly in remote rural communities) bus routes have already been axed to save money, will this invite further rationalisation? Could future smart transportation end up being another case of haves and have-nots, with the government and commercial enterprises only looking to serve a certain proportion of the populace, and the remainder having very limited access to it?

Whether embracing CAVs or opting for another form of transportation, it seems beyond doubt that all of us will have to make substantial lifestyle changes in the years ahead. Everyone needs to completely re-evaluate how they think about transport, and how society as a whole will continue to gain from it.

Below: Example of an SMLL test CAV



BRINGING ORDER TO CHAOTIC DIVERSITY

As requirements have evolved so too have the standards associated with VITA and PCIMG, as **Stephan Leng** explains

Over many years, CompactPCI and VME have established themselves across a range of diverse market segments. However, in order to meet new requirements, such as increasing transfer rates and new transfer technologies, the consortia behind both - VITA and PICMG - have had to update associated standards.

As the name suggests, CompactPCI-Serial (PICMG CPCI-S.0) is the logical further development of CompactPCI which focuses on standardised component dimensions, but also on a passive backplane that connects the plugged assemblies by means of defined connectors and a standardised pin assignment. Both standards are mechanically based on the common 19-inch standards IEC 1101-1 and IEEE 1101-10 and offer a variety of modules in 3 U (Eurocard form factor) and 6 U (double Eurocard form factor).

CompactPCI-Serial meets the demand for fast serial point-to-point connections and has replaced the parallel PCI bus in CompactPCI. Backplanes and platforms with one system slot and up to eight peripheral slots are now possible. By using bridges, backplanes with up to 21 slots can also be implemented. Whereas the old standard featured only the PCI bus, the system slot features eight PCI Express links (6 x 4 lanes, 2 x 8 lanes = 2x FatPipe), eight SATA/SAS, eight USB 2.0, eight USB 3.0 and eight 10GBASE-T Ethernet interfaces.

The PCI Express links, as well as the SATA/SAS and USB interfaces, are connected to the peripheral slots via a

star architecture - one of the interfaces (connected to the system slot) is provided for each peripheral slot.

Either a star architecture (one connection from the system slot to each peripheral slot) or a full mesh architecture (each slot is connected to each slot) is feasible for Ethernet connectivity. This allows, for example, the design of multiprocessor systems in which the individual CPU modules are connected via Ethernet. While CompactPCI still required four supply voltages (5, 3.3, +12 and -12V), the serial standard asks for a supply of 12V (optionally 5V standby).

The biggest change between the two standards concerns the connectors. While two 110-pin connectors were still used for CompactPCI in 3U format, up to six robust multi-pole connectors are used for CompactPCI-Serial. These enable transfer rates of up to 12 GB/s.

In 2009, the CompactPCI-Plus I/O standard was created to make it easier for CompactPCI users to migrate or apply the new standard, offering the possibility to implement

Below: New devices require new standards



hybrid backplanes and to use CompactPCI modules together with new serial cards. Instead of 64-bit address lines, the J2 connector of the system slot is now assigned to the serial connections, which are then routed to the CompactPCI serial peripheral slots. This allows for faster deployment of serial interfaces such as SATA - especially recommended when modules based on the previous standard are in use.

VPX

VPX (VITA 46) is a further development of the VME standard defining the electrical and mechanical specifications for assemblies. The mechanics are also based on the 19-inch standards IEC 1101-1 and IEEE 1101-10, which determine assemblies and backplanes in 3 U and 6 U and a depth of 160 mm each.

Assemblies and backplanes in 3 U have a connector according to DIN 41612 and are named P1 (assembly) or J1 (backplane).

A second connector (P2/J2 - also according to DIN 41612) is defined for 6 U assemblies. Initially, a 16-bit data bus and a 24-bit address bus were determined electrically. This allowed for transmission rates of up to 40 Mb/s. Numerous extensions (VME64 and VME64x) to the standard included 64-bit wide data and address buses. In the recent extension VME320, transfer rates of up to 320 Mb/s can be achieved. The VME standard generally requires supply voltages of 5, +12, -12 and 5V (standby).

Like CompactPCI-Serial, VPX meets the need for interfaces with fast serial point-to-point connections. It supports different interfaces such as Serial Rapid-I/O, InfiniBand, PCI Express and Gigabit Ethernet. A new connector was designed and selected, which enables transfer rates of up to 6.25 GB/s. As a result, VPX boards and systems - CompactPCI and the serial standard - are no longer compatible with the previous standard. For power-hungry modules, the maximum power

Three years after its launch into Earth orbit, a Chinese satellite has steadily been extending the reach of an encryption technology that is practically unbreakable.

Nicknamed “Micius” by the researchers responsible for designing it, after a 4th Century BC philosopher, the Quantum Experiments at Space Scale (QUESS) satellite demonstrated it was possible for photons sharing quantum entanglement to convey data over 750km.

By June this year, that distance had increased to 1200km.

Before the QUESS experiments began, researchers were unsure as to how far entanglement could be stretched. Now it looks as though satellites could let entangled states straddle continents.

So far, China is leading in the quest to build long-distance networks that use quantum entanglement to improve security rather than classical communications technologies. A year after Micius went into orbit, a consortium of research institutes completed a fibre-based ground network that ran from Beijing to Shanghai through Jinan and Hefei across a distance of almost 2000km.

In contrast to the direct communication between satellite and ground stations, the Beijing-Shanghai requires numerous relay stations. But both networks are pointing the way towards a radical change in the way encryption is used.

In 1984, Charles Bennett and Gilles Brassard unveiled what is now known as the BB84 protocol. It takes advantage of the Heisenberg uncertainty principle to detect third parties attempting to eavesdrop on private communications. The easiest mechanism for implementing BB84 is to use polarised light and then use polarisers arranged at different angles in front of detectors to spot them.

Consider two parties who want to communicate who, in the tradition of cryptography analysis, are called Alice and Bob. The sender, Alice,



ENTANGLED SECRETS

Quantum experiments point the way to secure communications. By **Chris Edwards**

randomly switches between two types of polarisation when encoding a random stream of entangled photon pairs: either along a perpendicular axis or at a 45° angle. Bob, the receiver of one half of each pair also randomly swaps between these two types of polarisation when measuring. Only if both choose correctly will the measurement work. If Bob performs the wrong type of measurement, any subsequent attempt to confirm the polarisation will lead to a random, useless result.

For each bit received, Bob tells Alice which measurement basis he used and Alice will inform him which guesses. Bob’s records of the correct bits generate a ‘sifted key’. To check their communication is secure, Alice and Bob sample some bits from the sifted key and compare results.

If the results in the checked bits differ, it points to the presence of an eavesdropper on their link, disrupting the measurements that Alice and Bob attempt. If they find disruption, Alice and Bob then have to start again, possibly using a different link to avoid the eavesdropper. If they do not encounter errors, Alice and Bob

Above: The Quantum Experiments at Space Scale (QUESS) satellite has demonstrated that photons could be used to convey data over vast distances

now both have a private key that can be used to encrypt data sent over a classical channel.

BB84 itself does not require entanglement but numerous variants have appeared that have Alice create entangled pairs for measurement later rather than having her enforce a measurement basis on single photons before sending them.

The satellite experiments have tended to focus on the use of entanglement.

Streamlining the process

Various forms of quantum key distribution (QKD) protocol have appeared that streamline the process of creating keys. With its need for sifting, BB84 key generation is not a fast process compared to the bandwidth of a photonic channel. One example is a protocol developed by Toshiba five years ago that calls on Bob alone to randomly pull bits from trains of coherent pulses without involving Alice. The developers claimed the protocol gives eavesdroppers almost no chance of decoding a key.

In 2018, they claimed the key-generation rate could be pushed into

tens of megabits per second with the help of FPGA-based hardware accelerators.

Theoretically, QKD using BB84 provides users with practical access to one-time pads. Claude Shannon proved in 1945 that a key generated entirely randomly and used only once is practically uncrackable. The problem in the past is finding a secure way to get the pads into the hands of receivers without risking them being uncovered by hackers.

While QKD provides a suitably secure mechanism, both distance and speed remain stumbling blocks for the technique but experiments such as those performed by QUESS are showing that space-based networks could transmit keys around the world, albeit not at the speed you would need for highly secure video. The practical key distribution rate is orders of magnitude lower than the channel's bandwidth.

Applications of QKD, up to now, have not required high throughput for the keys.

Although China is pushing the technology hard, high update rates may not be necessary. Having a key that changes several times a minute can be enough to provide sufficient confidence of security. QKD was used in this way more than a decade ago in Switzerland to protect voting data from the country's elections. Since then, banks have made limited use of the technology to protect data being replicated across sites for disaster recovery. Other near-term applications will most likely not go down the road of the one-time pad. Instead, QKD may simply provide a mechanism for getting the sensitive private keys needed for conventional cryptography into the hands of users without today's requirement to generate them in situ simply to avoid the possibility of eavesdropping.

There remains one major

snag. Although vagaries in hardware design could lead to side-channel attacks should a hacker gain access to equipment, QKD is extremely difficult to compromise in the case of direct communication. But limits on distance open up other attack possibilities. The QUESS experiments have shown satellite-based networks will be effective but they will need multiple hops to get keys to where they need to go. It actually gets worse on the ground.

Dispersion in fibre leads to entanglement being lost over distances of more than 150km: the Beijing-Shanghai network has no less than 30 relay stations. Each one has to decode and store keys locally before sending them on their next hop. This provides hackers with a possible weak link in the chain. Gain access to a relay and you have access to the keys flowing through it.

One option to get around the need for trusted relay nodes is to use quantum repeaters. They do not need to resolve quantum states in order to send a qubit over the next hop. The bad news is that they would most likely not work with relatively simple state measurements based on polarisation. There is also a cost.

Today's best option for a repeater is a mechanism that swaps quantum states across independent links. The

“While QKD provides a suitably secure mechanism, both distance and speed remain stumbling blocks for the technique.”

process barely works today and will probably increase losses compared to direct links, putting further dents in the key-update rate. In the short-term, users will most likely tolerate the notional insecurity of store-and-forward networks on the basis that QKD will be operated on telecom backbones using exchanges that boast high levels of physical security.

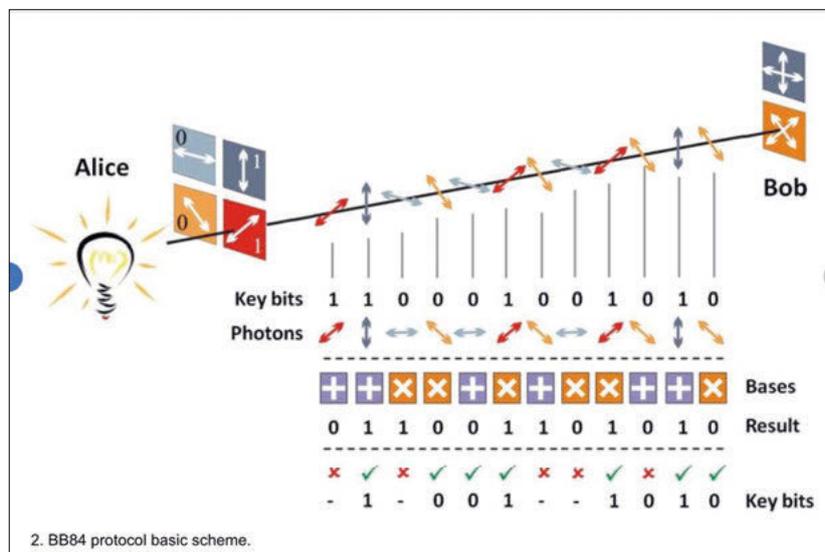
Although China has spent heavily on advancing QKD over the past decade, other regions are accelerating their work on the technology. A year ago, the European Space Agency (ESA) contracted a consortium led by UK-based start-up ArQit to develop the continent's answer to Micius. As with the QUESS experiments, the experimental satellite will exchange quantum-entangled photons with ground stations. The consortium expects to have the cubesat – which is much smaller than the 600kg Micius – in orbit and ready to work by the end of 2021. The ultimate aim is a global network of QKD relay satellites that can support international communication.

QKD pioneer ID Quantique, which worked on the Swiss elections project, is helping a different satellite project called QUARTZ. This will have the satellites generate keys and beam them to Earth. Another QKD specialist, Australia-based QuintessenceLabs has

used its experience of the technology to create more efficient random-number generators, as well as working space and defence agencies of Switzerland and Australia on their own experiments into space-borne QKD networks.

Because of the emphasis on satellite communications and backbone networks, QKD is unlikely to become a mass market for manufacturers of laser and filter components. But it is slowly becoming a commercial reality.

Below: The BB84 protocol devised back in 1984 by Charles Bennett and Gilles Brassard and third party attempts to eavesdrop on private communications



12TH MARCH 2020
BRITISH MOTOR MUSEUM, GAYDON

PCB

DESIGN & MANUFACTURING LIVE

UK's dedicated exhibition for sourcing the
electronic components & services needed to
develop your PCB design

WHY VISIT?

INNOVATIVE NEW SOLUTIONS

Solve your PCB design problems by connecting with market leading UK suppliers

NETWORK WITH PCB EXPERTS

Speak to PCB Design Consultancies & Electronic Manufacturers and save time and money on your designs

ATTEND TECHNICAL SEMINARS

Learn new techniques and discover technologies to improve your PCB design skills



Bought to you by the publishers of
newelectronics
& the organisers of the

Standards regarding the development of safety-critical software often require the management of software complexity, so how can we measure software complexity and establish software complexity management?

A metric, which has complexity already in its name, is the cyclomatic complexity. Thomas McCabe proposed this metric in 1976. The metric is based on graph theory. The metric gauges the complexity of the control flow of the software's source code, based on the control flow chart. The control flow chart comprises of nodes and edges.

The formula for the cyclomatic complexity $V(G)$ is as follows:

$$V(G) = e - n + 2.$$

The cyclomatic complexity $V(G)$ is defined as the number of edges (e) minus the number of nodes (n) plus 2 in a strongly connected directed graph.

Actually, the cyclomatic complexity is calculated from the more general cyclomatic number of graph theory: the cyclomatic number has the formula $e - n + p$, where p stands for the number of connected components. We can assume that the usual object of investigation, e.g. a function in the sense of the C programming language, has one entry node and one exit node. To turn the flow chart of such a function into a strongly connected directed graph (a graph where you can reach each node from every other node in the graph), we need to introduce one additional edge from the end node to the starting node.

This increases the number of edges by one. On the other hand, we have a single connected component and can set the value of p to one. The formula now becomes $e + 1 - n + 1 = e - n + 2$.

The cyclomatic complexity increases linearly with the number of binary decisions in the software. Let us think of a function (in the C programming language) without any

LIMITING SOFTWARE COMPLEXITY

Measuring software complexity comes with traps and pitfalls.

What do you have to consider? By **Frank Büchner**

```
int func1(int a)
{
    if (a)
        return 1;
    else
        return 0;
}

int func2(int a, int b, int c, int d)
{
    if (a || (b && c) || d)
        return 1;
    else
        return 0;
}
```

decision. The function has a starting node, an end node, and one edge from the starting node to the end node. Hence $V(G) = 1 - 2 + 2 = 1$. If we insert one binary decision, e.g. an if-statement, we get one additional node and two additional branches, resulting in $V(G) = 3 - 3 + 2 = 2$.

The cyclomatic complexity is equivalent to the number of linear independent, complete paths through the source code. Therefore, the cyclomatic complexity indicates the minimal number of test cases that are needed to execute all edges in the control flow graph at least once, which includes all possible paths through the flow chart. Executing the test cases, which form the base of the vector space, would result in 100% branch coverage.

Testing based on the possible paths through the code (i.e. the structure of the software) is (one kind of) "structured testing".

Calculation can differ

The function `func1()` on the left hand side of Figure 1 has one binary decision and therefore the cyclomatic complexity of 2. Strictly speaking, the function `func2()` on the right hand side

of Figure 1 above also has one binary decision and therefore the cyclomatic complexity of 2. However, due to the logical operators (`||` and `&&`), `func2()` obviously is more complex than `func1()`.

Based on the fact that you could write `func2()` without logical operators resulting in the cyclomatic complexity of 5, it is possible to argue that `func2()` as is has the cyclomatic complexity of 5. One can calculate this complexity from the "standard" cyclomatic complexity by adding the number of logical operators ($2+3=5$).

There are (commercial) tools, which will calculate the value 2 for the cyclomatic complexity of `func2()`, others will calculate 5, and others will calculate both value.

There are (commercial) tools, which will calculate the value 2 for the cyclomatic complexity of `func2()`, others will calculate 5, and others will calculate both value.

Weaknesses

One of the weaknesses of the cyclomatic complexity metric is not taking into account calculations.

Another weakness of cyclomatic complexity is that the labels of a switch-statement increase the cyclomatic complexity by one. This can lead to the effect that a clear structured piece of software gets a high value for the cyclomatic



"Be aware that tools might determine different values for the cyclomatic complexity for the same piece of software. Check how the tool you use behaves and adjust your limits accordingly."

Frank Büchner

complexity, indicating hardly understandable and difficult to maintain software, which is not true.

Figure 2 (right) illustrates the weaknesses of the cyclomatic complexity. The function `f_switch()` on the left hand side has a high cyclomatic complexity (which is 13).

However, the function `f_switch()` is clearly structured and you can guess the purpose of this function at a glance. On the other hand, on the right hand side of fig. X2, the function `sinus()` has a low cyclomatic complexity (which is 2). However, without having the function's name, you would have a hard time finding out what the function actually does.

The function `sinus()` is hard to understand and therefore hard to maintain. In consequence, the values for cyclomatic complexity in this example are contrary to the human notion of complexity.

Which value is the limit?

In spite of these weaknesses, the cyclomatic complexity is often used to measure software complexity. McCabe, the inventor of this measure, takes 10 as the number for cyclomatic complexity that might be just about acceptable. Software with higher numbers should be revised, although the number is widely discussed. One aspect to keep in mind is the discrepancy between case-labels in switch statements and calculations.

