Are augmented and virtual reality finally set to become the next big computing platforms?

Blockchain users are rediscovering hard lessons from real-time systems and game theory.
COMMENT
5
With the launch of the Galaxy Fold will Samsung be able to fight off the competition and halt falling sales?

Intel unveils next generation acceleration card to address the needs of 5G radio and core networks

Xilinx supports 5G deployment with full sub-6GHz spectrum support for the Zynq UltraScale+ RFSoC portfolio

Cadence and Green Hills announce a strategic partnership to help drive the embedded market

China looks set to overtake the US in becoming the global leader in international patent filings

COVER
12
Debugging the expensive way
Blockchain users are rediscovering hard lessons from real-time systems and game theory. By Chris Edwards

ROBOTICS
16
Robotic surgery
Robotics combined with machine learning and AI, promises to radically change surgical outcomes. By Neil Tyler

RESEARCH & DEVELOPMENT
18
Choosing a connectivity standard
When it comes to selecting a standard for the IIoT the choice should be based on the technology, according to Dr. Stan Schneider

EMBEDDED DESIGN
20
Designing with, not for manufacturing
A cloud-based platform looks to make collaboration between designers, suppliers and manufacturers easier. Bethan Grylls reports

FUTURE NETWORKS LAB
22
Taking a lead
The setting up of the Future Networks Lab looks to support and enable the adoption of innovative technologies. By Neil Tyler

SECTOR FOCUS
25
The wearable doctor
Developments in sensing technology and AI suggest that the wearables market is set fair, according to Neil Tyler

DESIGN PLUS
29
Battery anxiety
Our reliance on mobile devices means that users want to keep their devices always on and charged. By Bethan Grylls

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Samsung to the rescue?
WITH ITS LATEST FOLDABLE SMARTPHONE, CAN SAMSUNG REVERSE FALLING SMARTPHONE SALES?

With Mobile World Congress in Barcelona in full swing and 5G expected to steal the limelight with operators and vendors vying with one another to show that they are leading in the race for 5G commercialisation, we can expect to see plenty of handset launches.

Last week Samsung stole a march, and the headlines, when it unveiled the Galaxy Fold. The device, described as a phone-tablet hybrid, has been considered a bit of an ‘engineering marvel’, providing a foldable tablet sized screen that can be carried around in your pocket. So, has Samsung trumped Apple with this tenth anniversary release?

Being first has always been a major play for Samsung and it’s certainly able to claim a ‘first’ with this foldable device, successfully burnishing its innovation credentials with a device that contains six cameras, 12GB of RAM and half a terabyte of storage. The phone can also operate three apps simultaneously.

The Galaxy Fold resembles a conventional smartphone but opens like a book to reveal a second display the size of a small tablet.

But while Samsung has certainly wowed the smartphone industry it doesn’t come cheap, costing over £1,500.

The smartphone market is changing, however, and people are holding on to their devices for longer and it’s unlikely that the Fold will turn a profit for Samsung. Could we see Apple going to market with its own foldable phone, with more features, in a year or so?

It’s certainly too soon to tell, but industry analysts suggest that due to its price sales of the Fold could be limited. No more than 1 million devices according to some, which would represent less than one percent of the 291 million smartphones shifted by Samsung in 2018.

Whatever happens, Samsung has stolen a march on its competitors and while reaction to the phone has been mixed - it’s innovative but is it really needed seems to be the gist, it has certainly set new price standards in the smartphone premium category.

So, could this device help Samsung rejuvenate its mobile business in the face of strong competition from Chinese competitors and is it possible to innovate your way out of what is a mature market?

We’ll have to wait and see, but without doubt it comes at a crucial time for an industry which last year saw sales decline for the first time.

Neil Tyler, Editor (neil.tyler@markallengroup.com)
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INTEL DEVELOPS FPGA PROGRAMMABLE ACCELERATION CARD TO ENABLE NEXT-GEN 5G SOLUTIONS. BETHAN GRYLLS REPORTS

Looking to enable 5G next-generation core and virtualised radio access network solutions, Intel has developed the FPGA Programmable Acceleration Card N3000.

The N3000 is a customisable platform designed for service providers delivering high throughput, lower latency and high-bandwidth applications.

It is capable of accelerating network traffic up to 100 Gbps and of supporting up to 9GB DDR4 and 144MB QDR IV memory for high-performance applications. Commenting Ron Parker, chief architect at Affirmed Network, said: “Working with the N3000, we have developed a cloud-native, containerised solution for the 5G core and EPC - the first true 100G/CPU socket solution. The FPGA acceleration allows us to process this traffic load with 50 per cent less CPU utilisation, providing significant room for growth.”

“Intel FPGAs optimise software performance, lowering power consumption and latency for diverse quality of service characteristics across multiple 5G network slices.”

The new acceleration card allows for optimisation of data plane performance to achieve lower costs, while maintaining a high degree of flexibility, according to Intel. The support of end-to-end industry standard and open source tools provides users with the ability to adapt quickly to evolving workloads and standards.

Intel adds that the programmability and flexibility of an FPGA also allows customers to create tailored solutions by utilising reference internet protocols (IPs) for networking function acceleration workloads such as vRAN, vBNG, vEPC, IPSec and VPP.

Immersive compute

Qualcomm Technologies has announced broad ecosystem support from OEMs, operators, and platform providers to deliver the next generation of mobile immersive computing experiences with XR viewers connected to 5G smartphones.

XR viewers provide a lightweight headset form factor that offers visually rich, interactive, augmented or virtual reality experiences with high-resolution displays and advanced inside-out Six Degrees of Freedom tracking. They’re connected to smartphones based on the Qualcomm Snapdragon 855 Mobile Platform, tethered via USB Type-C.

Qualcomm describes XR as the “next gen immersive mobile compute”; and with high data rates and low latency, XR viewers can be optimised and commercial-ready for the mobile industry in 2019.

To support compatibility requirements, Qualcomm will expand the HMD Accelerator Program to include and help pre-validate components and performance between smartphones and XR viewers.

Data-driven

UltraSoC has extended its embedded analytics architecture, allowing designers and innovators to incorporate powerful data-driven features into their products.

Developers in the automotive, storage and high performance computing industries will now be able to integrate more sophisticated hardware-based security, safety and performance tuning capabilities within their products using UltraSoC’s in the system on chip (SoC) development cycle.