Another aspect is that different tools might calculate the cyclomatic complexity differently. In practice, different companies have different limits, usually more than one (e.g. a "warning" limit and an "error" limit), and different procedures on how to react on values too high. Usually a review process decides if the software needs to be re-written or not. In my experience, it is always

```

void f_switch(int month)
{
    switch (month)
    {
        case 1: days = 31; break;
        case 2: days = 28; break;
        case 3: days = 31; break;
        case 4: days = 30; break;
        case 5: days = 31; break;
        case 6: days = 30; break;
        case 7: days = 31; break;
        case 8: days = 31; break;
        case 9: days = 30; break;
        case 10: days = 31; break;
        case 11: days = 30; break;
        case 12: days = 31; break;
        default: days = 0; break;
    }
}

double sinus(double x_deg)
{
    int i;
    double temp, x_rad;
    int sign = -1;

    x_rad = x_deg / 180 * pi;
    temp = x_rad;

    for(i=3; i<=(MAX_FAC-2); i+=2)
    {
        temp += sign * pot(x_rad,i) / fac(i);
        sign *= -1;
    }

    return(temp);
}
    
```

a good idea to determine the values for the cyclomatic complexity from previous successful and failed projects and compare the current numbers to them. Additionally, characteristics of the project might influence the limits.

TESSY

Version V4.1 of TESSY, a tool for automated module testing of embedded software, includes for the first time a genuine static analysis feature, because TESSY is now able to measure cyclomatic complexity of the test objects.

From the cyclomatic complexity, several other measures are derived, namely the total, the average, and the maximum cyclomatic complexity.

You can set two limits for

Figure 2: The function `f_switch()` on the left hand side has a high cyclomatic complexity; whereas the function `sinus()` on the right hand side has a low complexity

the cyclomatic complexity: if the cyclomatic complexity is higher than the upper limit, the value is displayed in bold and shaded in red (indicating an error), if it is between the lower and the upper limit, the value is shaded in yellow (indicating a warning). Values below the lower limit are shaded in green.

In addition, the relation of the number of test cases for a test object to its complexity is also shown. As long as this relation is smaller 1, you do not have enough test cases to execute all paths. In this case, the value is shaded in red, otherwise in green.

The test object „is_equilateral“ has a cyclomatic complexity of 2, which is acceptable and therefore shaded in green. For the test object „is_isoceles“ it is 12, what is above the limit specified by McCabe, which TESSY currently uses as lower limit, and therefore is shaded in yellow. For the test object „is_right“ the cyclomatic complexity is 22, what is above the currently used upper limit of TESSY of 20, and therefore is shaded in red. You can specify the values which will use for the lower and upper limit.

Figure 3: TESSY displays the cyclomatic complexity for the test objects

Filter test project	CC	CC Avg	CC M...	TC/C
Hitex-Examples	76	-	-	0.00
BatchRestore	41	8.20	22	0.23
Categorize	3	3.00	3	1.33
categorize	3	3	3	1.33
Triangle	38	9.50	22	0.23
is_equilateral	2	2	2	0.50
is_isoceles	12	12	12	0.42
is_right	22	22	22	0.23
is_scalene	2	2	2	2.00

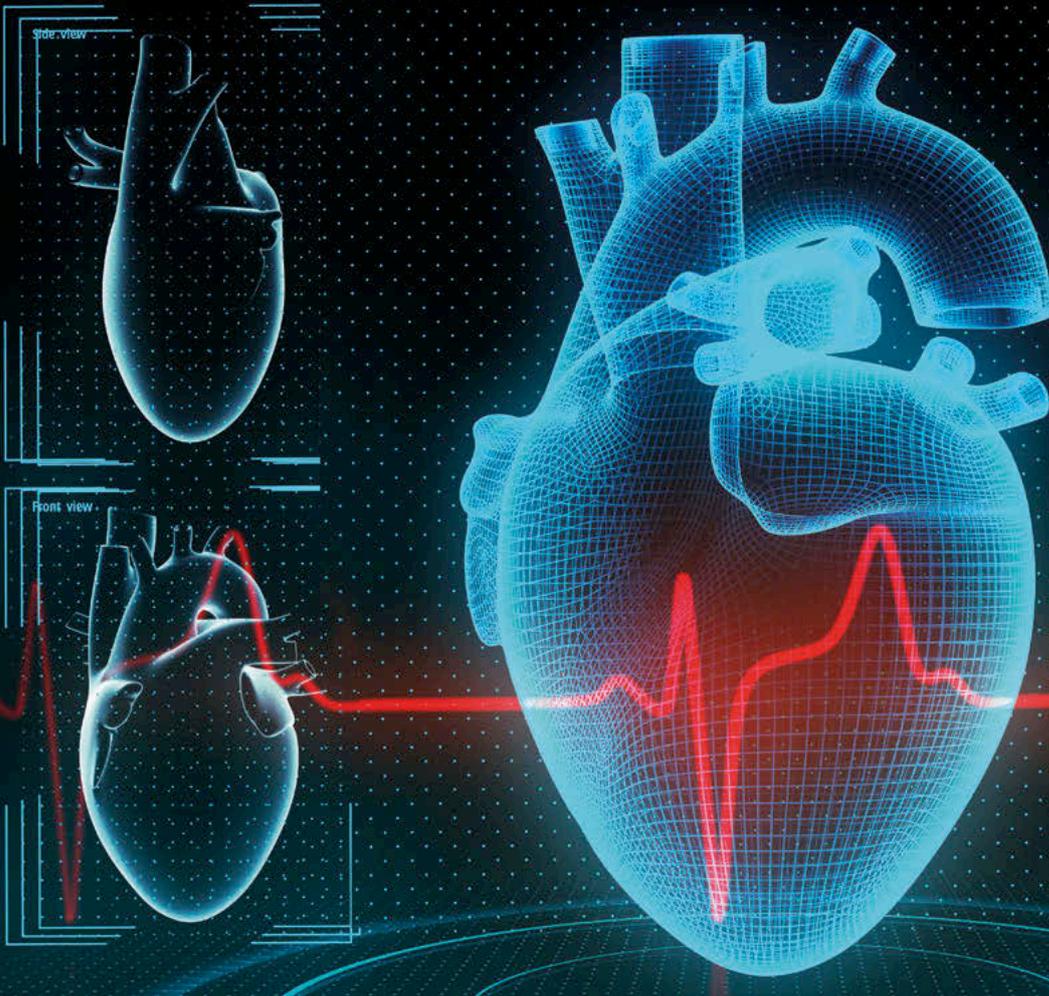
Author details:

Frank Büchner is Principal Engineer Software Quality at Hitex GmbH

MANUFACTURING AND DESIGN ENGINEERING

MADE IN IRELAND

Promoting
the success of
manufacturing
and engineering
in Ireland



10,000
Key decision
makers

6,000
Manufacturing &
design sites

**NEXT
ISSUE**
November
2019

*If you are doing business in Ireland
- or would like to be...*

CONTACT

Jez Walters, Sales Director
jez.walters@markallengroup.com • Tel: 00 44 (0) 1322 221144

www.madein.ie

MADE in Ireland is brought to you by:

Eureka!

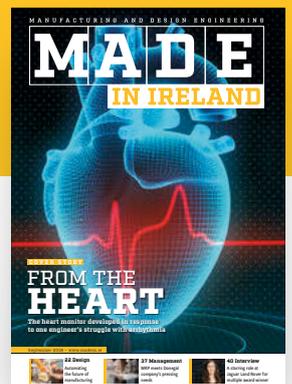
newelectronics

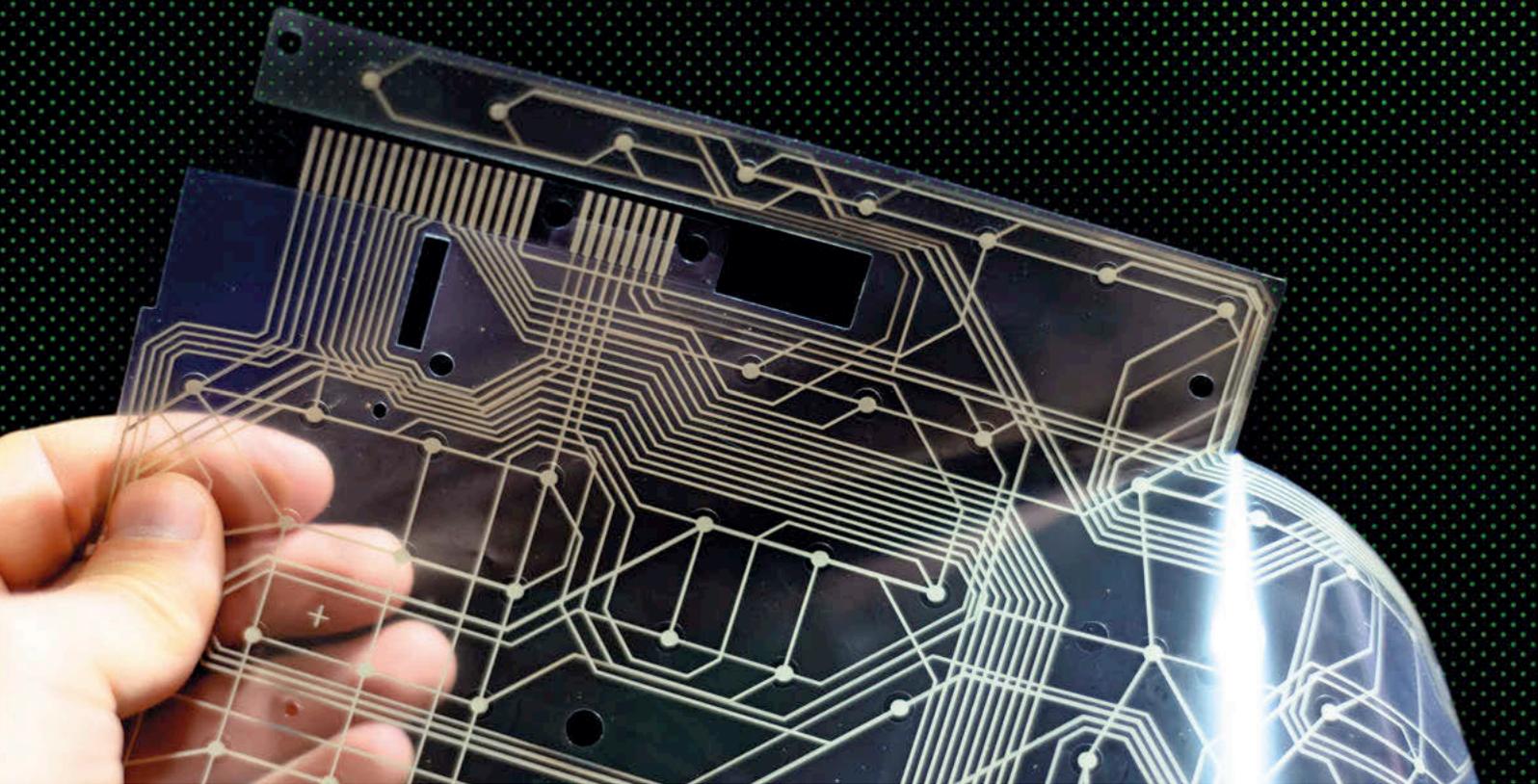
MACHINERY

**MANUFACTURING
MANAGEMENT**

FAST
FASTENING & ASSEMBLY SOLUTIONS AND TECHNOLOGY

**MA
BUSINESS**
A MARK ALLEN GROUP COMPANY





TIME TO BREAK FREE

Why designers need to start breaking away from traditional design. By **David Haboud**

Are PCB designers ready for a world of printed electronics? If not, it might be prudent to start thinking about moving beyond traditional PCB design and considering how to approach this rapidly growing market.

While there has been a lot of hope and hype around printed electronics, the market is finally catching up to the technology. The printed and flexible electronics market is expected to hit more than \$73 billion by 2027, according to IDTechEx.

Much of this market includes organic light emitting diodes and conductive ink that's used in a broad range of applications. It's also being driven by the Internet of Things, which demands low-cost, lightweight technologies.

At their core, designs for traditional PCBs and printed electronics deliver very much the same thing - connected electronic components form an electronic circuit that powers a product.

However, how printed electronics are built and what materials they are built with are very different.

In traditional PCB design, an electronics engineer designs the board, defines its dimensions based on electrical and some mechanical requirements and when ready releases the manufacturing files. The manufacturer then manufactures the PCB according to design files by etching away copper or other conductive materials to form a trace with the right dimensions that full-fill electrical requirements.

The process involves multiple layers and the use of a lot of hard, laminated materials.

In printed electronics, the same results need to be achieved, but with the use of different design rules, materials and manufacturing methods. While traditional PCB design and the manufacturing or printing process typically involves reducing materials (etching) to form a trace, printed electronics is an additive process.

Materials are added onto existing surfaces not with layers but by printing directly onto a substrate. For example, if a signal pathway needs to cross an existing pathway, a designer can print a small patch of insulation directly

in the required location to enable the new signal pathway to be printed across the existing pathway without causing a short.

Typically, printed electronics are easier to produce, lighter than traditional circuit boards, cheaper to print, quicker to assemble, and offer more design freedom.

Today, printed electronics have the potential to disrupt conventional technologies, overcome limitations in components or the manufacturing process and even create new markets.

The potential applications are diverse: medical diagnostic devices, smart packaging, clothing, batteries, sensors, drug delivery devices, flexible solar cells, displays, lighting products, injection-moulded electronics and more. Think wearables, glucose test strips and self-darkening windows to name but a few.



Author details:

David Haboud is a Product Marketing Engineer at Altium

Injection moulded electronics

Injection-moulded electronics (IME), for example, are a new way to design and manufacture products in industries spanning automotive, appliances, IoT and industrial

markets. With 3D technology, developers can simplify multi-part, complex electronics and replace them with durable, lightweight single-piece structural alternatives that integrate sensors, controls and other elements to produce smart electronics for today's consumers. IME integrates a number of broadly applied production technologies - flexible circuit printing, printed electronics, surface mounting of electronic components, in-mould labelling thermoforming and injection moulding - into one method that enables the mass production of 3D structural electronics with specific benefits in automotive.

But printed electronics come with their own unique challenges that need to be addressed at the design stage. Printed electronics are typically designed in 2D for a flat board, but once sent for printing and manufacturing, the electronics will be made to fit unconventional shapes and spaces. Routes and traces designed in a 2D environment won't always work as intended once they're bent and stretched to fit the angles and shapes when they're printed.

Essentially, designers need to break free from the traditional layers and organisational constructs seen in traditional PCB designs; design in a fluid space rather than horizontal and vertical design in 2D and visualize in 3D. They need to be able to route and design in 3D, but not in layers. Apart from the substrate that the design is printed on, there are no physical layers in a printed electronics product - conductive pathways are printed directly onto the substrate.

There are also considerations of integrating ECAD and MCAD requirements as you move into a fluid 3D environment. Will the circuit you designed in 2D fit the 3D mould?

Additionally, consideration is key between the compatibility of the conductive material and the surface that it will be used on; flexibility, adhesion measured by the material's

ability to stay on the product surface, and durability to heat and strain. The most important questions arise asking how the product will be used.

Simulations must test usage as in real world conditions:

- How people will move with the item?
- How often will it be used?
- When will it be used?
- The environment in which it will be used?
- Will it interact with other more complex systems or is it standalone?

The same physical laws govern the design of PCB and printed electronics, and essentially define what's possible to design. Although two circuits - one made for a PCB and another for printed electronics - can have exactly the same functionality, but the circuit implementations are quite different. This is because of the physical capabilities and limitations of the material used in electrical circuits. In both circuits, voltage differences must be applied over impedance of the routes made of difference conductive material. To get the same current flowing in both circuits requires adjusting impedances to the same level or setting circuit-specific voltage levels. This typically involves a good

Below: Finnish company TactoTek encapsulates flexible film electronics within injection molded plastics, which creates smart surfaces



bit of trial and error with impedances and voltage levels.

Choosing the right materials can be a challenge in printed electronics design. Extreme heat is required in the thermoelectric and molding process. The same goes for the thermoplastic simulation process.

A lot of progress has been made with materials, particularly in the area of conductive and dielectric inks designed to withstand extreme heat. Conductive inks such as silver, carbon and other polymer thick films (PTF) can be printed on various substrates that on their own are lighter than those used in traditional PCB design. These include polyester, polycarbonates, polyurethanes, and paper and hold the potential for enabling more creativity and less complexity in product development

Designers now have access to a wide material library section of not just different types of inks but adhesives and materials, including ink, that are stretchable. The ability to access and correctly select the right materials are crucial to printed electronics design.

As printed electronics become more mainstream across all industries, PCB designers must evolve their skills and experiences to encompass new technologies. In the near-term, printed electronics will likely continue to be used in combination with PCBs, but eventually printed electronics will displace many rigid and rigid-flex PCB designs as more products rely exclusively on printed electronics. That's because printed electronics will allow products to be more perfectly customised.

Industry also needs to coalesce around standards, such as the standardisation of file exports, and more manufacturers must ensure they have the materials for printed electronics. While we don't yet have the rules or best practices for how to design for printed electronics, like 3D, printed electronics are here to stay.



NEW SPACE AND BEYOND

Traditional packaging still has a role to play from deep space to new space, as **Rob Coleman** explains

At the start of space exploration, Transistor Outline (TO) JEDEC packages were the go-to packages of choice for the exploration industry. The TO package family consists of many types of packaging solutions for transistors and similar discrete devices as well as simple IC's with low pin counts. The structures of TO packages can vary widely, from expensive metal can enclosures to low-cost plastic-moulded package bodies.

TO-18 and TO-5 devices became the preferred option for small signal componentry, where TO-66 and TO-3 packages were recognised as ideally suited for high-voltage and high-power applications.

However, the difficulties experienced in the selection of TO-66 and TO-3 packages have resulted in the wider adoption of more modern metal case hermetic packages such as TO-257, TO-254, and TO-258 – in comparison, these are far easier to deploy than their more traditional case counterparts.

Yet the continued evolution of the wider electronics industry has seen these hermetic devices subsequently displaced by surface mount equivalents over the last twenty years.

Commonly selected UA and UB packages are utilised for small signal use, while SMD-05 and SMD-1 are chosen across numerous markets for applications demanding increased power.

On this landscape – and with the emergent era of space commercialisation – system designers may be wondering if there is still a place for the more traditional metal case devices.

Well, there is, and innovators in aerospace are again turning to this proven packaging option to tap into both compliance and reliability.