New features allow SoC designers to build on-chip monitoring and analytics systems with up to 65,000 elements, allowing support for systems with many thousands of processors. Future iterations will allow even higher numbers of processors for Exascale systems and new System Memory Buffer (SMB) IP will allow the embedded analytics infrastructure to handle the high volumes of data generated by multicore systems, and to cope with “bursty” real-world traffic.
XILINX EXTENDS ITS ZYNQ ULTRASCALE+ RFSoC PORTFOLIO TO FULL SUB-6GHZ SPECTRUM SUPPORT. BETHAN GRYLLS REPORTS

Xilinx’s Zynq UltraScale+ Radio Frequency (RF) System-on-Chip (SoC) portfolio now covers the entire sub-6GHz spectrum. With support for direct RF sampling of up to 5GS/S, 14-bit analogue-to-digital converters and 10GS/S 14-bit digital-to-analogue converters, both up to 6GHz of analogue bandwidth, Xilinx can meet the needs of next generation 5G deployment.

Xilinx’s says its RFSoC portfolio is the only single-chip adaptable radio platform that has been designed to address current and future industry requirements.

The portfolio now includes the Zynq UltraScale+ RFSoC Gen 2 which supports 5G New Radio and the Zynq UltraScale+ RFSoC Gen 3, which provides full sub-6GHz direct-RF support, extended millimeter wave interface, and up to a 20 per cent power reduction in the RF data converter subsystem compared to the base portfolio.

These products monolithically integrate higher-performance RF data converters that deliver the broad spectrum coverage required for the deployment of 5G wireless communications systems, cable access, advanced phased-array radar solutions and additional applications, including test and measurement and satellite communications. By eliminating discrete components, the devices enable up to a 50 per cent power and footprint reduction.

With pin-compatibility across the portfolio, customers can design and deploy their systems now using first-generation devices with a roadmap to Gen 2 and Gen 3 for greater performance.

At the forefront of innovation

Southampton University’s School of Electronics and Computer Science, and the Zepler Institute for Photonics and Nanoelectronics have received a £100m investment from UK Research and Innovation to fund the creation of the UKRI Centre for Doctoral Training (CDT) in Machine Intelligence for Nano-electronic Devices and Systems (MINDS).

The MINDS CDT, one of 16 new centres announced under this latest round of UKRI funding, will lead a research training programme to develop cohorts of PhDs to become “well-rounded innovators”.

The Centre brings together a mixture of complementary expertise from within the University and from industry to focus on the benefits of future AI systems and their application in a wide variety of domains including robotics, embedded systems, manufacturing and security, and smart cities.

These areas will be developed collaboratively with partners including Roke Manor, Thales, Intel, Huawei, AWE, IBM Research, Barton Peveril Sixth Form College, NXP Semiconductors, Royal Bank of Canada, Tata Consultancy Services, IP Group and Set Squared.

The MIND CDT is recruiting now for students to commence their PhDs in September 2019.

Graphene Flagship researchers solved one of the challenges of making graphene nano-electronics effective: to carve out graphene to nanoscale dimensions without ruining its electrical properties. This has allowed them to achieve electrical currents orders of magnitude higher than previously achieved for similar structures. The work shows that the quantum transport properties needed for future electronics can survive scaling down to nanometric dimensions.

To accomplish this, the team encapsulated graphene with another 2D material, hexagonal boron nitride. Then, using nanolithography, they carefully drilled nanoscopic holes in graphene through the protective layer of boron nitride. The holes have a diameter of approximately 20nm and are separated from each other with just 12nm. This great precision is said to make it possible to send an electrical current through the graphene that is 100-1000 times higher than typical numbers for lithographically carved graphene.

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Cadence and Green Hills announce strategic partnership

COMPANIES LOOK TO LEVERAGE THEIR STRENGTHS TO DRIVE EMBEDDED SYSTEM SAFETY AND SECURITY. NEIL TYLER REPORTS

Cadence Design Systems and Green Hills Software have created a strategic partnership with the aim of leveraging their respective strengths to drive embedded system safety and security.

Cadence has invested about $150 million in Green Hills that represents an approximate 16 percent ownership interest in the company. Cadence CEO, Lip-Bu Tan (right), has also joined the Green Hills Board of Directors.

There continues to be rapid growth of hyperconnected embedded systems that are deployed into critical infrastructure and security has become one of the most serious challenges that needs to be addressed.

Green Hills is seen as a leader in embedded safety and security solutions, with its INTEGRITY-178B real-time operating system having been certified to EAL6+, the highest Common Criteria security level achieved for an operating system.

The partnership will further Cadence’s System Design Enablement strategy and builds upon its core electronic design automation (EDA), verification hardware, embedded processor and IP solutions to address new market expansion opportunities in a market that’s worth an estimated $3 billion.

Both companies expect to collaborate on providing integrated solutions that comprehend both hardware and software aspects of safety and security, to enable the development of highly secure embedded systems.

“The hyperconnected era is creating increasing safety and security challenges, particularly for the critical aerospace and defence, automotive, medical and industrial IoT domains,” said Lip-Bu Tan, chief executive officer of Cadence. “By partnering closely with Green Hills, we look forward to delivering solutions that will accelerate the development of highly secure embedded systems in these critical areas and further our System Design Enablement strategy by broadening our reach in these verticals to expand beyond our core business into newer adjacent areas of the system space.”

Mesh Wi-Fi networks simplified

Qualcomm has announced the industry’s first development kit for mesh Wi-Fi networks, qualified by Amazon, to integrate the Amazon Alexa Voice Service (AVS).

The Qualcomm Mesh Networking Development Kit offers manufacturers the building blocks necessary to cost-effectively create mesh Wi-Fi systems with Alexa built-in. The addition of Alexa, integrated via the ClearVoice far-field voice enhancement software solution from Meeami Technologies, makes it easy for mesh networking manufacturers to provide leading voice capabilities to their customers layered on the Qualcomm Wi-Fi mesh platforms.

With Alexa built-in, customers will be able to manage, automate and monitor smart home devices. “By adding Amazon’s advanced voice capabilities through the Alexa Voice Service, we are unlocking new opportunities for customers controlled with the simplicity of voice,” said Nick Kucharewski, vice president and general manager, Wireless Infrastructure and Networking, Qualcomm.

Combination creates Electro Rent Corp.

Microlease and Electro Rent in Europe are to start the integration of their European operations. The two companies will merge to join the global Electro Rent Corporation. It will also consolidate the Microlease and Livingston brands into Electro Rent during this time.

The move is expected to deliver better service and support to customers, as well as access to a greater pool of equipment for immediate availability as well as increased technical expertise.

The combined new group will have equipment assets worth over $1.1 billion, making its inventory the largest in the industry. With a team of technical experts covering all aspects of engineering, along with lease and asset management specialists, the new company will be able to service a wider range of customers.

“Test equipment users will benefit from a unique brand-independent source with fast access to the widest range of equipment,” said Peter Collingwood, CEO EMEA, Electro Rent Corporation. “We look forward to sharing the benefits of this global collaboration across both Microlease and Electro Rent customers bases, offering expert applications and solutions advice without any disruption during the rebranding process.”

Achronix announces partner programme

Achronix Semiconductor, a developer of FPGA-based data accelerator devices and high-performance eFPGA IP, has unveiled a new partner programme.

The programme is for EDA tools, software, and IP vendors with solutions and services directly applicable to Achronix’s Speedster FPGAs, Speedchip chiplet technology and Speedcore eFPGA custom IP-block technology and is intended to connect Achronix’s partners with the company’s rapidly growing customer base and provide them with better access to developers who are creating designs based on the company’s technologies, or considering the use of its programmable silicon and IP technologies.

“Through the Achronix partner programme, we have committed to giving customers easy access to a broad, growing, and robust ecosystem of EDA and IP partners, who can provide products and services that will speed the design of systems based on Achronix’s programmable logic devices and IP,” said Steve Mensor, vice president of marketing at Achronix.
A recent report published by the World Intellectual Property Office (WIPO) has revealed a rapid increase in innovation activity in China. Based on data for 2017, China was in second place as a source of international patent applications at almost 49,000, with the US claiming first position at 56,000. The Chinese government hopes to reach 60,000 applications by 2020, and at the current rate of growth in patent filings, this seems within reach. China was the only country to achieve double-digit growth (13.4%) in patent filings in 2017 and there has been an average annual increase of more than 10% per year since 2003.

According to the report, China was the biggest source of patent filings related to digital communications in 2017, with 19.7% of patent applications originating in China falling into this sector and highlighting the country’s desire to be recognised as a global hub of tech innovation.

Commenting John-Paul Rooney, a partner and patent attorney at intellectual property firm, Withers & Rogers said: “China has had a reputation as a nation of ‘reverse engineers’ who copied the proprietary technologies and know-how of Western businesses. Then, China saw IP rights as a hindrance, something that would slow the pace of technological development.

“In the past five years, significant inroads have been made to create a nation of innovators and encourage IP ownership. Spurred on by the Chinese government, businesses have been challenged to develop an offering that instead of simply being “Made in China” was “Designed in China” too.”

As Rooney explained, the Chinese government has introduced some generous subsidies and inventor incentives.

“Inventors receive personal recognition for their work and could gain urban ‘hukou’ status in key cities, giving them access to incentives, such as subsidised housing, government jobs, education and healthcare.”

Patent owners are now able to monetise their innovations by licensing them to third parties in exchange for royalty payments. This is an important incentive for innovators to file more patents, wherever they are in the world.

Recognising its potential value to the Chinese economy, it is part of the government’s five-year plan to increase the value of royalty payments generated by Chinese companies from $4.4 to $10 billion by 2020.

“The global success of companies like Huawei and BOE Technology Group suggests that these subsidies and incentives are working. Huawei has extended its market share in Europe and other Chinese telecoms businesses are collaborating with Western businesses in the delivery of 5G networks. BOE Technology Group makes curved-edge and bendable display screen technologies for a variety of industrial and commercial applications, including dashboards for Tesla cars. The enhanced global reputation of these Chinese businesses is encouraging others in the domestic marketplace to follow in their footsteps,” explained Rooney.

The availability of subsidies and incentives for innovation activity is not wholly positive, however. There are still some anti-trust issues that need to be addressed in relation to patent subsidies and joint ventures, and Western businesses should seek advice if they are considering a form of collaboration in China.

“Chinese courts are doing what they can to tackle corruption and uphold IP rights where they exist. As a result, Western businesses are far more likely to be able to successfully enforce their rights in China, if there is reason to do so. At the end of last year, Jaguar Land Rover invalidated a patent owned by a Chinese company relating to the Range Rover Evoque at the Beijing High Court.”

Because things have been changing quickly in China and significant progress has been made in raising awareness of international IP rights and their role in unlocking global markets and collaborations, “Western businesses can be more confident, with the correct advice, that their IP rights will be respected in the Chinese IP Courts,” said Rooney.

“For those seeking to collaborate or otherwise join forces with Chinese businesses, they can now do so on a more predictable and level playing field.”
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Blockchain users are rediscovering hard lessons from real-time systems and game theory. By Chris Edwards

DEBUGGING THE EXPENSIVE WAY

Blockchain users are rediscovering hard lessons from real-time systems and game theory. By Chris Edwards

"I accidentally killed it," a programmer with the handle devops199 confessed on a Github message board. But unlike most situations where a developer had accidentally taken down a service or deleted a critical function, this particular error destroyed $300m of deposited cash.

Since the error in November 2017, the money remains locked away within the Ethereum blockchain. It can only be recovered by a “hard fork” in which users are forced to a new version of the chain, a move for which it is hard to find a consensus among users partly because it calls into question the claimed immutability of blockchain records.

The code killed by devops199 was a set of library functions for a so-called smart contract. Blockchain advocates use the term smart contract to describe small programs that run on blockchain networks and which manage transactions between users.

Such contracts are not so much smart as simply ways to automate record-keeping processes traditionally performed manually under conventional legal “dumb” contracts.

In an industry such as electronics manufacture, a smart contract might be invoked every time a shipment of components changes hands on its way to the factory. Although this could be handled by supplier databases, a blockchain implementation makes it easier for multiple parties to cooperate and open the door to easier trading between contract manufacturers.

One with a surplus of a particular batch of ICs could advertise them by placing them on the blockchain. Another manufacturer facing a shortage can bid for and buy those parts through one part of the smart contract and then assign a courier to pick them up, at which point the contract updates the record to show who has custody.

Most smart contracts in use today control wallets that store cryptocurrency tokens, such as Ethereum’s Ether, making it easier to move the money around and enforce controls on how transactions proceed. For example, a company can provide multiple users with access to the store of funds and impose transfer limits using smart contracts.

A key aspect of smart contracts is that everyone can see and interact with the contents of every smart contract posted to the blockchain. It is up to the smart-contract writer to enforce controls to prevent this work from interfering with their operation. For some reason, devops199 went about their research into smart contracts they found on the Ethereum network in a peculiarly destructive way on code that had not been properly protected. “I’m eth newbie…just learning…sending kill(), destroy() to random contracts. You can see my history,” the programmer wrote in a chat room later, ending with a sad emoticon.

“Can’t make an omelette without breaking some eggs, I guess,” wrote another chat-room occupant.

Most of the attempts by devops199 had apparently failed. The kill requests were simply rebuffed by the code inside the smart contracts
or had little practical effect. But one attempt succeeded in spectacular and expensive fashion. Because of a small but critical error made by Parity’s developers in writing the software, a package of library functions were not declared as such. Instead, they appeared as smart contracts in their own right. This gave the code an unfortunate property: it made it possible for a developer to claim ownership of it.