At the start of the space industry, many if not all circuit boards were made of ceramic material. The movement towards more commercial missions and the movement into New Space today means that often boards consist of FR4 board.

The attachment of large-scale surface mount parts has already raised an element of concern from ESA who have noted in their Space Product Assurance Classification, ECSS-Q-ST-70-38C, that component suppliers must deliver CTE compliance when employed within Class 1 boards (i.e., glass fibre epoxy or glass fibre polyimide resins).

Packages such as UA and UB do empower a low mass advantage, however this benefit demands careful soldering of the devices, a challenging real-world requirement. Further, SMD-05 and SMD-1 packages may also have more issues due to their large surface area and larger mass. The chances of stress fractures along joint areas is significant and generates a genuine risk of catastrophic failure of the device and an early end to the mission. SMD packages are also widely acknowledged to have issues with cracking if mounted above a large ground plane and subjected to extensive thermal cycles. One potential solution to this problem is

adopting a CTE compliant mounted package or carrier featuring dual lead connections, as can be seen in the figure below.

Traditional leaded packages should of course be used with care as additional lead length over surface mount packages can cause stray inductances which could affect switching performances; this can be mitigated by careful circuit layout, thus preventing oscillation within the circuit.

In comparison, proven metal case transistors reliably offer some degree of compliance. The leads act as an expansion route during thermal shocks. Typically, metal case transistors are better at dissipating heat generated within the system, especially as switching applications become quicker and chips become smaller and reach their respective control limitations.

Often these traditional packages have a gold flash on the lead termination; where a gold flash is present additional consideration should be given while using these products.

It is known that gold contamination within the PCB soldering connection can lead to embrittlement of the joint, which could contribute to premature failure of the component when used in harsh conditions. To prevent such circumstance, it is essential that the gold flash be removed prior to assembly.

As many parties choose to use commercial 'off the shelf' components these will typically be solder dipped with RoHS compliant sac type solders; however, when using these in critical applications, lead finished solders should be considered. Lead, although a non-preferred medium, is often approved under the RoHS status by exception. Within military, avionic and space applications it is common for lead to be the solder of choice due to reliability factors in difficult environments.

It is for the same reason that tin-plated terminations on plastic devices are often not used because of the known risk of tin whiskers which can short out transistors within a minimal period.

The use of leaded solders in termination within the system can add to increased reliability; it is worth nothing that when producing the PCB, it is imperative that the two RoHS compliant and non-RoHS compliant solder assembly (i.e. through wave soldering or reflow systems) are manufactured separately to prevent cross contamination of sac and leaded solder.

Long-term value in upgradability

System designers may also find that metal transistors enable a much easier route to upgrade when contrasted with surface mount options. The plastic TO-220 package,

Author details:
Rob Coleman,
Technical Sales
Manager, TT
Electronics

for example, has an identical footprint to that of the TO-257. This aids early prototyping, using low cost components, creating a design that can easily and efficiently be transferred to more robust packaging optimised for harsher environments.

As higher volume satellite constellations in low earth orbit are driving a requirement for increasingly cost-effective components, this is a tangible advantage.

Even as some semiconductor manufacturers are exiting the TO package space marketplace, there are providers that will continue to offer a choice of components and test routing. In this fourth age of space, creative and successful designs may demand either or both metal case leaded devices or surface mount technologies to support the mission, both of which must be tested in accordance to Mil standards or ESA specifications.

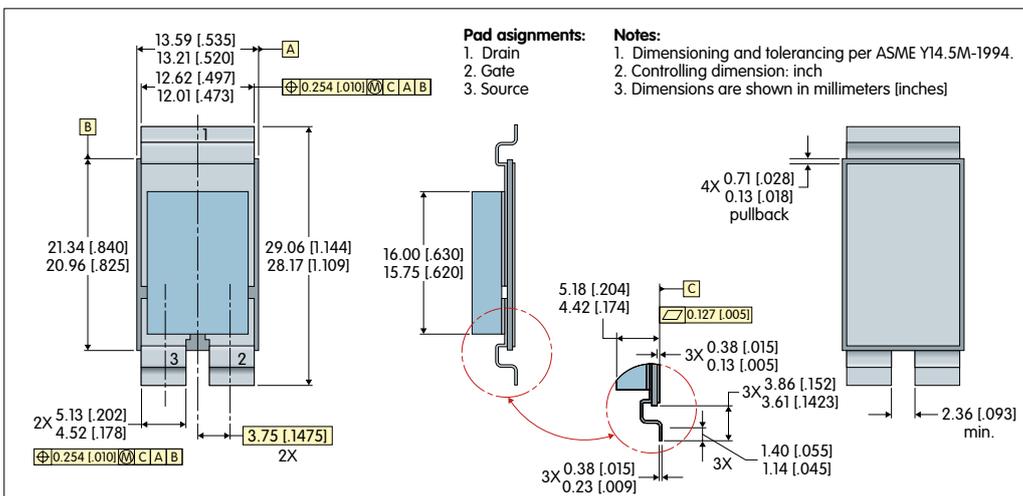
With cost considerations an increasingly high priority, screening options such as NS1 and NS2 can cost effectively deliver the reliability required. The NS1 sequence provides an assurance basis with manufacture utilising robust, controlled, space-proven processes and designs, including traceability to all materials and operations. NS2 adds baseline mechanical and electrical screening to provide the next level of assurance.

Most importantly, TO solutions offer an option to fully utilise packages in an optimised configuration, including the ability to mix technologies or manufacturers' die within the package.

Conclusion

In conclusion, traditional packages do have a significant part to play in the space market, mitigating the risk of poor soldering of surface mount packages onto PCBs where visual inspection is not easily undertaken. The leaded component can normally be examined right around its circumference.

Below: A CTE compliant mounted package or carrier, featuring dual lead connections, can help solve the problem of cracking





Celebrating

A DECADE OF EXCELLENCE

Join the UK's leading design engineers and tomorrow's rising stars as we unveil the winners of the 2019 British Engineering Excellence Awards



Where

The Landmark London

When

11th October 2019, 11.30am

What

Drinks reception followed by a 3-course lunch

Host

Dr Lucy Rogers, science author, inventor, and a judge on the BBC2 show Robot Wars.



Book your seat now and join us as we celebrate British innovation and engineering at its very best

BOOK YOUR PLACE NOW

WWW.BEEAS.CO.UK

HEADLINE SPONSOR

DISTRUPOL™
A Univar company

GALLERY SPONSOR



CATEGORY SPONSORS

Goodfellow

LGMOTION
UK MOTION
TECHNOLOGY
SPECIALISTS

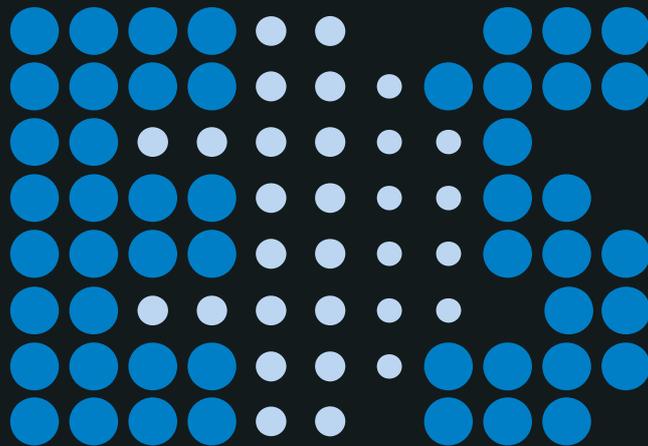
MiniTec
THE ART OF SIMPLICITY

ORGANISED BY



newelectronics
Eureka!

PREVIEW



ELECTRONICS DESIGN SHOW

16 - 17 OCTOBER 2019
RICOH ARENA COVENTRY

CONTENTS

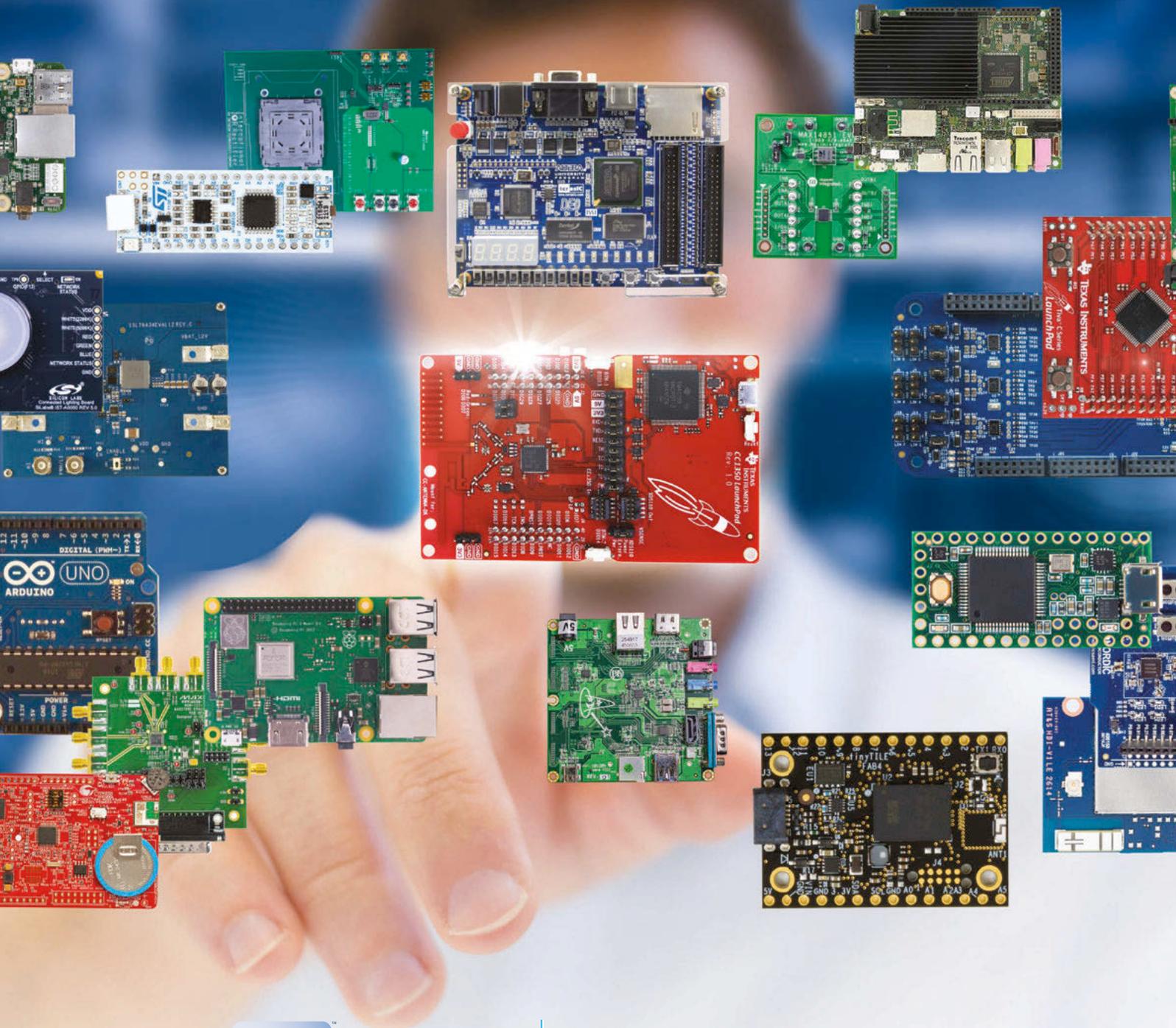
35 INTRODUCTION **36** CONFERENCE AND WORKSHOPS **39** EXHIBITOR INFORMATION **66** LIST OF EXHIBITORS

WWW.ELECTRONICSDESIGNSHOW.CO.UK

Development tools

THOUSANDS OF TOOLS FROM HUNDREDS OF TRUSTED MANUFACTURERS

in one location



MOUSER
ELECTRONICS

Choose from our extensive selection
at [mouser.co.uk/dev-tools](https://www.mouser.co.uk/dev-tools)

The future is here and now

Get up and personal with the latest technology, at this year's Electronics Design Show



Neil Tyler, Editor, New Electronics

The pace of change and the complexity that confronts today's design engineer are also having a profound impact on customers, suppliers and colleagues and those pressures continue to evolve, throwing up fresh challenges.

The Engineering, Electronics and Embedded Design Show is the UK's only dedicated event that looks to address the problems confronting the engineering and electronics community, and does so by providing an environment in which it is possible to access, not only the latest products, services and innovations, but via workshops and a dedicated conference hear from some of the UK's leading speakers and companies.

In its eighth year EDS continues to evolve and provide visitors with an immersive experience. Our aim is to provide engineers, whatever their level of experience, with innovation, inspiration, interaction and insight.

The Jaguar Exhibition Hall at the Ricoh Arena in Coventry will once again host EDS. Running across the 16-17th October, over 4000 visitors are expected to attend.

Those visitors will be able to meet with 200 suppliers, offering new technologies and design engineering solutions but not only that, the 2019 show will once again provide visitors with access to a range of experts exploring best practice, new design techniques and industry issues.

Visitors will also be able to join RiVR and MakerBot in the Future Zone to try out the very latest in VR technology improving training outcomes or the new desktop 3D printing systems that are making the

technology more widely accessible.

It is also a chance to be inspired by the Innovation Zone and a feature area focused on introducing visitors to ground-breaking technology. A visit to the Robotics Innovation Hub will give you the opportunity to get up close and personal with the latest robotics technology from Comau, Applied Automation and Sundance Multiprocessor Technology.

Gain insight and boost your professional learning and earn CPD points at the IED-approved conference and a host of workshops running across the two days of the show.

Among this year's highlights at the New Electronics' conference is the opening session from ABBs' David Nicholl, looking at the future for zero emission transport; while on day two, Microsoft's Paul Kieley-White and Colm Torris will talk about how to secure the billions of IoT devices that are now on the market.

Other speakers include: Julian Skidmore, Senior Firmware Engineer, with ByteSnap Design looking at EV charging; Andrew Waller from Analog Devices explaining how to navigate the world of industrial networking and Richard Gill, CEO of Drone Defence Services, who will be talking about the burgeoning drone industry.

For a full list of exhibitors, conference sessions and workshops sessions go online.

Whether visiting for the first time or returning again, use EDS to network with industry peers, develop new business contacts and discover the latest products, tools and techniques.

We look forward to meeting you at this year's Electronics Design Show.

Fast Facts

- **When:** 16-17 October 2019
- **Where:** Ricoh Arena, Coventry (2 minutes off jct 3 of the M6)
- **Parking:** Free
- Spread over 6000m³
- More than 200 exhibitors showcasing the latest technology
- Join more than 4000 engineers from around the UK
- **33** practical workshop sessions
- **25** thought leadership conference sessions from leading industry figure as well as expert panel sessions
- **Pre-registration: Now!**
- Social Media: [@EngDesignShow](https://twitter.com/EngDesignShow)

Conference Programme



WEDNESDAY 16 OCTOBER

09:15 - Writing the future for zero emission transport ABB, David Nicholl, VP, Northern Europe Electrification

The international ABB FIA Formula E Championship series serves as a family test track for a sustainable transport future. It's vitally important that we work together to deliver that future and address the concerning contribution fossil fuel vehicles are making to air and noise pollution.

No one solution can achieve the ambitious objective of zero emission travel alone. It will take a well-established and integrated ecosystem made up of multiple components, which as a leader in digital industries ABB is well positioned to help deliver.

10:15 - Mechatronics Evolution in the Age of Digital Transformation

Dassault Systèmes, Louis Feinstein, Global Director High Tech Sales

Today products go beyond the traditional product usage and are now interconnected and interwoven into our daily lives and activities creating an immersive customer experience. Creating smart, connected customer experiences is complex, costly and associated with high business risk. This session will focus on technologies for smart and connected products through collaborative mechatronics engineering. One of the key success enablers is the orchestration of software, electronics and mechanical engineering.

11:15 - The EV Charge Point Journey: What's the Final Destination?

ByteSnap Design, Dunstan Power, CEO

In this session we take a look at where we've come from, where we are now and where we're heading in the EV charge point journey? What are the barriers to adoption: the electric vehicle charging process is seen as a pain and not particularly convenient, which puts people off buying EVs. Electric vehicles are evolving, but is infrastructure keeping up? Reflections on the EV journey - from milk floats to desirable, high performance cars.

12:15 - Build products your way by combining SCRUM, Kanban & Gantt Scheduling

Perforce, Johan Karlsson, Senior Technical Consultant, Perforce

When it comes to project managing methods in engineering design, Agile has been a consistent buzzword. But as

Practices, frameworks and certifications continue to evolve, many organisations are adopting various hybrid methods. So how can you best merge classic methodologies with the latest and greatest?

Creating your own "secret sauce" for project management means looking at how your team works. This gives you the chance to cherry pick from various methods to manage your team how you want. Learn how to construct (and constantly improve) your approach to maximise productivity.

13:15 - Evolving building performance regulations

EnOcean, John Corbett, Sales Director Northern EU and Middle East

European buildings are to be CO2-neutral by 2050, and this is already leading to several stricter requirements in the coming years. The focus is now on improving building automation which implies new and existing buildings will require a high standard of energy control. These requirements in the new EPBD strongly reinforce the need for monitoring, which is in turn possible only through an extensive use of sensors and connection to higher-level controllers and monitoring systems. Energy harvesting is the key to implementing these new smart buildings.

14:15 - Designing Removable Memory into an Embedded System

Nexus, Richard Warrilow, Technical Author

Many applications require removable flash memory devices. Purposes include in-field data logging and providing products with software updates in scenarios where wired networking is impossible and wireless networking is either also impossible or simply undesirable.

When embedding a removable memory device into a product there are a variety of challenges. These include countering the potential obsolescence of a selected form factor, addressing security concerns and designing for the physical environment. Bespoke form factor devices provide practical solutions to all these challenges.

15:15 - The choice between LoRaWAN and NB-IoT

Bostin Technology, Duncan Bennett, CEO

With IoT growing quickly there is a need to communicate with remote devices over long distances using small amounts of data. LoRaWAN and NB-IoT are 2 technologies vying for our attention as a low-power WAN solution for remote IoT devices. This presentation is a result of research into which technology is most suitable for an application. The

2 technologies are compared and contrasted using range, power consumption, data rate, accessibility and cost.

THURSDAY 17 OCTOBER

09:15 - Securing the billions of IoT devices

Microsoft, Paul Kieley-White, IoT Solutions Architect Edge Devices and Colm Torris, Director, IoT Ecosystem, Microsoft EMEA

As billions of new devices are connected, organisations need to secure them to help protect data, privacy, physical safety, and infrastructure. Internet connectivity is a two-way street and as those devices become a gateway to our homes, workplaces, and sensitive data, they also become targets for attacks.

10:15 - Navigating the new world of industrial networking Analog Devices, Andrew Waller, Field Application Engineer

The Industrial Internet of Things (IIoT) is transforming the industry. In a relatively short time serial protocols have developed into Ethernet-based versions. Soon these protocols will evolve into versions that incorporate Time Sensitive Networking (TSN) features. TSN brings with it the ability to scale Ethernet bandwidth allowing networks to seamlessly connect edge devices to the cloud. This presentation will explore the Industrial Ethernet protocols themselves, their benefits, and how these protocols will change with the emergence of TSN.

11:15 - Addressing the challenge to positive drone industry development

Drone Defence Services, Richard Gill, CEO

CEO Richard Gill will provide a brief introduction to the technological environment that has enabled the rapid adoption of drones, and the challenges that this growth has presented to security and privacy. He will then expand on the human issues presented by the technology and finally how technology itself as the better way to provide an environment in which drone technology can flourish.

12:15 - The benefits of flexible printed circuits as a replacement for wire harnesses

Trackwise, Philip Johnston, CEO

CEO Philip Johnston will give an overview of flexible printed circuit (FPC) technologies and applications and introduce Trackwise's patented Improved Harness Technology (IHT). He will outline the benefits of FPCs over wire harnesses and

Conference Programme

(Accurate at the time of going to press)

emphasise the new application opportunities presented by multilayer FPCs of unlimited length.

13:15 - How SBC and IoT are shaping the business landscape

Okdo, Richard Curtin, SVP Technology & Founder

More and more businesses are using single board computers (SBCs) and the Internet of Things (IoT). From improved decision making to increased customer satisfaction this session will look at how Okdo can support businesses to reach key objectives through these technologies.

14:30 - When Lightning Strikes

AEF Solutions, Peter Scott, Engineering Director

15:30 - The ideal filter in just 6 steps

SCHURTER, Herbert Blum, Product Manager

WORKSHOP THEATRE 3

10:30 - Optimizing Engineering Designs with Multiphysics Simulation

Comsol, Dr Richard Chippendale, Technical Manager

14:30 - Beta Layout

Content tba

15:30 - Capacitance - Tip of an Iceberg

Wurth Elektronik, Gopi Patel, Field Applications Engineer



12:30 - How to maximise PCB space with connector selection

John Brunt, Product Manager High Reliability Connectors, Harwin

13:30 - Simms International,
Content tba

WORKSHOP THEATRE 3

10:30 - Samtec Products for Severe Environments

Toby Electronics/Samtec, Terry Emerson, Micro Rugged Product Manager

11:30 - Build vs Buy

Ron Singh, Director Channel Sales EMEA, Digi International

12:30 - Industrial removable memory devices, their benefits over USB and SD

Richard Warrilow, technical author, Nexus

13:30 - Press-Fit Technology for High Current Applications

Wurth Elektronik, Javier Carnero, Field Applications Engineer

Workshop Programme

16TH OCTOBER

WORKSHOP THEATRE 2

10:30 - Defining High Speed Signal Paths in modern PCB

Altium, Sten Iversen, Field Applications Engineer

11:30 - Implementing Disruptive Mid-Infrared Technologies in Gas Sensing Applications

Hamamatsu, Adnan Quazi, Sales Engineer

12:30 - Create Effective Cooling Solutions Using SOLIDWORKS®

Flow Simulation and the 3DEXPERIENCE® Platform

Dassault Systemes, Mattias Robertsson, Solution Consultant and Ian Pilkington, 3DEXperience Business Development Executive

13:30 - Smart Solutions for Complex Machines. A Molex presentation sponsored by Mouser

Mouser, Jeff Barnes, Distribution Corporate Account Manager - Industrial Europe

11:30 - Samtec Products for Severe Environments

Toby Electronics, Terry Emerson, Micro Rugged & Power Product Manager

12:30 - On-Device AI with Qualcomm Snapdragon

BCD Atlantik, Dominik Bohn, Embedded Product Manager

13:30 - Microsemi Polarfire FPGA System Solutions

Solid State Supplies, Chris Bowers, Field Application Engineer

17TH OCTOBER

WORKSHOP THEATRE 2

10:30 - µModules, an Analog presentation, sponsored by Mouser Electronics

Mouser, Diarmuid Carey, Senior Applications Engineer, Analog Devices

11:30 - Defining High Speed Signal Paths in modern PCB

Altium, Sten Iversen, Field Application Engineer

EURO QUARTZ

Specialists in Frequency Stability

See us at Embedded Design Show, Stand F2, Ricoh Arena, Coventry 16th & 17th October.



- APPLICATIONS**
- Industrial Camera Systems
 - Remote Metering
 - Fire Security
 - Data Transmission Systems
 - Complex Audio Systems
 - Automotive • Radio Pagers
 - Aero Engine Monitoring
 - Military Vehicles
 - Naval Systems
 - Space Applications
 - Oil & Gas

UK Manufacturing since 1982

t: 44(0)1460 230000
w: www.euroquartz.co.uk



NOW!

PCB-POOL®

Ordering NOW even easier
via **Drag & Drop**
Altium*

with > 40,000 customers Europe's largest prototype manufacturer



E TARGET 3001! + **KiCad** **gbr x2**
* supported file formats

Give it a try: www.beta-layout.com

PCB-POOL® is a registered trademark of

Beta

LAYOUT
create:electronics



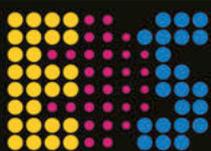
Visit us at
Stand J52



RHOPOINT COMPONENTS

proudly represents

Come and see us



ENGINEERING
DESIGN SHOW

STAND K6

16 & 17 OCTOBER 19

Ricoh Arena
COVENTRY

Alpha Electronics
A VPG Brand

AMETHERM
Circuit Protection Thermistors

CADDOCK

CISSOID

OTO
TECHNOLOGY

cynergy3

DGH

EMERSON

GENERAL RESISTANCE

InterFET Corporation

ISABELLENHÜTTE
Innovation by Tradition

JACKCON

LORD SENSING
Stellar Technology

MERIT SENSOR

NVE
NVE CORPORATION

ohmcraft
A DIVISION OF MICROPIEN TECHNOLOGIES

POWERTRON
A VPG Brand

RAAA

RdF

RIEDON

SRT
Micro Cleanroom

Resistor Technology

SSM SUSUMU
Thin Film Specialist and Innovator

VISHAY FOIL RESISTORS
A VPG Brand

Weidmüller

contact us for more information

01342 330470

rhopointcomponents.com

What to see at this year's show

There will be more than 200 exhibitors at the Electronics and Embedded Design Shows; here's a flavour of what visitors will be able to see.

Headline sponsors



Dassault Systèmes, the 3DEXPERIENCE Company, provides business and people with virtual universes to imagine sustainable innovations. Its world-leading solutions transform the way products are designed, produced, and supported. Dassault Systèmes' collaborative solutions foster social innovation, expanding possibilities for the virtual world to improve the real world. The group brings value to over 250,000 customers of all sizes, in all industries, in more than 140 countries. For more information, visit www.3ds.com

3DEXPERIENCE, the Compass logo and the 3DS logo, CATIA, SOLIDWORKS, ENOVIA, DELMIA, SIMULIA, GEOVIA, EXALEAD, 3D VIA, BIOVIA, NETVIBES and 3DEXCITE are registered trademarks of Dassault Systèmes or its subsidiaries in the US and/or other countries.

To learn more about how SOLIDWORKS and SIMULIA can inspire innovation and improve your business, come visit the Dassault Systèmes stand on C21.

Stand number: C21
Telephone: 01223 228500

www.3ds.com



Digi-Key Electronics is an authorized global distributor of electronic components, offering more than 7.9 million products, with over 1.5 million in stock and available for immediate shipment, from 800+ quality name-brand manufacturers. Digi-Key also offers a wide variety of online resources as well as customer and technical support available 24/7/365.

Stand number: N/A
Telephone: 0800 587 0991

uk.support@digikey.com



IC BLUE
the answer comes out of the Blue

IC Blue brings together three key elements of component procurement, engineering design automation tools and asset management to give customers a competitive advantage in today's demanding world of product design, development, manufacture and sustainability.

Partnered with Siemens, IC Blue is the source for Mechanical design, PCB design, analysis and electrical and harness design solutions providing sales, support and training for these class leading applications.

Stand E2 for a refreshing conversation

Stand number: E2
Telephone: 0845 644 0914
sales@icblue.com

www.icblue.com

SOLID STATE SUPPLIES

Solid State Supplies is a technical, franchised distributor serving the UK electronics community.

We sell semiconductors, related components and modules for embedded processing, control and communications (wireless/wired), power management, and LED lighting. Focusing on products from a limited number of suppliers, we understand their products in depth and offer customers outstanding levels of commercial and technical support.

Our Quality Management System accords with ISO 9001: 2015, AS9120, and AS9100.

Stand number: K2
Telephone: +44 (0)1527 830800
marketing@sssltd.com

www.sssltd.com



WURTH ELECTRONIK As one of the leading brands in the Electronic and Electromechanical Components market, Wurth Electronics are constantly expanding. We have now incorporated IQD Frequency products into our portfolio and have many of their parts in our catalogue. With 16 production facilities spread all over the globe, we guarantee complete design-in support, samples free of charge and the delivery of our components anywhere in the world.

Stand number: L4
Telephone: 0161 872 0431
sales-uk@we-online.com

www.we-online.com

Electronics Design Show

Altium: Stand G2

Altium is a leading provider of PCB design software, PCB component and data management software and the host of AltiumLive – the industry's fastest-growing conference for PCB designers and engineers. Altium's PCB Design Software has helped a wide range of companies succeed in designing next-generation electronic products and systems. Those wishing to see current and emerging PCB design trends should join Altium on our stand.

ByteSnap Design: Stand L22

ByteSnap is a multi-award-winning electronics design consultancy with hardware/software development expertise across the embedded systems stack.

At this year's EDS see RAY: ByteSnap's

binder UK (Stand M12)



new Smart Charge Point Communications Controller and technical displays, including a 1.8m traffic sign running on SnapUI, ByteSnap's powerful, flexible OpenGL framework.

ByteSnap is an ISO 9001:2015 certified, NXP Gold Partner.

Visit us to talk about how our cross-vertical,

design solutions can give your project the competitive edge.

binder UK: Stand M12

Designers looking for industrial circular connectors for a broad range of applications from automation to medical, should visit binder, while at EDS.

binder will be showcasing the latest additions to its comprehensive range of circular connectors including: a unique connector for medical applications, new M12 connectors designed for railway applications, a hybrid M12 connector that combines power and signal contacts and a shielded M5 connector system for high performance sensor applications.

Alongside these new additions, binder will also show many examples from its circular connector portfolio including versions for outdoor applications including agriculture and models specifically designed for the food and beverage sector.

Make your next move a SMARC® one!

ARM Cortex™-A35 module with i.MX8X

Graphic with 4K Support

DSP for audio processing

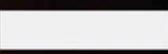
High-speed communication

Low power consumption (typ. 4 W)

Integrated security functions

2x CAN FD



hitex 
EMBEDDED TOOLS & SOLUTIONS



024 7669 2066

www.hitex.co.uk

sales@hitex.co.uk

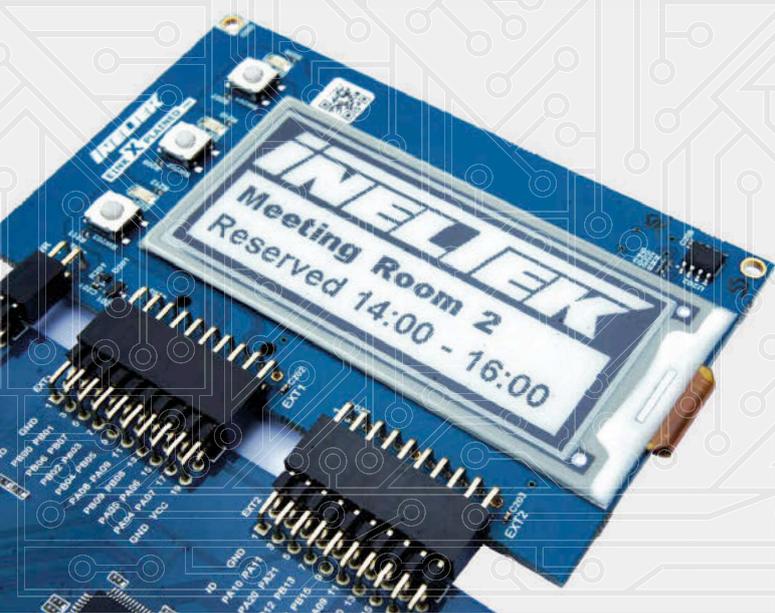


E Ink's Advanced Colour ePaper (ACeP™)



Win an E Ink Development Board

Visit us at **Stand H4** at the **Engineering Design Show** in **October** for a chance to win an **E Ink Xplained Pro**



Ineltek has developed a low-cost, simple-to-use family of E Ink display add-on boards for the Microchip Xplained Pro platform - currently available with 1.5", 2.9" and 5.7" displays. Our Ineltek E Ink Xplained Pro boards make it easy to develop using E Ink's unique technology in a Microchip ARM® or AVR® based environment. Ineltek's support for your e-paper display development includes software libraries, example projects, 2D and 3D CAD for the displays and the PCB data to quickly prototype your own designs.



Join us at the Ricoh Arena,
Coventry
16-17 October 2019
Stand H4

MORNSUN®

COST-EFFECTIVE 3-65W LO SERIES AC/DC OPEN FRAME POWER SUPPLIES

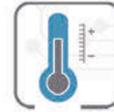
Widely used in applications of instrumentation, street lamp control, industrial control, communication, etc.



Universal input:
85-264VAC
(LO05: 165-264VAC)



Isolation voltage up to
3000VAC



Operating temperature
range: -25°C to +70°C



CE certification
Meets EN60335,
UL62368 standards

* For the detailed information, please refer to datasheet.

MORNSUN®

E-mail: info@mornsun.cn
Website: www.mornsun-power.com
Facebook/Linkedin: Mornsun Power



Easby
Electronics

Phone: +44 (0) 1748 850 555
E-mail: sales@easby.co.uk
Website: www.easby.co.uk

Engineering Design Show: Come and see us at stand G11
16-17 October 2019 Ricoh Arena, Coventry

**COMPONENTS
BUREAU**
A FORTEC GROUP MEMBER



WE'VE GOT THE POWER

A range of power supplies available for the following applications:

RAIL

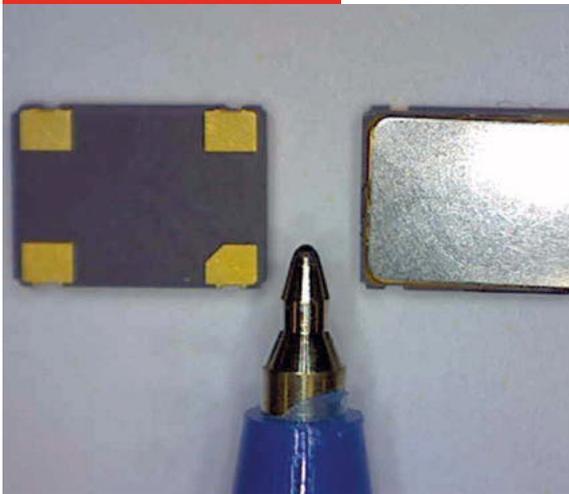
MEDICAL

INDUSTRIAL

Call + 44 (0) 1480 412233 | Email info@componentsbureau.com

www.componentsbureau.com

Euroquartz: (Stand F2)



performance and reliability.

As a UK-based specialist franchised distributor, Charcroft will showcase their portfolio of harsh and high-end components, in addition to in-house manufacturing capabilities covering specialist passive components, testing and value-add solutions.

Exxelia will be introducing new Hi-Rel Power Magnetic components and their latest range of high-capacity aluminium electrolytic capacitors – the SNAPSIC HC and FELSIC HC, that are suitable for medium-voltage, high energy-density applications in the Energy, Industrial and Transportation sectors.

with a miniature quartz crystal housed in a low-profile ceramic surface mount package measuring 7.0 x 5.0 x 2.5mm. Utilising the latest advances in production technology, the combination of optimised design and high-quality materials will provide a high reliability clock oscillator suitable for the defence and aerospace markets. The principal advantages of these UK-manufactured components are that they will be free from ITAR regulations with reduced shipping costs.

Euroquartz will also be exhibiting its latest ranges of products including miniature surface mount temperature-compensated crystal oscillators (TCXOs) offering very low current consumption, surface mount oven-controlled crystal oscillators (OCXOs) for high accuracy frequency control, and a range of ultra-miniature, ultra-low current crystal oscillators from Statek for high-reliability applications.

Cambion Electronics: Stand M24

Cambion Electronics have a long history as manufacturers of high performance electro-mechanical and inductive components serving the Military, Aerospace, Petrochemical, Instrumentation, Transport and Industrial markets.

Continual investment, especially in the latest machinery, has resulted in substantial manufacturing and assembly capabilities to cover a broad and comprehensive range of disciplines and technologies.

Manufacturing processes include: turning, moulding, assembly and the design and bespoke manufacture of transformers, inductors, chokes and coils.

Catalogue Products include: Miniature Single Pole Sockets, PCB Pins & Interconnects, Connector Pins, RF Connectors, Solder Terminals, Spacers, Inductors and Coils.

Custom product manufacture is a speciality.

Charcroft: Stand H48

Charcroft Electronics will be exhibiting alongside Exxelia Group, a manufacturer of electronic and electromechanical components and systems – providing both off-the shelf and bespoke, engineered solutions - using the latest technology to provide extreme levels of

Euroquartz: Stand F2

Frequency control specialist Euroquartz is to launch a new range of UK manufactured surface mount military clock oscillators at EDS.