Once they had ownership of the contract users could do what they liked, such as kill it. And kill it they did, along with the money it controlled. Such problems are not limited to blockchain networks.

The blockchain concept
The ‘open-source’ software world has itself faced the consequences of a developer killing off creations. Appalled by a trademark-infringement over the naming of one of his modules on a popular open-source Javascript repository, developer Azer Koçulu removed all of his code including a function that padded the left side of strings with zeroes. This function had been used in numerous other libraries that suddenly refused to build.

An important difference is that the left-pad function code could be easily restored to the repository, albeit in a legally questionable way. The key difference with the blockchain is its guarantee of irrevocability. On top of this is the way in which blockchain development is, today, intertwined with finance. Because they suck in real money by the million, accident-prone blockchains are guaranteed to make headlines.

David Wong, security consultant at NCC Group, argues one way to look at a network such as Ethereum as simply being “a very big computer”. It is also a very slow computer. This is a consequence of the way in which all actions need to be recorded through the consensus-forming process that has emerged as one of the main features of blockchain systems since the creation in January 2009 of the Bitcoin protocol.

The blockchain concept described in the Bitcoin white paper written by its creator under the pseudonym Satoshi Nakamoto borrows ideas from several sources. The most obvious was a timestamping system for official documents devised in 1991 by Stuart Haber and W Scott Stornetta, who worked at Bellcore. Their proposal was to create a chain of cryptographically signed blocks, with each successive block’s signature dependent on its predecessors. In the original proposal, the timestamps used to show authenticity would be created by recording data from the latest block in the form of a cryptographic hash and publishing it on Usenet or in a newspaper.

Nakamoto’s protocol replaced the need for publication off-chain with a consensus algorithm that could be used in a peer-to-peer system. In this proof-of-work system, “miners” collect the data for the next block in the chain and generate a hash that must have a certain number of leading zeroes by adding in a “nonce” value. As the output of a hash function is almost impossible to predict without performing the function itself, it can take a large number of attempts to come up with a hash with the required format. The first miner to succeed is paid. If two miners happen to publish a result simultaneously, the successful recipient is the one whose version of the blockchain propagates more widely and receives additional the blocks afterwards.

The idea of Ethereum and similar networks being large decentralised computers is fundamental to making blockchain-based system able to execute smart contracts and not just exist as stores of notion cash value: the primary use of Bitcoin, the most successful blockchain so far.

Because of the time and computational effort needed to complete each transaction, blockchain processing is considerably slower than trusting the changes to a third party with a dedicated computer. For applications that need a combination of transparency, permanent records of transactions and an unwillingness to rely on a single provider to maintain the records, the blockchain has distinct advantages. But with those properties come attributes that have tripped up numerous developers.

Many of the issues encountered in blockchain programming will seem familiar to those used to programming real-time systems, with concepts such as race conditions and re-entrancy faults as well as even simpler programming mistakes such as not dealing with arithmetic underflow and overflow. Although the consensus algorithms provide a strong guarantee that transactions were made, they make no attempt to check whether they should have happened. The result has been that those discovering problems the hard way cause million-dollar losses rather than a board locking up or a small motor burning out.

The first major loss due to a core
mistake in the smart contracts running on a blockchain led to the collapse of the DAO crowdfunding network. A hacker took advantage of a function that allowed re-entrancy without any checks to withdraw money time and again before account balances were updated. Once the blockchain updated, the wallet behind the victim’s smart contract would be empty. The attacker obtained the equivalent of $60m although Ethereum agreed to allow a hard fork to reclaim a large proportion of the money. 

Whereas real-time programmers have to face the vagaries of interrupts and their influence on the timing of processes inside their systems, at least conditions such as race conditions can be written off as the consequences of random chance. Blockchains also suffer from the often malign influence of game theory.

**Security assumptions**

“Some of the security assumptions we have to make are economic,” Philip Daian, a postgraduate researcher at Cornell University, explained at Ethereum’s Devcon4 in Prague late last year.

For example, the assumption behind the consensus mechanism that underpins Bitcoin is that the miners who control the blockchain will not subvert it because to do so would undermine the value of the tokens traded on the network. A 2018 paper by Eric Budish, professor of economics at the Chicago Booth School of Business, argued sabotage is another motive for corrupting a blockchain though a miner has to spend heavily in a proof-of-work system to achieve enough control.

In the case of Bitcoin, only nation states are likely to have the clout to perform a majority attack, limiting their probability. Alternative blockchains, particularly if they suffer a decline in usage, would be far more vulnerable although researchers from the Digital Currency Initiative at MIT have argued the practical barriers to a successful majority may be higher than Budish has calculated. But a concentration of power is not just possible it seems likely for blockchain systems. Analysis 18 months ago by researchers at Cornell University found more than 90 per cent of the mining power on Bitcoin was owned by eleven mining pools on Bitcoin and just seven on Ethereum.

More subtle attacks on the integrity of blockchains come through race conditions, another problem from real-time computing that has resurfaced in the world of consensus protocols though with some additional wrinkles from the world of economics. For example, because all transactions are public, front-running afflicts Ethereum in much the same it does stock and futures exchanges.

Front-runners spot potentially lucrative transactions that they can gazump. They step in to satisfy them with a fee that is more attractive to miners and so wind up winning the order. On blockchains, this is not necessary as they can simply take advantage of the mining latency. Miners may also choose to reorder competing transactions in ways that are more advantageous to them.

To avoid these kinds of attack, writers of smart contracts will need to agree on locked prices rather than submit to spot pricing or find techniques, such as so-called submarine sends, to hide details until mining has completed for the block that contains them.

Although it has taken some time for the industry to react to its challenges, blockchain developers now recommend more stringent programming practices that take transaction security into account and looking at ways in which technology might help.

Wong says because smart contracts are usually small in terms of lines of code they are amenable to techniques such as formal verification. And formal verification projects focused on blockchains have sprung up. At Devcon4, Professor Mooly Sagiv of Tel Aviv University and co-founder of Certora said his company expects to launch a freemium service next month that will check smart contracts for consistency. The tool would test for generic properties that all contracts should obey, such as the ability to perform combinations of transactions atomically, and against specific use-cases described using the company’s own Contract Vulnerability Language.

This second part is where Certora is trying to build a portfolio of specifications to cover common applications such as asset ownership and money-market trading systems.

“The interesting thing about this language is that it’s reusable: we have the ability to write reusable specifications,” says Sagiv. But it will take time to develop the necessary specifications.