The new components will be manufactured in the company's recently installed class 7 cleanroom facility and preliminary specifications have been announced encompassing frequencies available from 2.0 to 60MHz.

The EQX075000BM series oscillators will comprise a TTL/CMOS-compatible circuit

Express Assemblies Ltd: Stand J12

One of the UK's leading manufacturers of wire and cable assemblies, Express Assemblies are passionate about offering our clients customised wire and cable solutions.

We are here to be your one stop solution for any wire and cable design issue you may have. We pride ourselves on no job being too big or too small and aim to provide not only a professional assembly service but an unbeatable customer service experience.

We are here to stand out from the crowd and want to build our brand as much as possible by reaching out to as many new potential leads as we can.

Express Assemblies is an ISO9001:2015 company operating at the highest quality standards and not only that but are seeing record sales and an increasing product portfolio to suit.

From initial enquiry and quotation to procurement and manufacturing, Express Assemblies is there for you every step of the way. We offer not only a concept, but a solution for any wire or cable assembly issue you may have.

Come and see what Express has to offer.



Foremost Electronics (Stand J46)



Foremost Electronics: Stand J46

Foremost Electronics, the engineering-led Essex based importer and specialist distributor of electromechanical components, will be using their presence

at EDS to celebrate 30 years of electronic component sales in the UK.

A competition will run both days with a prize of a bottle of celebratory champagne for the lucky winner.

Foremost Electronics was founded in 1989 as a direct importer and specialist distributor of switches, keypads, joysticks, connectors and other electro-mechanical products. They now represent a global supplier base of more than 20 manufacturers from around the world, having strong partnerships with market leaders including Schroff, NKK Switches, Binder, Thermodisc and Elma.

Their portfolio specialises on the E-Mech sector and includes products suitable for extreme conditions including Military and Aerospace and also commercial grade components for less arduous applications.



Ro|bust

■ HEC 696 series ■ Bayonet locking system ■ IP68/IP69K ■ For outdoor applications



www.binder-connector.co.uk

ARROW
Five Years Out

 **ANALOG
DEVICES**
AHEAD OF WHAT'S POSSIBLE™

Arrow
Electronics
guides innovation
forward for over
200,000 of the world's
leading manufacturers of
technology used in homes,
business and daily life.

See us at the
**The Engineering
Design Show**
Stand H6

16th & 17th October 2019



ENGINEERING
DESIGN SHOWS

www.arrow.com
analogdevices.gc.uk@arrow.com

ten reasons to team up with tioga

- State Of The Art Electronic Assembly
- 6 Fully Automated SMD Production Lines
- BGA, μ BGA and Complex Technologies
- EKRA X5 Automatic Screen and Stencil Printers
- Large Board Capability 560 x 600mm
- In house 3D X-Ray Facility
- ISO 9001 / ISO 13485
- Full Turn Key Solution / Boxbuild
- Wide Ranging Expertise
- Design Partnership



**ELECTRONICS
DESIGN SHOW**
SEE US ON STAND
G100



www.tioga.co.uk

telephone +44 (0) 1332 360884

sales@tioga.co.uk

tioga
electronic assembly

PART OF SIMPATICA GROUP

Engineering Design Show: Come and see us at stand G11

16-17 October 2019 Ricoh Arena, Coventry

 **DISPLAY
TECHNOLOGY**
A FORTEC GROUP MEMBER

PRODUCTS DEVELOPED FOR ATEX CERTIFICATION

We provide our customers
with a product or system
ready for ATEX certification

www.displaytechnology.co.uk



Hammond (Stand M16)**Hammond: Stand M16**

Hammond Electronics will showcase its customisation capabilities, with examples of application-specific plastic and die-cast enclosures that demonstrate its in-house facilities. CNC milling, drilling, punching, engraving and printing are available, as are EMC coatings, front panel overlays, custom colours for moulded enclosures and a variety of different paint finishes for metal enclosures. PDF drawings or CAD files for all products are available on www.hammondmfg.com, allowing customers to specify the customisations required.

Also on show will be a selection from Hammond's 5000 different standard plastic, metal, extruded and die-cast aluminium enclosures. The focus of this year's stand is enclosures optimised for use in industrial environments. The new 1551V miniature ventilated sensor enclosures are designed to house temperature, humidity and pressure sensors and distributed intelligent sub-systems.

In many applications, physical protection of the electronics can require EMC protection and protection against dust and water. On show will be several families of environmentally protected industrial enclosures, notably the IP68 sealed 1554 and 1555 polycarbonate and ABS range and the 1550 and 1590 die-cast enclosures, which give excellent RFI attenuation and sealing up to IP67.

Hitaltech: Stand L48

For more than 30 years, Hitaltech, the connecting technologies and enclosures specialist, has been a trusted source for flexible interconnect products, terminal blocks and enclosures.

Hitaltech is expanding its Conex-it range to include a whole new range of rigid interconnect products, delivering more choice whilst maintaining the quality, availability and speed of delivery manufacturers traditionally associate with Hitaltech.

"Our clients need access to both rigid



and flexible connectors," explained Matt Hughes, Hitaltech sales manager, "If PCBs are stacked on top of one another or at right angles, a rigid system may often be the natural choice.

"However, for PCBs that are manufactured in panels and whose end applications can be a little more obscure, flexibility is often essential. By launching the rigid system, we're enabling manufacturers to enjoy the best of both worlds with Hitaltech."

One of the major advantages of the new product range is its breadth. "We've sourced the largest possible range," said Hughes. "There are tens of thousands of permutations available off the shelf so customers can be sure there's always a rigid system to meet their requirements."

Even within the off the shelf range, customers can still customise the important elements, with customised pin lengths, special platings and insulators available for any application.

Visit Hitaltech at Stand L48.

LEMO: Stand H52

LEMO will be exhibiting its extensive range of high-quality interconnect products and technologies at EDS.

Designing precision connectors for over 70 years LEMO offers high quality, reliable connectors and cables in a vast number of product combinations which are found in a variety of challenging application environments including Autosport, Broadcast,

Defence, Medical, Oil & Gas as well as Test & Measurement.

LEMO will be showcasing a range of its high-quality push-pull multi-pin connectors accompanied by a variety of cable assembly solutions at this year's show

Noritake Itron: Stand L2

Visit the Noritake Itron stand where it will be displaying newly developed integrated HMI+PAC solutions for control applications requiring a compact panel mounted display system capable of directly controlling 12V/24V motors, solenoids, valves and relays in response to connected sensor and switch inputs.

The iDevOS operating system handles user and machine interface protocols plus process and PID control allowing stand-alone operation with connectivity to peripherals, networks and the web for data logging, program selection and up-date.

The 12 zone high voltage isolation employed protects all interfaces and the CPU core from potential surges and system imbalances.

The handheld/wall mount controller provides remote operation for our PAC products or other user systems with various interface options.

Noritake Itron (Stand L2)

PULS Power: Stand J5

PULS Power focuses entirely on the development and production of DIN-Rail power supplies. The PULS DIN-Rail power supply range includes: Single-Phase Power Supplies, Three-Phase Power Supplies, DC/DC Converters, Buffer Units, DC-UPS Battery Modules and Redundancy Modules. PULS can also provide COTS, part and fully customised units and conformal coated ruggedized versions for operating in harsh conditions.

PULS will be running live demonstrations of their key design features and PoE functionality at EDS 2019. A live comparison between PULS DIN-Rail power supplies and competitors' products will graphically show how the ultra-high efficiency design of the PULS units produce less heat in the enclosure ensuring improved reliability and greatly reduced cost of ownership.

The PULS SmartFab Box will also be

**PULS Power (Stand J5)**

running live at the show. This diagnostics tool makes the power requirements and thermal conditions in systems and installations transparent and allows users to check and specify their power budgets directly on their own systems, live and completely securely.

The third demonstration will be to see PULS DIN-Rail PoE converters in

action. The CP10-PoE1 PoE injector offers system builder's maximum integration and simplicity of installation.

A wide range of standard DIN-Rail power supplies will also be on the stand including the 90W PIM90 power supply which offers outstanding price/performance for smaller systems.

AEF
solutions



Flying the flag for innovation, design and manufacturing

AEF Solutions provides expert design and manufacturing of filtered connector solutions for electromagnetic compatibility and transient voltage suppression including lightning protection, amongst its wide capability offering. This includes a mission critical purpose designed, upgraded 'black box' connector for the iconic C-130 aircraft offering vital lightning protection to Level 4, waveform 4 of DO160-F.

- Filter & EMP Connectors, Modules and Plates
- Protective Caps
- Solder Tail Connectors
- Backshells
- Cable Assembly
- Flexible Circuit Build
- Panel & Box Build
- Fibre Optics & Media Conversion

01227 711455
www.aefolutions.com



Part of the AEI Group of companies

EDS Stand L54

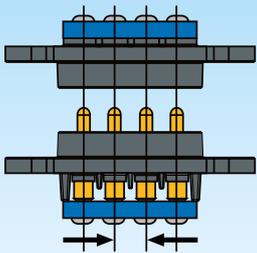


Spring Loaded Interface Arrays

For power and data transfer in handheld devices and docking stations

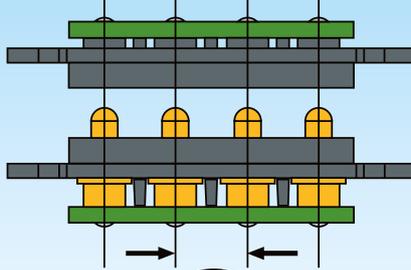


up to 2 amps



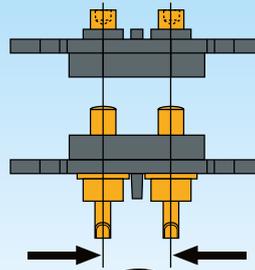
3mm

up to 6 amps



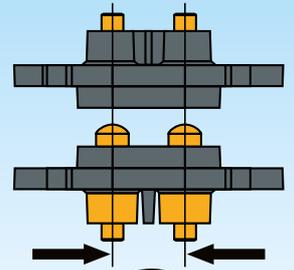
7mm

up to 10 amps

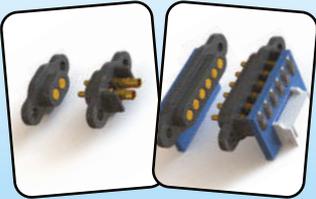
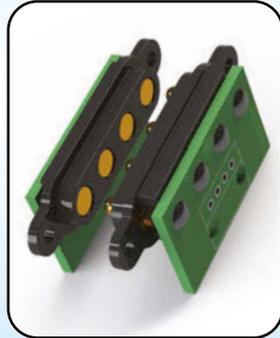
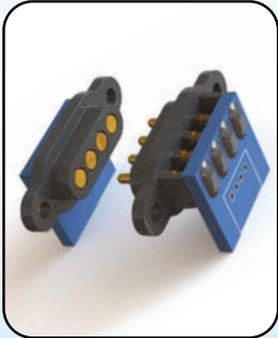


7mm

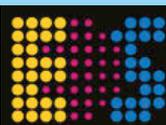
up to 20 amps



10mm



'Avoid the costly development of a bespoke interface by integrating Swift-Dock® into your design. Designed and manufactured in the UK.'



ENGINEERING
DESIGN SHOW

16th & 17th October | Ricoh Arena, Coventry

Come and see
the entire range
on stand K50



+44 (0)1787 478678 | sales@coda-systems.co.uk

www.coda-systems.co.uk

Superfly Ultraminiature Connectors for Hi-Rel

Superfly Ultraminiature Series 88 Connectors and Cordsets

Glenair Series 88 SuperFly®



Connectors and other components for high-rel applications including defence, aerospace and industrial

Visit Powell Electronics at Engineering Design Show (EDS)

Glenair • Cinch • Quell EESeal • Conesys • Ametek • Carlisle RF
and more... Stand H9 | Ricoh Arena | Coventry | Oct 16-17



powell.com



Leaders in Innovation, Design & Manufacture of Electronic Products

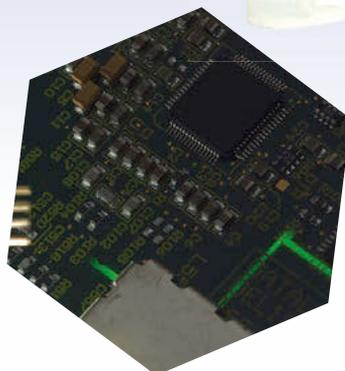
- Feasibility & Engineering Studies
- Full Product Design & Development
- Analysis Verification & Validation
- Standards, Regulations
- Technical Files & Certification
- Complete Manufacture & Assembly

Design: Dr Arash Ghadar

T: +44 (0)1509 231023

E: aghadar@datalink-electronics.co.uk

W: www.datalink-electronics.co.uk



RJS Electronics (Stand K40)



RJS Electronics: Stand K40

RJS Electronics has over 16 years of experience in globally supplying high-quality electro- mechanical components to a variety of industries. RJS Electronics provides customer service, high quality products at competitive prices and have a fast-turn around for delivering their goods. When enquiring about products, don't forget to ask them about the customisable options. Many of the products can be bespoke, including custom legends, pre-wired, different LED colour options, body finishes to match and support your product design

On show this year are: short body/ low profile metal switches, K16 range and PB615 range and the SLB, a multi select encoder - fully programmable with multiple options to support a variety of different function. The SLB consists of a full colour LCD display, rotary encoder and push button switch. Additionally, the SLB is IP65 rated and a short body travel. The short body push button metal switches are available in sizes 12mm - 25mm, with or without LED option. This push button switch is waterproof IP67/IP68 rated.

Additionally, the 19mm short body push button switch is available as PCB or screw type. The K16 range are a range of durable plastic switches which can be customised to feature symbol/ LED light that support either latching, momentary or locking mechanism. The PB615 Range available as through hole/SMT mount can be customised to suit your product with custom symbols or with a single/bi-colour/ RGB LED illumination..

Schurter: Stand L20

SCHURTER Electronics Ltd form the UK branch of SCHURTER Electronic Components, a leading innovator and producer of electronic components. Swiss owned since 2014, our group design and manufactures customisable HMI solutions and components such as fuses, EMC products and connectors to name a few. We guarantee excellence in customer service and technical support along with an ideal price-performance ratio. At this year's EDS, we will be displaying our new interactive product stand giving you the opportunity to get 'hands on' with our products and discuss how we can find your business's electronics solutions.

SCHURTER will be running an EMC workshop on Wednesday 16th from 3.30pm. Join Product Manager Herbert Blum and the rest of the team as we discuss 'the ideal filter in just 6 steps.'

The team will be on hand for any questions you may have after the workshop or visit our stand, for all your electronic components needs.

Selwyn Electronics: Stand H72

Selwyn Electronics will be highlighting the broad range of cable assemblies that they can offer. Since the company was formed in 1984, they have gained extensive knowledge of both cable assemblies and connectors over the last 34 years.

The cable assembly manufacturing service that is offered by Selwyn Electronics continues to grow and the company's extensive range covers Miniature through to Industrial circular (in both metal and plastic versions), Ribbon cable, Custom moulded, Waterproof, Coax,

Selwyn (Stand H72)



SATA (in custom lengths), FFC, Crimp and IDC, and Telecom assemblies. In fact there are very few assemblies that they cannot supply.

They can also offer a full cable assembly service for the ODU range of connectors from their ODU approved UK facility.

Both company facilities are ISO accredited and all assemblies are 100% electronically tested. All orders are controlled from the Selwyn sales office and they can offer a full engineering support service including recommendation of products, drawings, quotations and samples in a short lead time. They can work with free issue or Selwyn purchased piece parts, whichever is easiest for you.

Schurter (Stand L20)



Swindon (Stand H2)**Swindon: Stand H2**

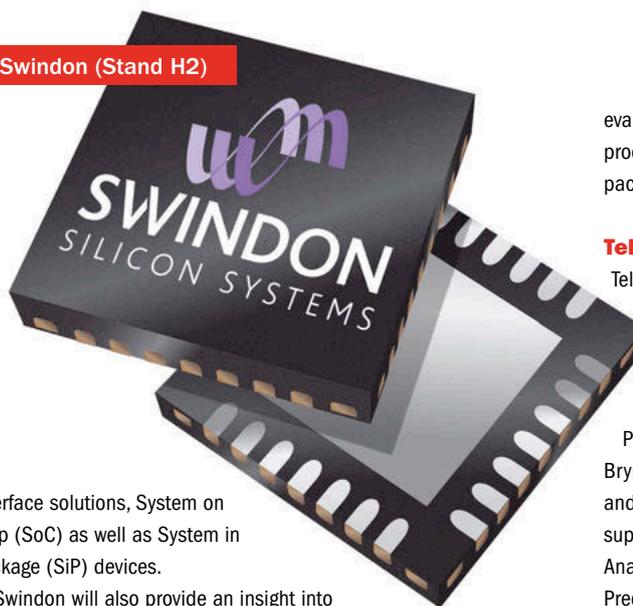
Swindon Silicon Systems, a Sensata Technologies company, is once again exhibiting at EDS and will use this year's event to highlight the benefits of Application Specific ICs (ASICs) and how embracing silicon gives a product a genuine technical and commercial advantage.

Swindon is a leader in high performance, low-cost mixed signal ASICs and integrated MEMS sensor interface solutions and is a major supplier of ASICs across many industrial sectors.

Members of the Swindon Silicon Systems team will be on hand at EDS 2019 to highlight the advantages of these single package devices including Application Specific Integrated Circuits (ASICs) and integrated MEMS sensor

interface solutions, System on Chip (SoC) as well as System in Package (SiP) devices.

Swindon will also provide an insight into the company's full turn key (FTK) service offering which commences with the ASIC specification, design, simulation, layout and verification and continues with the



evaluation, qualification and in-house production test (both wafer probe and packaged devices) of the ASIC.

Telonic: Stand E85

Telonic specialises in Test Instruments and Programmable AC and DC Power Supplies from industry leading manufacturers including Kikusui, Delta Elektronika, Lab-Power, ETL Pruftechnik, Rigol, Siglent, Brymen, Danisense, Tekbox, Graphtec and Micsig. Products include: Power supplies, Oscilloscopes, Spectrum Analysers, Waveform Generators, Precision Current Transducers, Bench Multimeters, Electrical Safety Testers and EMC Pre-Compliance Measuring Instrumentation. Visit our stand to find out more.