“We need a community effort. We need to understand what you are doing so we can understand the correctness requirements.”

Until the tools are in place to assess the quality of blockchains and their smart contracts, users who want to embrace the technology will still need to tread carefully. And make sure they have learned the lessons of programming history.
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According to a report from PwC that looked at the use of artificial intelligence and robotics in various sectors, healthcare was identified as being one of those with real potential when it came to the use of these technologies.

An ageing population, together with more recent advances in sensors and wireless connectivity, along with much improved IT systems, mean that healthcare is now well placed to take advantage of the capabilities of robots and AI which are leading to the greater adoption of more automated systems.

According to the report AI could be used for the examination, diagnosis, and treatment of patients, for example, and could help clinicians to speed-up their decision making as well as help perform certain tasks more effectively and efficiently.

The most striking potential, when it comes to the future deployment of robots, is in conducting the surgery itself.

The da Vinci robotic surgery system is perhaps the best-known example of this kind of technology, with over 4,500 robots deployed worldwide. These robots are, however, more about manipulation than true surgical robotic systems.

Nonetheless, the global surgical robotics market is growing strongly and research, from Allied Market Research, suggests that it is expected to top $98 billion by 2024. The range of applications is also expected to continue to expand rapidly.

In the UK, CMR Surgical has unveiled the Versius robot, which it says is smaller, and more flexible and versatile than existing robots, allowing it to perform a much wider range of operations.

But it’s with robots enabled with AI where we can expect to see the acceleration in their adoption in automated surgery.

“Advances in sensors and wireless connectivity, mean that healthcare is better placed to take advantage of robotics and AI.”

While it is certainly a relatively new area of research, innovation is accelerating around the world. Plastic surgeons at Maastricht University Medical Centre, for example, have carried out super-microsurgical intervention using ‘robot hands’ capable of suturing 0.3 to 0.8mm blood vessels in a patient’s arm, in what was described as a world first.

Microsure, a spin-off of from Eindhoven University of Technology and Maastricht University, has developed a surgical robot that can be controlled by a surgeon whose...
Spinal surgery

But it remains surgery where the application and use of robotics is providing the most exciting opportunities.

In the UK, a team led by Professor Philip Breedon, of the Medical Design Research Group at Nottingham Trent University, has developed robots capable of performing spinal surgery with much greater accuracy than currently possible.

Part of a ground-breaking research project the team of researchers, led by the professor, have created a system which allows two robotic arms to semi-autonomously drill holes in individual vertebrae.

“The drilling is required as part of an operation which allows surgeons to straighten the spines of patients who have conditions such as scoliosis or kyphosis,” explained Prof Breedon.

The research has been undertaken as part of a collaboration with Professor David Brown of Nottingham Trent University’s School of Science and Technology and consultant spinal surgeon Professor Broniek Boszczyk, who is Head of Spinal Surgery at Benedictus Krankenhaus Tutzing in Germany, and who was a former visiting professor at Nottingham Trent University.

According to Professor Boszczyk, “It is paramount that spinal procedures are carried out with total accuracy as there are substantial risks to the patient from this type of surgery. This technology has the potential to minimise those risks by performing a key part of the operation with accuracy which cannot be achieved by the human hand.”

Prof. Breedon agreed. “The technology that’s been developed is able to deliver previously unachieved levels of accuracy, partly because the robotic arms move in unison and naturally with the patient’s spine during the operation whilst drilling.”

Professor Boszczyk explained that the device uses AI to stabilise any tremors in the surgeon’s movements, making the procedure much safer and easier to perform.

Going forward, it is expected that surgeons will look to use these AI-inspired robots across a range of complex microsurgical procedures, such as tissue reconstruction.

But the role of robots goes further than ‘just’ surgery. Once out of the operating theatre, there will be a role for robotics in post-operative care and so we are seeing the development of so-called ‘bedside robots’ that by using voice recognition software, will be able to help patients with their post-operative rehabilitation.

“Surgeons who are performing this type of life-changing operation have to ensure that pinpoint levels of accuracy are achieved.”

Prof. Phillip Breedon

“Many still want to have the tactile experience from conducting surgery because that tells them whether the surgery is being carried out effectively, so we are now looking at using AI or machine learning to learn from that experience so we can better understand the needs of the surgeon and the surgery itself.”
The IIoT covers many industries with very different use cases. The connectivity technologies and standards that target these applications are themselves diverse. In fact, the IIoT space is so big that the technology options barely overlap.

The architecture challenge in the IIoT space is not one of choosing among overlapping standards that may each be able to reasonably solve a problem but rather understanding the technologies, comparing the intended use to the application, and choosing the one that best addresses the particular challenge.

Stretching a technology out of proportion can make anything work. But, that will result in a lot of extra work and an awkward design.

Before the Industrial Internet Connectivity Framework (IICF), people assumed that competing standards met overlapping requirements in the IIoT connectivity space. It turns out, however, that those connectivity standards do not overlap. Most applications will not be a perfect fit and so must adapt.

After all, while connectivity technologies all move data, they are nonetheless very different.

Since the connectivity options are so different, in most use cases, there tends to be no choice in the connectivity technology, but this lack of overlap in the IIoT space actually helps to makes an architect’s task much simpler.

It’s possible, however, to ask a few very simple questions for each technology option and quickly narrow the choices.

**Data Distribution Service (DDS)**

Here are five questions to answer and determine if you need DDS:

1. Is it a big problem if your system goes down for a short time?
2. Are milliseconds important in your communications?
3. Do you have more than 10 software engineers?
4. Are you sending data to many places, as opposed to just one?
5. Are you implementing a new IIoT architecture?

If you answered three out of the five questions “yes,” you probably should use DDS.

DDS is a series of standards managed by the Object Management Group (OMG) that define a databus, which is data-centric information flow control. It’s a similar concept to a database, which is data-centric information storage. The key difference: a database searches old information by relating properties of stored data. A databus finds future information by filtering properties of the incoming data.

Both understand the data contents and let applications act directly on and through the data rather than with each other. Applications using a database or a databus do not have a direct relationship with peer applications.

The databus uses knowledge of the structure, contents and demands on data to manage dataflow. It can, for instance, resolve redundancy to support multiple sources, sinks and networks. The databus can control Quality of Service (QoS) like update rates, reliability and guaranteed notification of data liveliness. It can look at the data inside the updates and optimize how to send them or decide not to send them at all. It also can discover and secure data flows dynamically.

All of these things define interaction between software modules. The data-centric paradigm thus enables software integration.
OPC UA

OPC UA is a standard managed by the OPC Foundation (formally known as Object Linking and Embedding for Process Control) also documented as IEC 62541.