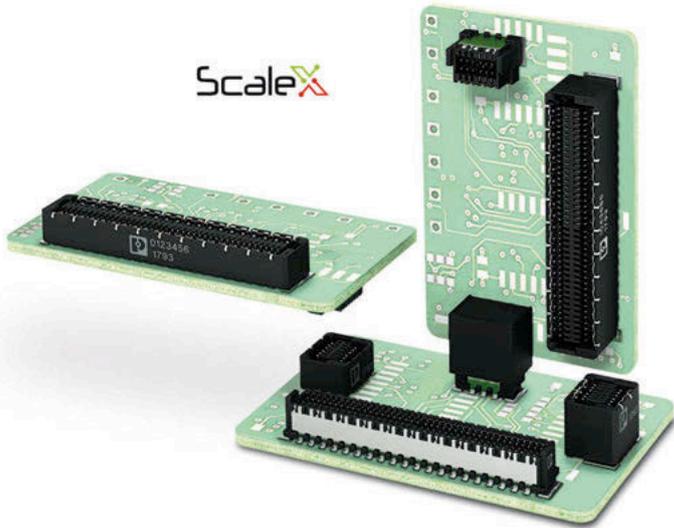
HARWIN**Higher Reliability
smaller footprint****New Ready-To-Use Cable Assemblies**

Now Available with Reverse Fixing
Screw-Lok for Design Flexibility

- Save time and money on tooling, training and testing cables
- Metal back-shells for maximum strain relief and RF shielding
- Up to 45% smaller and up to 75% lighter than Micro-D
- Resists extremes of shock, vibration and temperature
- Excellent out-gassing properties

gecko SLwww.harwin.com/gecko-sl

ScaleX



Connectivity for all dimensions

New FINEPITCH board-to-board connectors

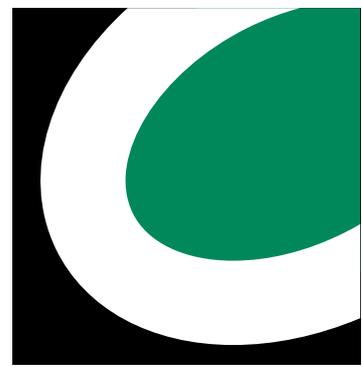
For data & signal transmission solutions inside the device look no further than PHOENIX CONTACT.

For the first time you can design with different stack heights, shielded or unshielded versions in a compact 0.8mm & 1.27mm pitches.



For additional information call 0845 881 2222 or visit phoenixcontact.co.uk/btb

 **PHOENIX CONTACT**
INSPIRING INNOVATIONS



corintech



ELECTRONICS MANUFACTURE

- Component sourcing
- PCB assembly
- Hybrid microcircuits
- Full product assembly
- Rapid UK and scalable offshore production
- AS9100, ISO 9001, IPC, J-STD

ELECTRONICS DESIGN

- Advanced electronics engineering
- PCB layout
- 3D CAD
- Design for manufacture
- Wireless and IoT integration
- Software and firmware development
- Cloud service and app development



Speak to Our Team

Visit stand **E50** and speak to our team to find out what we can offer your business.

Call us on **01425 655655**
to discuss your project



Book a meeting with us
corintech.com/eds-meet

EDS, RICOH ARENA | 16th - 17th OCT 2019

STAND K2

End-to-End IoT Solutions



**THE
"THING"**

**COLLECTING
DATA**

**CONNECTING
TO CLOUD**

**PLUG-&-PLAY
APPS**

**INTELLIGENT
ACTION**

**EURO
CIRCUITS**

Get your prototype produced from PCB to assembly including all sourcing and verification from 7 days

Come and meet the team at the Electronics Design show, Coventry, 17th & 18th October - stand L46

Hi-quality European PCB and full assembly service for prototype and small series including component sourcing and full production verification with our online Visualizer tools:

- 5 working day assembly service
- Unique data verification with Gerber and assembly data comparison and correction
- Instant online price including components



Professional bench-top prototype and small series soldering and testing equipment

- eC-stencil-mate
- eC-placer
- eC-reflow-mate
- eC-pre-heater
- eC-test-mate

Online tools to verify your PCB data and Assembly data instantly providing immediate pricing including component sourcing with full local UK support to help and guide you.

www.eurocircuits.com

Prototyping simplified

Welcome to the world of simplified prototyping. By Mark Patrick

Over the past couple of decades, there have been noticeable changes in the range of development and evaluation boards available to engineers, driven by changes in the semiconductor industry.

Firstly, packages have become smaller and leadless. The 0.1" pitch Veroboard-style prototyping area of older development boards have become, sadly, mostly unusable in this era of fine-pitch quad flat-packs (QFP) and quad flat no-lead (QFN) devices.

Secondly, many microcontroller vendors have broadened their portfolio, expanding into power conversion, sensing, wireless and networking interfaces. With an eye on a 'system sell', they are designing their development boards with plug'n'play approach connector systems. This ensures that their other semiconductor products can be easily interfaced and evaluated together with the chosen microcontroller.

A prime example of this approach is the Explorer 16/32 development board from Microchip Technology. The DM240001-2 initially developed for their 16-bit PIC24 and dsPIC33 families of microcontrollers, also supports their 32-bit PIC32 family. This is made possible by their early decision to make the microcontroller interchangeable through their Plug-In Module (PIM) approach. These PIM modules, typically 38 x 38 mm (1.5" x 1.5") in size, feature the bare minimum of hardware.

For a standard microcontroller, only decoupling capacitors and the necessary crystal for the clock are fitted alongside the MCU itself. For more complex devices with more options, a series of jumpers for selecting interfaces may feature, as well as clip-points for oscilloscope probes for MCUs targeting motor control or digital power applications.

The board also provides some basic input/output support in the form of an alphanumeric LCD, a potentiometer, LEDs,

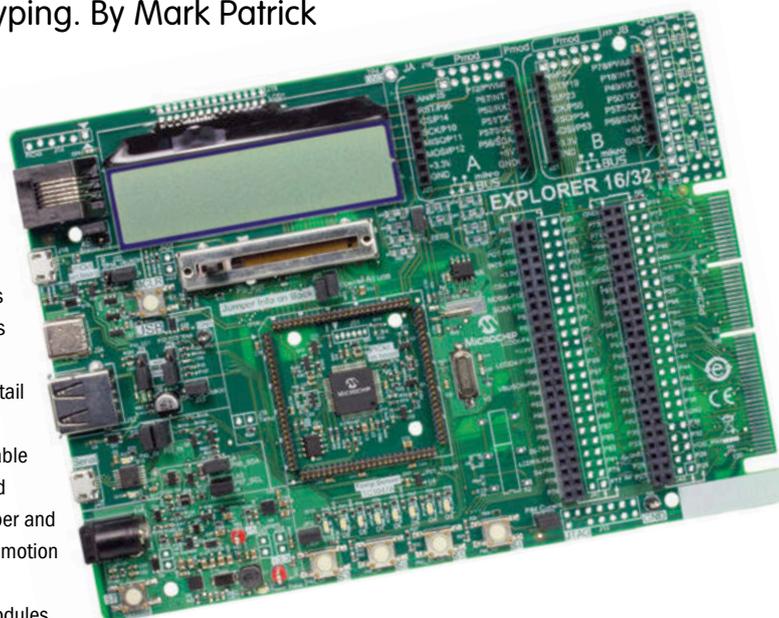
some push buttons, and a temperature sensor. However, in order to quickly prototype more complex applications, Microchip's standardised PICtail Plus interface is provided. In conjunction with the PICtail Plus Expansion Board, a range of cards are available that provide wireless and wired connectivity, e-paper and full-colour displays, and motion sensors.

Many sensors and modules, even complex solutions for Wi-Fi or Ethernet, only require a simple serial interface such as SPI to interface with a microcontroller. Despite this, the industry has never really coalesced around the standardised pinning or form-factor needed to offer a standard prototyping solution to the market.

However, this is beginning to change as microcontroller vendors provide support for mikroBUS. This open standard, developed by MikroElektronika, defines the functionality of 16 interface pins along with the dimensions and silkscreen markings of the board. Boards from MikroElektronika based upon this standard are known as Click boards.

All boards are 25.4 mm (1000 mils) in width, with the length being offered in small (28.6 mm/1125 mils), medium (42.9 mm/1690 mils), and large (57.15 mm/2250 mils) sizes. This flexibility ensures that the interface stays the same, while a prototyping area or space for antennae or connectors can be accommodated. The standard supports SPI, UART and I2C, along with pins dedicated to analogue and PWM signals, an interrupt line and a reset pin. It also defines +5.0V and +3.3V supply pins.

The latest Explorer 16/32 board also



Above: The Microchip Explorer 16/32 development board.

features two sets of headers supporting the mikroBUS Click boards, offering developers an even broader spectrum of prototyping options from the MikroElektronika range. If more are required, two additional headers are provided on the PICtail Plus Expansion Board.

One such board is the Hall Current 2 Click that utilises an ACS711 Hall effect sensor from Allegro Microsystems. The board measures currents of up to +/-12 A for both AC and DC of up to 100V. This particular device makes use of the I2C interface for configuration and digital measurements, along with the analogue pin providing an alternate output option. Via the integrated analogue-to-digital converter (ADC), the measurement is provided to the microcontroller as a 12-bit value, with sensitivity set at 110 mV/A. To handle the ACS711's fault detection circuitry, the interrupt output and reset input are also implemented. Thus, should there be a current overload, the microcontroller can recognise the failure and reset the device.

Prototyping boards are not limited to simple measurement and interfacing tasks. Boards such as the Grid-EYE click put thermal imaging capability into the hands of developers. Leveraging a Panasonic



Author: Mark Patrick

AMG8853 infrared array, this Click board provides 64 outputs from an 8 x 8 thermal array. The device is capable of measuring temperatures from -20°C to +100°C over a detection distance of 5m. To ensure that ambient temperature does not interfere with the measurement results, the device compensates against an internal thermistor. A simple I2C interface is all that is required to provide even 8-bit microcontrollers with vision.

At the other end of the scale devices such as the Raspberry Pi 3 Model B+, with its 64-bit quad-core processing power, graphics capability and support for everything Linux can offer, make for a compelling prototyping platform. With software available for every conceivable use case, the Raspberry Pi is ideal for testing ideas and concepts around the digitisation of industrial applications and interfacing with the cloud. In comparison to bare-metal programmed MCU development



Above: The Hall Current 2 Click Board

boards, the interfaces provided by Raspberry Pi are quite limited. A 40-pin header offers a single I2C and SPI interface, along with 17 digital I/Os. A Python library also makes it possible to use the digital pins as pulse-width modulated (PWM) outputs.

To leverage this interface and potentially add analogue input capability, developers can select from a range of HATs, extension boards that interface with the 40-pin header. For example, if your application needs to control motors or stepper motors, the Adafruit DC and Stepper Motor HAT will be of interest. This board can control up to two unipolar or bipolar stepper motors, up to four DC motors, or various combinations thereof.

The motors are supplied via their own +5.0 to +12.0V DC input while the remaining circuitry draws upon the +3.3V DC provided by the Raspberry Pi. In addition to two Toshiba TB6612FNG integrated motor drivers, there is also an NXP PCA9685. This provides

16-channels of 12-bit PWM signals, 12 of which are used for the motor control, controlled via I2C. The remaining four are routed to a header and can be used for other purposes. If there is a need to control even more motors, the HAT can also be stacked up to 32 high, allowing potentially 64 stepper motors, or 128 DC motors, to be controlled.

As the world of electronic components is miniaturised, it can seem difficult to know how best to evaluate devices and build prototypes with devices we can barely solder anymore. However, emerging standards are helping ease this issue. Key technologies, from wireless to wired, and control to measurement, can be sourced in the form of populated boards that integrate with a range of microcontroller development boards. Even if the form-factor is not compatible, support for visible and solderable 0.1" headers makes such prototyping boards usable by us all.

ODU CIRCULAR CONNECTORS

+ Push-Pull locking for a self-securing connection



Contacts for solder, crimp and PCB termination

+ ASSEMBLY



SECURE CONNECTIONS WITH UNLIMITED APPLICATIONS

ODU circular connectors benefit from Push-Pull locking that secures the connection from unmating. Due to the robust construction and the reliable ODU contact technology, the high performance is maintained through thousands of mating cycles. The Push-Pull product range includes different versions that can be used in a large variety of applications.

+ COMPLETE SYSTEM SOLUTIONS

ODU provides pre-assembled component solutions. Our development and manufacturing expertise, combined with our state-of-the-art manufacturing facilities in Europe, China and the USA, enable us to offer our customers outstanding assemblies and a full range of logistics services.



Visit us at Stand K8

ODU-UK Ltd.
Phone: 0330 002 0640
sales@odu-uk.co.uk
www.odu-uk.co.uk



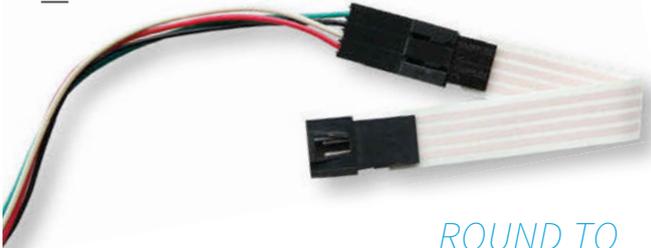
A PERFECT ALLIANCE.



EDS
COVENTRY
OCT 16TH & 17TH
STAND J44



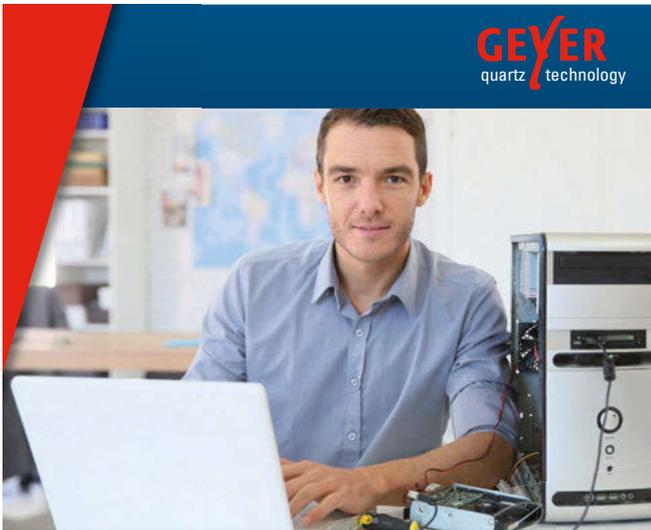
INNOVATIVE
SINCE 1976



ROUND TO
FLAT CABLE
CONNECTION

QUALITY WITHOUT COMPROMISE

→ NICOMATIC.COM

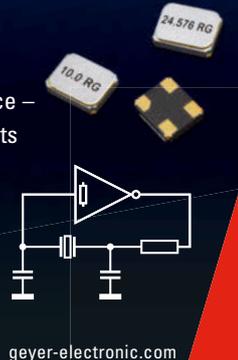


GEYER
quartz technology

Design that works.

GEYER Quartz Crystals and Oscillators offer Quality, Reliability and Performance – bringing optimal balance to your projects with circuit analysis and optimization from the Geyer Test Centre.

GEYER Electronic UK Ltd
Romsey, Hampshire
Tel: +44 (0)1794 329 341
sales@geyer-electronic.co.uk



geyer-electronic.com

RIGHT ANGLE ANGLISSIMO™ PLUGS



The Anglissimo™ plug is an eight in-one plug that can be adapted by the user to all space constraints.

One plug, eight cable outlets

This new elbow connector design allows to adjust and position the connector in an efficient way. Each connector can be orientated during its assembly and enables 8 positions. The connector then remains securely positioned in its orientation.

- 8 in 1 plug
- Cable clarity
- Clean design
- Prevent cable snagging
- Reduce operating failures caused by stressed cables



Visit us on stand H52
Ricoh arena | Coventry
16 – 17 October 2019

LEMO UK LTD, Worthing, UK
Phone: +44 (0) 1903 234 543
uksales@lemo.com

facebook.com/lemoconnectors
 linkedin.com/company/lemo-sa



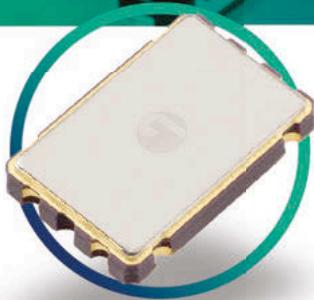
High Quality Connectors and Cables

Precision timing from Golledge

Frequency control for today's
connected world.

▶ CALL +44 1460 256 100

From cutting edge pricing to high-end technical applications, we provide the best frequency control solutions tailored to your needs.

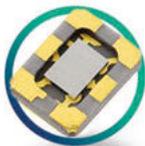


QUARTZ CRYSTALS	OSCILLATORS	TCXOs
OCXOs	SAW FILTERS	SAW RESONATORS
CRYSTAL FILTERS	RTC MODULES	VCXOs

EVENT FOCUS

EDS 2019

Visit stand L42 at the Electronics Design Show to check out our wide range, from tiny TCXOs through to SAW Duplexers and everything in between.



GTXO-163

Tight stability in an ultra-miniature package

- Excellent ± 0.5 ppm stability available
- Tiny 1.6 x 1.2 x 0.7mm package
- Wide range of supply voltage options
- Frequency adjustment available
- Cost effective for volume applications
- Ideal for wearable, tracking and aerial applications



GSDX

Dual filter functionality, tiny packages

- High Tx to Rx isolation
- Ultra-miniature packages as small as 1.8x1.4x0.5mm
- Low insertion loss of just 1.8dB available
- Balanced Rx port available
- Standard bands and custom frequencies available

www.golledge.com
+44 1460 256 100
sales@golledge.com



fischer[®]
CONNECTORS



FISCHER **FREEDOM**[™] SERIES

EASY MATING | EASY CLEANING | EASY INTEGRATION



Connect with us @ **EDS 2019**

STAND K42

Ricoh Arena, Coventry, 16-17 October

INTRODUCING AWARD-WINNING
BREAKTHROUGH PLUG & USE
CONNECTIVITY

FISCHER LP360[™]

- No key code for 360° mating & optimized cable management
- Fully cleanable, IP68
- Easy to integrate into devices OR garments

How to innovate faster

Wolfgang Lex, project manager Technology & Maker, Conrad Electronics, provides some tips on choosing the best development and evaluation platforms

Microcontrollers (MCUs), with their serial interfaces, digital input and outputs, and analogue converter peripherals, would seem to be the ideal choice for implementing a quick prototype. However, as microcontrollers have grown in complexity, so have their development tools, software libraries and development boards. Despite vendor's best efforts, generic development boards with plug-in MCU modules never remain flexible enough for next generation interfaces, such as USB and Ethernet, nor for the ever-broader range of applications where MCUs are used.

More often than not, MCUs are also a challenge to get initialised into a useable state. The functionality of the entire device is often tightly coupled to the oscillator frequency. Even with code snippets from previous projects and a configuration function, a change in the clock frequency will have ramifications in every peripheral from the timers to serial interfaces, and this is all before the MCU executes anything close to a useful section of application code.

Until recently, single board computers (SBC) almost seemed to be consigned to the relics of computer history, with highly integrated MCUs offering everything the developer required inside a single black package. But then something changed.

Now, if the latest MEMS sensor looked to offer attractive capabilities for an application, its serial interface could be hooked up to an SBC and, within half-an-hour, an initial evaluation could be undertaken.

The Arduino eco-system also provides that much needed embedded developer's debug tool, an easy to use serial interface. This is already linked to a serial-to-USB converter, allowing the board to be connected to a terminal on a development PC with ease. At last, a "hello, world\n" string can be output on an MCU with code that is similar to the examples found within the books of Kernighan

and Ritchie. With a little extra effort, serial data can also be visualised graphically with other open-source software such as Processing.

A wide variety of sensor and interface modules also allow beginners to quickly add the desired functionalities. These digital sensors or peripheral modules usually have an I²C or SPI interface. The manufacturers' libraries make the integration of these modules very easy. The Arduino IDE helps library manager in a simple and extremely efficient way with the search for the right library on github.com, an ingenious developer forum and online service.

Should no library be available, such it is the case with brand new or very special hardware, developers can also create their own library. Thus, rather than writing hexadecimal values to numbered registers, functionality can be converted into meaningful function calls such as 'configOutput' or 'readTemperature'.

The more forward-looking chip manufacturers and third-party tool providers provide complete hardware and software solutions for the Arduino development environment. Software is provided as a library, while the hardware is in a 'shield' format that fits on top of the standardised Arduino Uno form-factor boards. One example is the Motor Shield. It comprises the well-established L298P Dual Full Bridge motor driver along with two operational amplifiers for current sensing. The library utilises the pulse-width modulation, digital I/O and analogue input libraries to provide motor speed and direction control along with current measurement.

With the growth in smartphones and apps, many developers are looking for ways to easily experiment with Internet of Things (IoT) applications. For such applications is

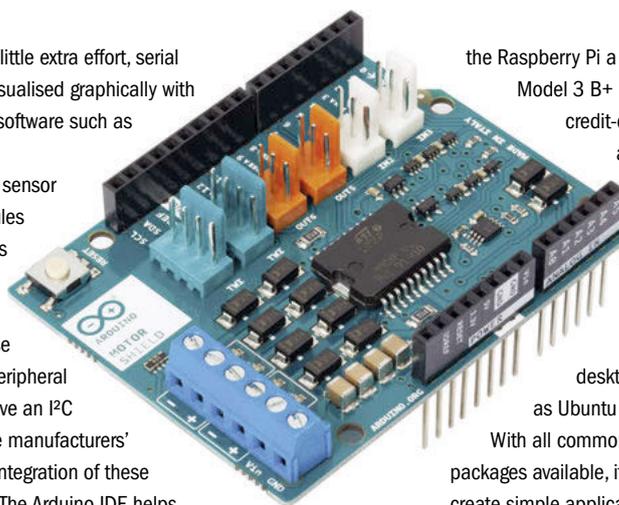


Figure 1: The Arduino Uno and the Raspberry Pi are probably the two best known SBCs of the 21st century

the Raspberry Pi a suitable option. The Model 3 B+ is essentially a PC in credit-card format, with video and audio output as well as USB, Ethernet and wireless LAN. It uses the Debian-based operating system (OS) Raspbian along with the lightweight LXDE desktop. Alternative OSs, such as Ubuntu MATE, are also available.

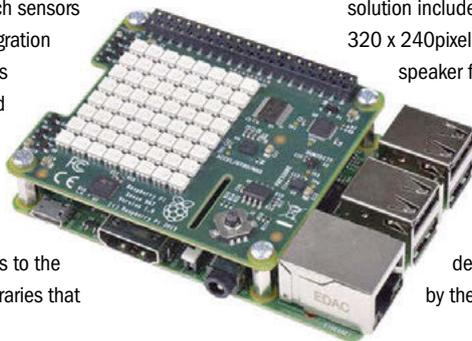
With all common Unix and Linux packages available, it is relatively easy to create simple applications that communicate via TCP or UDP in almost any language you have mastered. There is also a broad community of developers willing to help and provide examples. Almost foregoing written code entirely, packages, such as Node-RED included in Raspbian, enable simple drag-and-drop programming of IoT applications.

The electronic functionality of the Raspberry Pi can also be easily extended. Firstly, the board itself offers a standardised two row header featuring analogue and digital I/Os, as well as the SPI and I²C serial interfaces. Libraries are included in the OS distribution for programming languages, such as Python, to interact with them. Secondly, just like shields for Arduino, third-parties can develop 'hats' to simplify integration of silicon devices to be controlled by the Raspberry Pi. One example is the Sense Hat that integrates a range of sensors including a MEMS gyroscope, accelerometer, magnetometer, and barometer, along with a temperature and humidity sensor. It also includes an 8 x 8 matrix of LEDs for outputting simple images or icons for situations where an HDMI display is not appropriate. When it comes to rapidly evaluating silicon devices, it is worthwhile taking a look at the range of 'Click' development boards from MikroElektronika. Initially conceived as a way to extend the

functionality of their MikroE microcontroller development boards, the standardised interface has been adopted by a range of microcontroller manufacturers such as Microchip Technology, NXP Semiconductor and Quectel.

The interface and form factor of the boards has been documented in the mikroBUS standard. This defines specific pins for power, serial interfaces, an analogue signal, and a digital interrupt signal. The Click Boards leave few application needs untouched with solutions for everything from MP3 encoding and decoding to capacitive touch sensors and digital potentiometers. Integration with other prototyping systems is also provided with a Click Shield for Arduino and Click Hat for Raspberry Pi. When used in conjunction with the MikroElektronika hardware and software tools, users gain access to the wealth of LIBSTOCK software libraries that

Figure 2: The Raspberry Pi Sense Hat incorporates a range of sensors, a joystick, and an 8 x 8 matrix of LEDs



simplify getting started.

Both SBCs mentioned here are delivered as an unprotected board, leaving a risk of damage through short circuit on the typical developers work bench. Of course, there are a range of cases provided that protect the hardware from such events as well as providing means to access the connectors of the board. However, there are other platforms on offer that come complete with protective housing.

The M5Stack from Maker Factory are based upon the ESP32 processor. Not only does the solution include a case, it also integrates a 320 x 240pixel colour TFT display and a small speaker for audio output. Its modular design offers extensions that include a battery, charging base, GPS, and prototyping area. The M5Stack can be programmed using the same development software used by the Arduino ecosystem, UIFlow,

a visual development environment, or even MicroPython. It also features an interface that enables simple connection to the wide range of Grove modules, developed by Seeed, that provide a wide range of input and output modules. These include simple switches and sensors, through to complex displays, motion sensors, and wireless solutions.

With consumer expectations of their electronic appliances rising with respect to functionality and design, developers need tools to efficiently evaluate innovate silicon solutions to gain first-mover advantage.

Although initially considered to be little more than toys, developers now have a wide range of competent, highly featured SBCs at their fingertips that can form the basis of a prototype application. This, coupled with a near endless supply of sensor and evaluation boards in harmonised form-factors and interfaces, leaves no excuse for not trying out every new silicon solution that is released to the market.



www.pacer.co.uk

EDS, RICOH ARENA | 16th - 17th OCT 2019

STAND K2

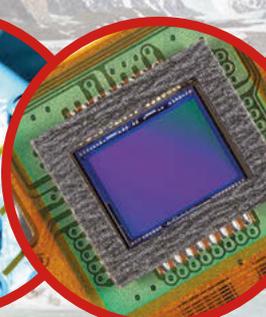
Innovative Choices for Working with Light



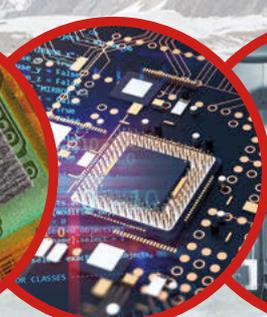
ILLUMINATE



FOCUS



DETECT



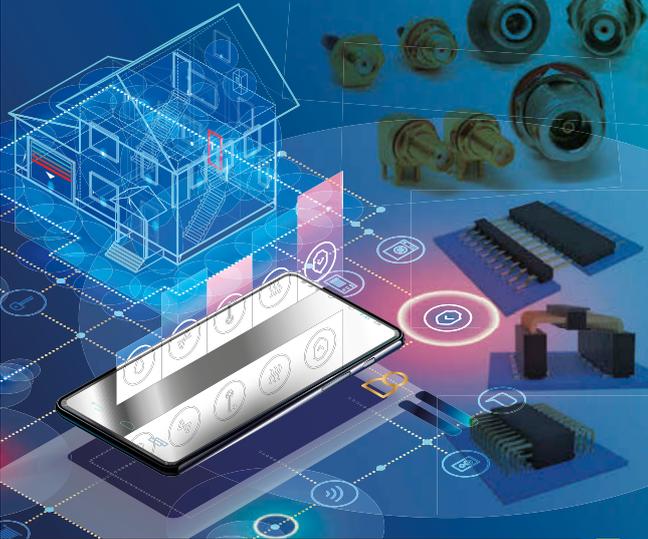
PROCESS



DISPLAY



GRADCONN



**Waterproof Coaxial Cable Assemblies,
Board to Board & SIM Card Connectors
for Internet of Things Applications**

Visit GradConn on Stand M22 at the Engineering Design Show
Ricoh Arena, Coventry, 16th-17th October 2019



AM SKINNER SOLICITORS

INTERNATIONAL TRADE COMPLIANCE LAW



Andrew Skinner is a trade lawyer, practising export controls and sanctions, anti-bribery and corruption, and customs law.

Andrew is a recognised trade compliance expert and previously worked as Head of Global Trade Compliance for a large distributor of electronic components, so he understands the regulatory challenges around global trade in the electronics industry.

Contact AM Skinner Solicitors for clear pragmatic advice on all trade compliance legal issues.

Andrew Skinner BEng (Hons), CEng, MIET – Solicitor.

AM Skinner Solicitors

Tel: +44 (0) 7793 066 245

Email: amskinner@amskinnersolicitors.co.uk

www.amskinnersolicitors.co.uk

Powerful Schematic Capture
and PCB Design Software

PULSONIX

Are you looking for
cost effective
PCB Design Software?



Look no further,
Pulsonix is the answer

- Very easy to learn and use
- Co-design in integrated PCB/3D design environment
- Import design data from your existing CAD tool
- High Speed design with Constraint Manager
- Free access to over 13 million library parts
- STEP integration with Mechanical CAD
- Reverse Engineer feature to PCB from Gerber files

Download a FREE trial from

pulsonix.com

Call 01684 296 551

Email sales@pulsonix.com



ENGINEERING
DESIGN SHOW

Visit us on
stand H45



SEE US AT
STAND H2:
Engineering
Design Show
16/17 October 2019



The Future is Silicon
Your Future is Swindon

www.swindonsilicon.com

A Sensata Technologies Company

Inventions that have stood the test of time

5 inventions that have revolutionised the world of electronics, according to Ulf Timmermann, CEO of reichelt elektronik

Smart sensors, powerful LEDs and 3D printers - over the past 50 years, the distribution market for electronics and IT components has changed dramatically. Nevertheless, some of the inventions of the last five decades have stood the test of time and remain indispensable.

To mark reichelt's 50th anniversary we've been taking a look back to give an overview of five pioneering innovations in electronics history.

1. The battery

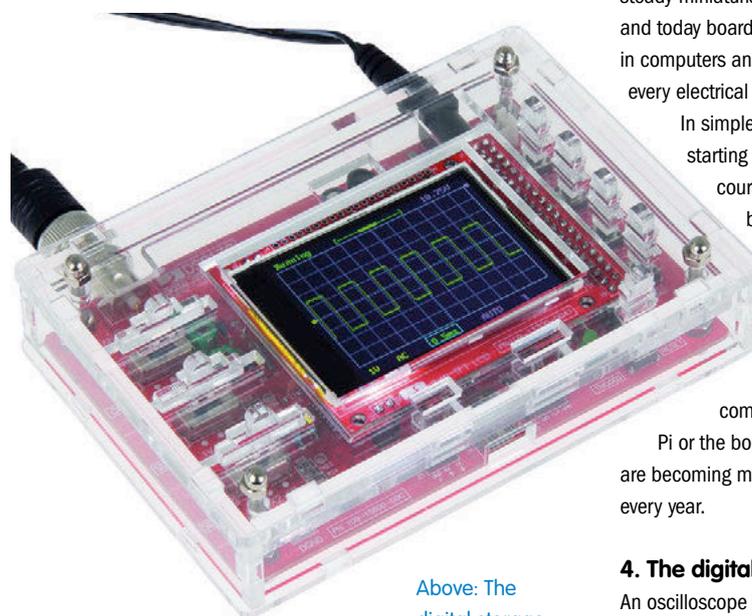
Whether in small devices such as watches, pagers, hearing aids and pocket calculators or even in small computers - button cells are used across devices with low power consumption. It's impossible now to imagine a world without the battery.

You might not believe it, but the first battery - at that time much larger - was invented at the beginning of the 19th century. The Voltasche column, named after its inventor Alessandro Volta, consisted of copper and zinc flakes stacked on top of each other as well as pieces of cardboard and leather saturated with electrolyte that would then conduct the current.

Once an inexplicable scientific phenomenon, today an indispensable source of energy - the battery is one of the most significant technical innovations in contemporary history.

2. The soldering iron

For the connection of components, the soldering iron, for DIYers and industry alike, is



Above: The digital storage oscilloscope



Author: Ulf Timmermann

absolutely indispensable. Depending on the application, there are various sizes available these days from the soldering needle to the large soldering iron.

Today mainly electric soldering irons are used. However, in the past gas or coal heated devices were also used. The invention of the soldering iron traces itself all the way back to the ancient Egyptians and Trojans. While gold and silver were still used as solders at that time, tin became the preferred material around 4,000 years ago.

Finally, a German engineer in 1921 invented the first electric soldering iron. Over the past 90 years, the design of the soldering iron has been steadily perfected and today it can be found in almost every tool shed and wherever electronic components are used.

3. The circuit board

The development of the soldering iron also kicked off another essential innovation for the electronics industry: the circuit board. The invention of this carrier for electronic components dates back to the late 1930s. Previously, components were liable to become jumbled or crossed. But it wouldn't be until the 1950s that the circuit board really came into its own. Since then, there has been a steady miniaturisation of the circuit board, and today boards are now no longer used only in computers and televisions, but in almost every electrical device.

In simple design, they make for a great starting point for projects. And of course you can't talk about circuit boards without mentioning the Raspberry Pi. Thanks to further developments such as more computing power and RAM, the Raspberry Pi along with its numerous competitors such as the Banana Pi or the boards from Ordooid and Arduino are becoming more exciting and capable every year.

4. The digital storage oscilloscope

An oscilloscope is an indispensable tool for electrical engineers. But many other sectors such as medical technology or radio and television technology also rely on the voltmeter.

Due to their increased feature set, increased performance, and larger memory, digital storage oscilloscopes have largely supplanted the analogue variant on the market. In addition, analogue storage oscilloscopes based on the cathode ray technology have their own disadvantages such as a higher susceptibility to errors and a lower energy efficiency.

Oscilloscope technology itself dates back to the beginning of the 20th century, when the New York-based manufacturer LeCroy launched the first digital storage oscilloscope in the 1980s.

Today, storage oscilloscopes are available

in a variety of price ranges and functions, depending on whether the meter is used at home or in a professional environment. For example, simple oscilloscopes can complement an existing multimeter, while the larger devices have touch displays, multiple channels, and built-in dataloggers.

5.The 3D printer

In recent years, manufacturing in particular has benefited from huge leaps in 3D printing technology. Complex prototypes can now be printed in any environment instead of having to go through several complicated and costly production processes. 3D printers are already being used in medical technology and catering as well as by hobbyists in their homes.

The technique of stereolithography, in which material layers are applied three-dimensionally for the first time, was first

invented in 1981 and successfully practiced in 1983. In 1988, the first 3D printer was released to the public. This was based on the laser sintering principle.

Since then, 3D printing technology has evolved and has been perfected, making 3D printers available in a variety of designs and sizes today. The selection of filaments has also

increased steadily. Even eco-friendly plastic and chocolate can now be printed.

So, what's next?