OPC UA targets device interoperability. Rather than accessing devices directly through proprietary application program interfaces (APIs), OPC UA defines standard APIs that allow changing device types or vendors. This also lets higher-level applications, such as human machine interfaces (HMI) find, connect to and control the various devices in a factory.

OPC UA divides system software into clients and servers. The servers usually reside on a device or higher-level Programmable Logic Controller (PLC). They provide a way to access the device through a standard “device model.”

There are standard device models for dozens of types of devices from sensors to feedback controllers. Each manufacturer is responsible for providing the server that maps the generic device model to its particular device.

The servers expose a standardised object-oriented, remotely-callable API that implements the device model.

Clients can connect to a device and call functions using the generic device model. Thus, client software is independent of the actual device internals, and factory integrators are free to switch manufacturers or models as needed.

So, OPC UA can build and maintain a system from interchangeable parts, much like standardized printer drivers allow PC system integration. Note that the device model also provides a level of “semantic” interoperability, because the device model defines the generic object APIs in known units and specified reference points.

If you are in discrete manufacturing; building a device that will be integrated by control or process engineers or technicians, rather than software engineers; developing a product to be used in different applications in different systems, as opposed to one (type of) system where you control the architecture or building equipment for a “workcell” then the OPC UA is for you.

OneM2M

OneM2M provides a common service layer that sits between applications and connectivity transport. Its emphasis is on providing common services, on top of different connectivity standards.

To determine if you should use oneM2M, consider these questions:
1. Do you know what “ICT” stands for, and does it describe what you do?  
2. Is the cellular network your primary connection technology?  
3. Are your target applications largely composed of moving parts?  
4. Can the components of the system tolerate intermittent connections and loosely-controlled latencies?  
5. Will the system leverage services provided by a communications provider, such as a telco?

These questions differ in character from the questions about the previous technologies. OneM2M results from cooperation among many mobile wireless providers. It targets networks of mobile devices that communicate mostly or only through the base-station infrastructure.

RESTful HTTP

REST (Representational State Transfer) over HTTP is the most common interface between consumer applications and web services. REST is an architectural pattern for accessing and modifying an object or resource. One server usually controls the object; others request a “representation” and may then send requests to create, modify or delete the object.

To see if RESTful HTTP is the best single web service API; building an HMI interface to an IoT device or service; does your application only need to be fast enough for human interaction; must your dataflow cross firewalls that you do not control or is there no device-to-device communication?

Comparing these technologies highlights the stark differences and non-overlapping nature of connectivity approaches.

For instance, OPC UA is object oriented (OO), while DDS is data centric. Those are diametric opposites. The object-oriented mantra is “encapsulate data, expose methods.”

Data centricity is all about exposing data, and there are no user-defined methods. The only methods are defined by the standard.

OPC UA targets final device-centric integration by plant engineers. It offers easy interoperability between devices from different vendors. By contrast, DDS targets final data-centric software integration by software teams. As intelligent software gains importance, DDS provides the global data abstraction and dataflow interface control that software teams need.

OneM2M and RESTful HTTP aim at connection from the edge to cloud services.

Looking at the differences, it’s clear that these technologies simply do not compete in practice. However, the level of “confusional competition” is amazing. The various vendors and standards organisations, in general, do not help. Their positioning often uses similar words for vastly different concepts. Common terms like “publish subscribe” hide huge differences in types of information, discovery, selection of data and QoS control, and “Real time” without specifying a time period like milliseconds or minutes is meaningless.

Most applications fit one of these popular standards. If you answered “yes” to three questions for any technology above, you should start there. If you didn’t, choose the closest match and start adapting.

Author details:
Dr. Stan Schneider is CEO at Real-Time Innovations
A cloud-based platform looks to make collaboration between designers, suppliers and manufacturers easier.

By Bethan Grylls

At last year’s Altium Live, an event dedicated to help printed circuit board (PCB) designers, several new product announcements were made, including the release of Altium Designer 18 and Nexus.

Commenting, Ted Pawela, Chief Operations Officer, Altium, said that despite the launch of these products much of the collaboration that is required between designers, the supply chain, and manufacturers still tends to be unstructured.

“One of the most important elements of any collaboration in this industry is being able to take a PCB from a concept or idea to the design phase, and ultimately getting it manufactured. A designer will have to connect and then work with a manufacturer and this can prove a slow and laborious process.”

Leigh Gawne, Director of Cloud Operations at Ciiva, agreed, describing those connections as “weak and informal”.

“In the past, design and manufacturing tended to be done within one company,” he explained. “Today, in order to remain competitive, most companies have a core competence. Despite that trend the various processes remain closely associated with one another.

“The partitioning of the work flow and the complexity of technology means the process has become increasingly difficult to control. These different stages have to be brought together in some way in order to realise and then bring to market a product,” said Gawne. “Too often communication is made through uncontrolled documents and emails. What’s more, the information that is sent is mostly of minimal detail, resulting in mistakes and leading to those involved having to go back and ask more questions.”

In response Altium is focusing on improving the collaboration and communication between those involved in this process.

“If we are going to create a more connected, more advanced world, we will need to get considerably better at collaboration,” confirmed Pawela.

Altium has acquired a number of businesses in recent years – from content providers to suppliers of cloud-based CAD for electronics – as the company looks to move beyond traditional desktop application software to a more modern web, or cloud-based, software package.

Altium 365

To accommodate this shift, Altium has launched a cloud-based platform, Altium 365. Integrated into Altium Designer 19, it offers an easier and more efficient way to connect designers with component distributors and manufacturers, so they can share information and design collaboratively.

It does this by allowing designers to share working schematics and 3D board designs with manufacturers who can mark up designs in real time using a web browser.

“EDA tools have tended to be confined to the desktop,” explained Lawrence Romine, Altium Vice President of Corporate Marketing. “Operating in silos it has mostly been up to the designer to share information to other parties who require it. Altium 365 has been designed to make the process and the user feel less isolated. It will give designers and engineers – for the first time – the ability to design with manufacturing rather than design for manufacturing; and will help to speed up the process from the design process to manufacture.”

The cloud is a critical part of this new infrastructure and facilitates a new way of communicating, according to both Gawne and Romine, because it provides the ability to communicate on the same bit of information in real-time.

“Traditionally,” Gawne said, “the different domains have been restricted...
to exchanging static images or other files at a specific given point of time. But, designers like to design. This means the second that information has been sent, it is no longer an accurate representation.”

At present, designs are released in flat files, spreadsheets and images which are exchanged with manufacturers who then adapt and adjust the design. That information is passed back to the designer and this is not only timely but often has to be undertaken three or four times.

“Sometimes when you exchange details, by the time any feedback has been received it’s obsolete because it’s been days and your design has moved on,” agreed Pawela.

Altium 365 has been designed to enable users to communicate with manufacturing inside the platform, keeping design and manufacturing in sync.

This means that manufacturability of designs and pricing details can be obtained via the click of a button – but with the designer controlling what they share and who they share it with.

The platform doesn’t comprise of static screenshots, but rather “real” designs.

“Those who have access can see exactly how it looks in Altium Designer,” explained Pawela. “As it is connected to the cloud, any changes are also added automatically and can be seen. We want to take a design and put it in the hands of everybody that it involved in the process of going from idea to a realised product.”

The cloud was an obvious choice because of the potential pitfalls of an internal network, with IT and firewall issues to contend with, according to Gawne.

The cloud also provides users with what are claimed to be “limitless” possibilities - meaning that as new challenges arise, more capabilities can be easily added to assist the design, supply and manufacturing process.

As for current functions, everything inside the platform is indexed to allow for easy navigation of schematics. Layouts are readily accessible and users can even pan and scan the designs, so areas such as components can be inspected.

The platform also provides 3D visualisation, meaning it’s possible to see the proposed final board.

Apart from allowing shared viewing, the platform also offers the ability to make comments, which appear in Altium Designer in real-time. This means a particular component in the schematic or a part of the board can be selected, and a contextual comment added to it.

The platform also has native plug-ins such as Inventor and Solid Works, meaning that ECAD and MCAD vendors can make changes, be notified, and then have the capability to pull and push between domains in either direction, again, in real-time.

**Octopart**

Another benefit of the software is ‘Octopart’ – a new and powerful component search engine that helps electronic designers find the components they need for their designs and provides the data they need for making informed decisions during the design process.

Price, stock levels, data sheets and reference designs are all available. The BOM tool aims to achieve the best deal, and the Common Parts Libraries for prototyping and production ensures that the parts in a design will be readied for build when the designer is themselves.

“A lot of the time people don’t consider component availability. All of a sudden, information is made available to all three parties, so issues such as obsolescence can be flagged and dealt with at an earlier time before it becomes a major issue,” explained Gawne.

“Sometimes things that seem insignificant, like a 10c capacitor that you designed in and single sourced with a lengthy lead time could prevent you from meeting your release date. Or worse, without that foresight you could go into full production only to lose that supply and your line completely stops simply because the information wasn’t accessible whilst you were designing.”

As library management is interwoven into the software, there is a single source of truth, which means no duplication.

“Project level libraries run the risk of copies being made that have error propagation. With Altium, those contributing to the design are seeing the same part,” explained Pawela.

It’s important to note, that as well as being a built-in tool in Altium Designer, 365 is also accessible via a regular browser. This means that those who would not normally use such a design programme, for example the manufacturer or procurement person, will not be required to navigate through unfamiliar software to obtain information.

In fact, Romine said changing people’s work flows was not the intention of the platform, though it is indeed possible to change them with the tools provided inside the software.

“We recognise that people have their way of working and this was always at the forefront of our minds when developing Altium 365,” he said.

“What 365 should enable is an easier way to communicate and keep track of information. It’s a tool to let users begin to make that step towards bringing these three isolated domains together,” concluded Gawne.
The setting up of the new Future Networks Lab looks to support and enable the adoption of IoT, LPWAN and 5G technologies. By Neil Tyler

Taking a lead

The Future Networks Lab, as described by Silver, is meant to help businesses achieve more and better understand the use of new technologies.

“It is a Lab for business to experiment and take risks in and to create a sense that while we can be innovative, we can also take technology out of the lab and into the real world.

“It will be a place for collaboration and important conversations; where technology is able to meet with industry. There are specific challenges if we are to fully realise the potential of the IoT and it’s at this kind of facility that we can find solutions,” Silver explained.

Partners
The Digital Catapult has partnered with BT, Siemens, PTC, Texas Instruments, IBM, SemTech and ServiceNow to launch this dedicated facility for leading edge network technologies. But, alongside some of the UK’s leading industrial players, the Lab is intended to help companies of all sizes access the very latest in network technologies, as well as provide them with development opportunities and advice for the practical adoption of these technologies.

“We want to de-risk innovation and show how these technologies can be rolled out in practice, not just in theory,” explained Peter Karney, Head of Innovation at the Catapult.

“We have a close relationship with a number of organisations,” Karney explained. “Take local authorities as an example. We work with them to identify specific issues that they are challenged by and what the level of interest is in addressing their problems. Is there a budget to pay for it and is it scalable? When you are dealing with SMEs or start-ups few have the resources or time to waste, so they need to be confident that any open call for solutions they enter into will have the possibility of delivering a real project of value at the end.”

Among the companies using the Lab and who have gone through that kind of process are VRM Tech, which has developed an innovative software platform to manage energy assets more efficiently and significantly reduce costs, while ensuring regulatory compliance.

The platform was developed out of a live project with Camden Council which has been able to use integrated KPI dashboards to monitor the district heat network that serves some 342 homes in Somers Town, London.

The Future Networks Lab, working with a number of its partners, unveiled a new facility at its headquarters in London’s Kings Cross. The Future Networks Lab is intended to unlock value for industry by enabling collaboration and the experimentation and demonstration of new, cutting edge technologies.

The Lab is one of the first facilities in Europe that has been specifically designed with a focus on the Internet of Things (IoT), 5G and LPWAN technologies.

Speaking at the launch of the Lab, the Chief Executive Officer of the Digital Catapult, Jeremy Silver said that while we lived in incredibly uncertain times and that, “global competition, driven by technology itself, was as challenging as ever,” the UK’s ability to ‘swim’ in that environment would be dependent on its ability to take a different approach and to use, “its inventiveness”, to create “incredible solutions” and by combining technologies provide a,

“glimpse of what was technologically possible going forward.”

According to Silver, UK businesses could lead the world in the development of new applications and services to run on advanced digital networks, but that they would need access to experimental testbeds and trial networks to try out new and risky ideas in a safe and measurable environment.

“While we need to be responsible when it comes to the development of technology here, in the UK, there is a real opportunity to create a truly dynamic digital nation and economy,” Silver suggested.

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As a business, to help extend and deepen the innovation ecosystem in the UK and why we have decided to be a part of this new Lab.

The UK is very strong in health, fintech and the commercial application of AI and I believe that knowledge and innovation can, and should, be able to find its way into the industrial landscape. The Future Networks Lab will have a critical role to play in delivering on this ambition.”

adoption will allow the Future Networks Lab to give companies hands-on access to LoRa Technology and IoT expertise,” explained Vivek Mohan, Director of IoT in Semtech’s Wireless and Sensing Products Group.