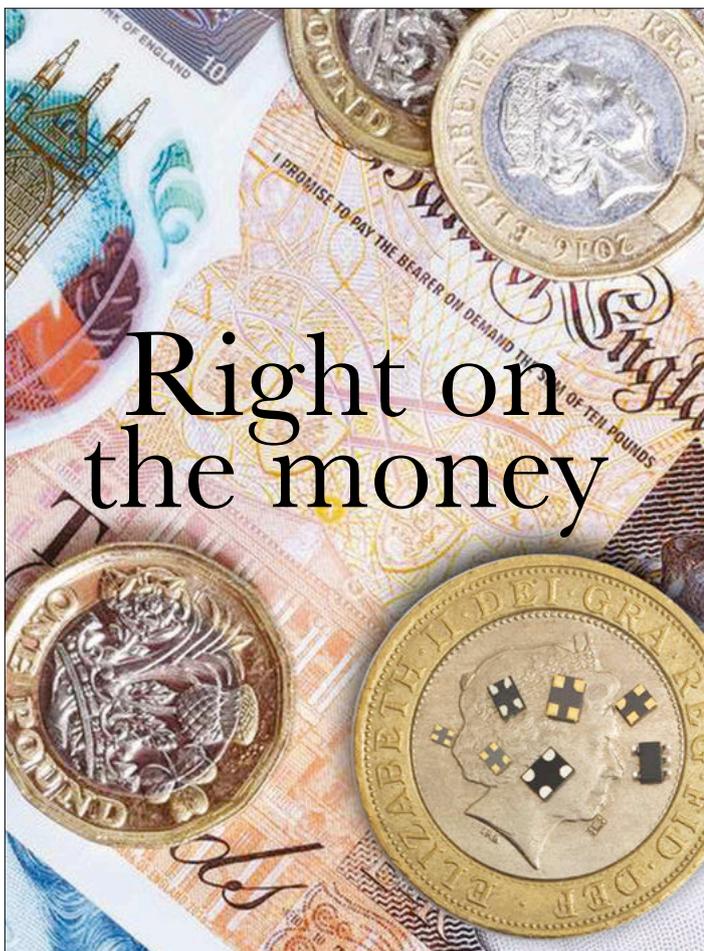
It is difficult to predict what the electronics and components landscape will look like in 10, 25 or 50 years, and which technologies will be indispensable to the electronics industry in the long term.

Autonomous driving will continue to be a focus of research in the next few years.

The construction of self-driving cars will inevitably increase the demand for the sensors and semiconductors required. Furthermore, powerful LEDs are needed to ensure the safety of autonomous vehicles.

A more connected world also means bigger and more complex networks to link devices together. The fourth industrial revolution will mean everything is connected and therefore electronic. We can't wait to look back again another 50 years' time.

Below: The circuit board



Your innovative products deserve sterling performances.

- Ultra-Miniature components crucial for IoT applications
- Maximise PCB Real Estate
- Smaller crystals need lower power requirements
- Of-The-Shelf products developed with leading chip manufacturers for Bluetooth, Zigbee and WiFi applications
- Proven reliability
- Highly competitive global pricing from AEL Crystals Ltd

Talk to our highly experienced field sales engineers and let's see how we may assist you in the development of your next innovative product.



AEL Crystals Ltd
 Unit 28, The ioCentre, Salbrook Road, Salfords, Surrey, RH1 5GJ, UK
 email: sales@aelcrystals.co.uk - web: www.aelcrystals.co.uk
 Tel: +44 (0)1293 789200

**SMALLER
STRONGER
FASTER**

ROHM
SEMICONDUCTOR



SiC: FROM NICHE TO MASS MARKET

As technology driver ROHM has pioneered in SiC development. Meanwhile, SiC power semiconductors have a high acceptance in the mass market. We produce SiC components in-house in a vertically integrated manufacturing system and thus guarantee the highest quality and constant supply of the market. Together with our customers in the automotive and industrial sector, we are shaping the power solutions of the future.

SMALLER inverter designs
reducing volume and weight

STRONGER performance
by higher power densities

FASTER charging
and efficient power conversion



AUTOMOTIVE



INDUSTRIAL

www.rohm.com

Challenge Jack...



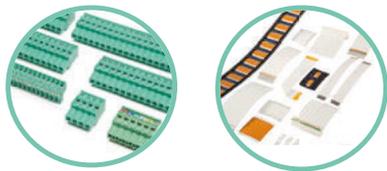
...to solve your connectivity problems

Contact our Sales Engineer, Jack Walker,

We guarantee he will be able to solve your connectivity problems.

With many years in-depth industry experience, we can guarantee we have seen every connectivity problem and also solved them. That's why our team of experts are the perfect resource to solve your connectivity issues. Our products range from flexible interconnect cables to terminal blocks and connectors, all of which are designed to withstand high levels of use and minimise the risk of failure.

Email Jack today at uksales@hitaltech.co.uk



Hitaltech

The experts in connecting technologies

Hitaltech UK Ltd, Unit 5 Sovereign Court, Wyrefields, Poulton-Le-Fylde, Lancashire, FY6 8JX
Telephone: +44 (0) 1253 899910
www.hitaltech.co.uk



ELECTRONICS DESIGN SHOW **SHOW PREVIEW**

Exhibitor list

6SigmaET from Future Facilities	Electronic	K31	Kingmate Electronic Co Ltd	Embedded	Z57
Active-PCB Solutions Ltd	Embedded	G10	Labtronix Test & Development Solutions	Electronic	Z58
Alpha 3 Manufacturing Ltd	Electronic	B55	Lambda Photometrics	Electronic	K3
Altium	Embedded	G2	LEMO (UK) Ltd	Electronic	H52
Anders Electronics Ltd	Embedded	G30	Lincoln Binns Ltd	Electronic	K51
Arrow Central Europe GmbH / Analog Devices	Embedded	H6	Lohmann Technologies (UK) Ltd	Electronic	F40
BCD Atlantik	Electronic	K18	Metz Connect GmbH	Electronic	H67
BELA EMS	Electronic	H25	Momentum Circuits	Embedded	G35
Beta Layout Ltd	Electronic	J52	Mornsun	Electronic	H80
Binder UK Ltd	Electronic	M12	Mouser Electronics	Electronic	D10
Blue Chip Technology	Electronic	L3	Nemco Ltd	Electronic	K5
ByteSnap Design Ltd	Electronic	L22	Nexus (GB) Ltd	Electronic	L18
Cambion Electronics	Electronic	M24	Nicomatic Ltd	Electronic	J44
Carlisle Interconnect Technologies	Electronic	J16	Noritake Itron (UK)	Electronic	L2
Charcroft Electronics Ltd	Embedded	H48	ODU Connector Systems	Embedded	K8
Circuitworx	Electronic	H58	OKW Enclosures Ltd	Electronic	J56
Coda Systems Ltd	Electronic	K50	OMC (UK) Ltd	Electronic	L30
COMSOL Ltd	Electronic	J30	Omron Electronic Components Europe	Electronic	K32
Corintech Ltd	Electronic	E50	OSI Electronics UK	Embedded	J19
Cosel Europe GmbH	Electronic	D5	Panasonic Electric Works UK Ltd	Electronic	H75
cTech	Electronic	L38	Peak Production Equipment	Electronic	K48
Cypress Semiconductor	Embedded	F8	Phase One Electronics	Embedded	G21
Datalink Electronics	Electronic	M8	Phoenix Contact Ltd	Electronic	M18
DAU Components Ltd	Electronic	Z59	Photronic Group	Embedded	G20
Diamond Electronics	Electronic	L52	Pico Technology	Electronic	J8
Display Technology	Electronic	G11	Powell Electronics	Embedded	H9
DVR Ltd	Electronic	K52	Pulsonix	Electronic	H45
Easby Electronics Ltd	Electronic	H55	PULS Power	Electronic	J5
Ecopac (UK) Power	Electronic	F9	QT Company	Embedded	G32
EMS Proto	Embedded	J18	Review Display Systems	Electronic	H85
Enix Power Solutions	Embedded	A18	RGS International Ltd t/a Electric Motors Online	Electronic	C112
AEF Solutions / Esprit Electronics	Electronic	L54	Rhopoint Components Limited	Electronic	K6
Eurocircuits	Electronic	L46	RJS Electronics	Electronic	K40
Eurofins York	Electronic	L50	Rohde & Schwarz	Electronic	G25
Euroquartz Limited	Embedded	F2	Schurter Electronics	Electronic	L20
Exception PCB	Electronic	J10	SDC Systems	Embedded	H8
Express Assemblies	Electronic	J12	Selwyn Electronics	Electronic	H72
Fischer Connectors	Electronic	K42	Simms International	Embedded	H7
Foremost Electronics Ltd	Electronic	J46	Solid State Supplies	Embedded	K2
Gem Cable Solutions Ltd	Electronic	Z56	Soumac	Electronic	H60
Geyer Electronic UK	Embedded	G12	Swindon Silicon Systems	Embedded	H2
Globe Electronics (UK)	Electronic	Z0	Tactiq Ltd	Embedded	H30
Golledge Electronics	Electronic	L42	TDK Lambda	Electronic	K30
GradConn Europe	Electronic	M22	Tektronix UK Ltd	Electronic	G5
Hammond Electronics	Electronic	M16	Teledyne Ltd	Electronic	J17
Harwin plc	Electronic	J54	Telonic Instruments Ltd	Electronic	E85
HCC Embedded	Embedded	J2	Thermal Issues Ltd	Electronic	H40
HCD (Holmes Circuit Designs)	Electronic	M20	Toby Electronics	Electronic	K16
Heber Ltd	Electronic	H5	Transfer Multisort Elektronik Sp zoo	Electronic	D72
Hi5 Electronics	Electronic	J40	Universal Science	Electronic	K46
Hitaltech	Electronic	L48	Wavemar Electronics	Electronic	L16
Hitex (UK) Ltd	Embedded	K4	Wurth Electronik	Electronic	L4
Holtek Semiconductor	Embedded	J6	xPLM Solution GmbH	Electronic	J48
Ineltek	Electronic	H4	Yamaichi Electronics Deutschland GmbH	Electronic	J36
Inelco Hunter	Electronic	H50	Yokogawa UK Ltd Measurement Technologies Division	Electronic	H42
INGUN (UK) Ltd	Electronic	J34			
Innovative Sensor Technology	Embedded	J1			
Jauch Quartz UK Ltd	Electronic	H70			
Kasdon Electronics Ltd	Electronic	L34			



Automotive-Qualified 200 V Qspeed Diodes from Power Integrations

Low-noise, high-efficiency, AEC-Q101 diodes solve thermal, EMI and distortion challenges in power amplifiers

San Jose, Calif. – September 10, 2019 – Power Integrations (Nasdaq: POWI), the leader in high-voltage integrated circuits for energy-efficient power conversion, today announced that its 200 V Qspeed™ diodes – LQ10N200CQ and LQ20N200CQ – are now available with AEC-Q101 automotive qualification. Qspeed silicon diodes use merged-PIN technology to offer a unique balance of soft switching and low reverse recovery charge (Qrr). This results in low EMI and reduced output noise, which is especially important for in-vehicle audio systems.

The newly qualified 200 V diodes feature the industry's lowest reverse recovery charge, typically 32.4 nC at TJ of 125°C, and a diode softness ratio of 0.39. This minimizes high-frequency EMI inherent in the Schottky rectifiers often used in Class-D power amplifier output stages. Dual 10 A and 20 A common-cathode diodes are housed in the industry-standard, rugged DPAK TO-252 package.

@: peter.rogerson@power.com
☎: (408) 414-8573

www.power.com/products/qspeed-q-series



Danisense invests in HV current transducer calibration lab

Certificate of Calibration assures customers of accuracy of instrument

Taastrup, Denmark, August 21 09E Danisense, the leader in high-accuracy current transducers for demanding applications, has set up a DC Calibration test lab at its Danish headquarters and manufacturing site in Taastrup, further strengthening the company's reputation for flexibility, quality and accuracy of its products.

A free service for its high voltage 500V and 10,000V products, units are 100% tested and shipped with a Certificate of Calibration which details the actual current error (always significantly less than the ppm values specified in the datasheet), the error without offset and the linearity error. This enables customers to have full confidence in the measurements they make.

Commented Christian Markvardsen, Project manager/R&D engineer at Danisense: "The investment means that we can assure our customers of the accuracy of our current transducers without relying on shipping parts to a third party."

@: lmo@danisense.com
☎: +41 78 704 29 67

www.danisense.com



EDT Smart Embedded Products

New modules enable the user to add a modern GUI with High – end graphics and smooth animation to any system without the overhead of a memory and power hungry operating system.

The controller board is integrated with the display as one compact module. It includes all necessary circuits to control the TFT module, backlight , PCAP and the GUI application.

The graphic framework is based on Touch GFX and Free RTOS. Three modules are available – 4.3 inches, 7 inches & 10.1 inches.

Evaluation kits are also available.

For you tube video see:
<https://www.youtube.com/watch?v=mnShrk3nqCM>
<http://www.mansky.co.uk/products/embedded-solutions/>

@: nw@mansky.co.uk
☎: 01344 307733

www.mansky.co.uk



Mouser Electronics and Transphorm Announce Global Distribution Agreement

Mouser Electronics

September 9, 2019 – Mouser Electronics, Inc., the authorized global distributor with the newest semiconductors and electronic components, has signed a global distribution agreement with Transphorm, manufacturers of high-quality, high-reliability gallium nitride (GaN) transistors for high-voltage power conversion applications. According to the agreement, Mouser will distribute Transphorm's lines of JEDEC- and AEC-Q101-qualified GaN FETs and evaluation tools.

"We are pleased to add Transphorm to our power line card," said Kristin Schuetter, Mouser Vice President of Supplier Management. "Transphorm's innovative high-performance GaN transistors and evaluation platforms greatly benefit designers and manufacturers developing high-voltage power-conversion applications, in a variety of vertical markets."

"We're excited to join Mouser's list of global suppliers as a manufacturer of high-quality, high-reliability GaN devices," commented Philip Zuk, Vice President of Worldwide Technical Marketing and North America Sales at Transphorm.

@: Kevin.Hess@mouser.com
☎: (817) 804-3833

www.mouser.com/transphorm



New 0.5Amp Large PXI Matrix Modules from Pickering

39% higher density than competing modules; Enables complete functional ATE in a 3U PXI chassis

September 2019 – Dacton-on-Sea, UK – Pickering Interfaces, a leading provider of modular signal switching and simulation for electronic test and verification, has launched a new 0.5Amp ultra-high-density PXI matrix module family that delivers up to 6,144 crosspoints. With a switching density 39% higher than competing devices, the 40-558 allows a complete functional ATE system to be housed in a single 3U PXI chassis, and the integrated BRIC design saves on valuable chassis slots compared to standard PXI matrix modules.

Part of Pickering Interfaces' BRIC large PXI Matrices range, the new 40-558 modules are available in two, four or eight-slot widths for matrix sizes between 64x16 and 1,008x6. The modules are fitted with high quality, ruthenium-sputtered reed relays – manufactured by sister company, Pickering Electronics – which feature a very long life with good low-level switching performance and excellent contact resistance stability. Automatic isolation relay switching maximizes bandwidth and reliability.

@: sales@pickeringtest.com
☎: +44 (0)1255-687900

www.pickeringtest.com



Nexperia secures \$1,500M financing to fund future growth plans

Leading discrete semiconductor company's refinancing fully supported

Nijmegen, September 5, 2019: Nexperia, the expert in discrete and MOSFET components and analog & logic ICs, today announced the successful raise of USD 1,500 million equivalent of senior credit facilities. The proceeds will be used to refinance the existing outstanding debt and to partly finance the acquisition by Wingtech Technologies Co., Ltd., a listed Chinese computer and telecom equipment manufacturer.

The facilities were arranged and underwritten by ABN AMRO, Bank of America Merrill Lynch and HSBC acting as Global Coordinators and were syndicated to a group of twelve global banks in total. The refinancing is fully supported by Wingtech and provides a flexible financing package at very attractive terms to support the further growth of Nexperia going forward.

Nexperia is a Netherlands-headquartered, global manufacturer of discrete semiconductor components.

@: petra.beekmans@nexperia.com
☎: +31 6 137 111 41

www.nexperia.com



OMC adds new dust-proof FDH1M SMA bulkhead receptacle

Robust design with integrated dust seal ensures signal integrity in materials processing applications and high dust environments

October 17, 2018 OMC, the pioneer in optoelectronics design & manufacture, has announced a new receptacle for its range of fibre optic receiver and transmitter diodes. On display for the first time on Stand L30 at the Electronics Design Show, the new FDH1M SMA housing with integrated dust seal is an enhanced version of OMC's popular FDH1 SMA bulkhead housing and is designed to protect signal integrity in fibre optic links in dust or powder contaminated environments, such as materials processing plants.

The FDH1M housing is a rugged, all-metal design with square base flange, featuring mounting holes in each corner to bolt down to the bulkhead, securing it firmly and helping to resist vibration and strain. As well as being far more robust than plastic housings, the all-metal construction of the FDH1M also helps screen the active device against radio frequency interference.

@: Heathw@omc-uk.com
☎: +44-1209-215424

www.omc-uk.com



Rugged, modular MIL 83513 1.27mm pitch connector

Nicomatic's easy-to-use EMM series suits harsh-environment defense applications

September 04 2019 Bon-en-Chablais, France: Nicomatic SA, the leading manufacturer of high-performance interconnect systems, has announced new features for its rugged micro connector, the 1.27 mm pitch EMM series, which targets defense and other high-reliability applications. The MIL 83513-style connectors that require a significantly smaller footprint than the closest industry competitor now feature captive screw fixings and can be used with thicker PCBs and larger diameter cables.

Captive screw fixings provide the fastest locking solution available, since there is no need to tighten alternative sides repeatedly. They also ensure that screws are never lost. EMM miniature connectors are also now optionally available with longer straight-through and 90° contacts enabling them to be used on PCBs that are up to 3.5mm thick. Finally, EMM connectors can also be used with AWG24 cable, larger than competing devices.

@: p.mcdavitt@nicomatic.com
☎: +44 1183 801033

www.nicomatic.com





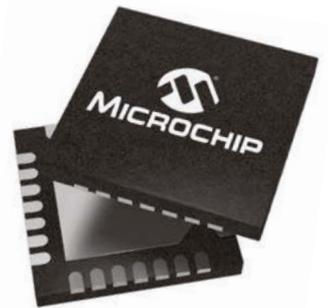
Smart Solutions to Accelerate Design

Building Blocks to Optimize Your Design's Intelligence

As technology has evolved, more and more devices demand intelligent systems. Microchip has been on the forefront of this evolution, bringing you a broad portfolio of solutions that helps you:

- Easily find the right level of intelligence for your design with our broad portfolio of 8-, 16- and 32-bit MCUs, DSCs and MPUs
- Efficiently create differentiated designs with flexible peripherals and functions
- Accelerate design time with our intuitive development environments, complete reference designs, free software libraries and automatic code generation tools.

Learn how Microchip can get you to production faster by providing solutions that are not only smart, but also connected and secure.



Get smart at www.microchip.com/Smart