“We are pleased to be underpinning the Future Networks Lab to encourage further innovation in 5G and IoT,” said Vince Cable, Secretary of State for Business.

Speaking at the launch of the Lab, Jeremy Silver, the UK’s First Minister for the Future, said: “The Future Networks Lab will have a critical role to play in deepening the innovation ecosystem in the UK and why we have decided to be a part of this new Lab.

That’s why we are so keen, as a business, to help extend and deepen the innovation ecosystem in the UK and why we have decided to be a part of this new Lab.

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Another is Nwave, which is a company that has developed a vehicle detection sensor that interfaces with a driver identification (one-click payment) mobile app enabling a much easier and simpler experience when it comes to parking.

“Over the past five years our reputation has grown,” said Karney. “When the Catapult was established our focus was somewhat nebulous, but today and under Jeremy Silver’s leadership, we have increasingly been able to make what we do more tangible and real. We have worked with companies to turn designs and concepts into actual physical products.”

Among the sponsors of the Lab is Semtech, which supplies high-performance analogue and mixed-signal semiconductors and advanced algorithms.

“Showcasing the world’s leading Internet of Things (IoT) solutions to developers and early corporate adopters will allow the Future Networks Lab to give companies hands-on access to LoRa Technology and IoT expertise,” explained Vivek Mohan, Director of IoT in Semtech’s Wireless and Sensing Products Group.

“This cooperative, vendor-neutral space, will help to foster innovation, reduce the time to market for LoRa-based solutions and help grow the LoRaWAN-based ecosystem in the UK,” Mohan suggested.

Speaking at the launch of the Lab Gerry McQuade, CEO of BT’s Enterprise business, said: “BT aims to be a leader in delivering 5G and IoT networks and services to UK businesses and the public sector.

“We’ve already conducted the UK’s first live trials of 5G with services set to launch across 16 cities initially this year. And we’re actively helping customers across the transport, logistics, utilities and retail sectors transform their operations through intelligent IoT solutions, for example, Stobart Group’s Rail & Civils Division.

“Collaboration with an ecosystem of partners and tech start-ups is key to success in this space. So, we’re pleased to be underpinning Digital Catapult’s Things Connected Network in London and extending our partnership through the new Future Networks Lab to encourage further innovation in 5G and IoT,”

Another company heavily involved in the setting up of the Lab is Siemens.

Speaking at the launch, the company’s UK CEO, Juergen Maier, focused on the benefits of the Catapult network.

“The Catapult network that we have today has taken a number of years to develop and came as a response to the call for, and then development of, the UK’s Industrial Strategy,” he said.

“UK industry had been calling for a much stronger innovation ecosystem and the various Catapults that have been set up are now an essential part of the innovation ecosystem that now exists in the UK.”

Maier went on to say that Siemens’ involvement with the Future Networks Lab constituted a more formal partnership with the Digital Catapult.

“Siemens has been heavily involved, with other UK industrialists, with the adoption and creation of digital technology in manufacturing and what we have achieved to date would not have been possible without the help and direction of the Digital and High Value Manufacturing Catapults. However, we have to remember that while the UK is home to over a 1000 small businesses working in the area of artificial intelligence, for example, very few have found their way into the manufacturing space.

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Without an IoT security strategy, your data is their data.

- New insights and know-how from Arm’s latest Security Manifesto can help ensure you’re protected. Download your copy at www.arm.com/security-manifesto
In the past decade technology has started to play an increasingly important role in the provision of healthcare, whether that’s in the form of wearable devices, home diagnostic applications or remote monitoring devices. Many powerful artificial intelligence (AI) tools are now being embedded into both mobile and wearable devices enabling users to collect data on their bodies to better manage their health and well-being.

According to a recent survey in the UK, these health and fitness focussed technologies are being used by more people to achieve their fitness goals.

The survey, from LaptopsDirect.co.uk, found that among those questioned 37 percent thought their choice of tech products would help them to reach their fitness goals.

Those devices seen as most helpful were wearable fitness trackers (34%) and smart watches (26%) followed by smartphone apps; heart rate monitors and lower tech wearable trackers, that simply monitor the users heart rate, were also listed.

Commenting Mark Kelly, marketing manager at LaptopsDirect.co.uk, said: “From using fitness trackers whilst walking to work to apps that plan meals, it’s clear that adults in the UK are turning to technology to help them reach their 2019 fitness goals.”

It’s true to say that wearable technology has garnered plenty of headlines, both positive and negative, but many of the early lessons learned are now poised to deliver real benefits.

Beyond simple wearable fitness devices, health monitoring applications have seen a string of product and service innovations that offer real-world benefits to the user.

For example, a new wearable assistive technology from Control Bionics is helping people suffering from paralysis and loss of speech to better communicate with friends, family and clinicians.

The ‘Neuronode’ device is said to be the first wearable electromyography (EMG) device and is able to use EMG signals to control a paired computer, tablet or smartphone.

Essentially a wireless keyboard, the Neuronode connects to a device via a Nordic nRF52832 Bluetooth Low Energy System-on-Chip (SoC), users are able to send emails, access the Internet and watch online entertainment via the device.

**Wearables slow-down**

Research from Tractica, a market research company that focuses on human interaction with technology, expects the wearable device market to exceed $95 billion by 2021 with total shipments expected to exceed 560 million units and this despite last year when growth in the market dipped to single figures.

This slowdown was ascribed to weak demand for basic step-counting wearables, but analyst IDC is predicting that double-digit growth will return this year as smartwatches and new form factors start to gain acceptance in the market.

“There is certainly plenty of innovation on display in the wearables space, such as Microsoft’s Glabella Project,” said Martin Keenan, Technical Director at Avnet Abacus.

“Gabella is essentially a pair of glasses that monitors the heart rate at three sites on the wearer’s head. In addition, the prototype incorporates optical sensors, processing, storage, and communication components, all of which are aimed at precise monitoring of the wearer’s pulse transit time.”

The ability to monitor blood pressure throughout normal daily activity, as well as mine the data within that continuous measurement could represent a significant health benefit for millions, suggested Keenan.

Another heart-based innovation is Apple’s new watch, which now features a full electrocardiogram (ECG) and which has been approved by the FDA and AHA.

“In theory this should enable casual users to monitor their heart for anomalies and test for atrial fibrillation – the WatchOS will even create a PDF you can send to your doctor,” enthused Keenan.

FDA Commissioner Scott Gottlieb said on Twitter that the agency “worked closely with Apple as they developed and tested these apps, which may help many users identify health concerns more quickly.

“Health care products on smartwatches may help users seek treatment earlier and will empower patients by giving them more information about their health.”

The Apple Watch also includes fall detection sensors, and if the person remains prone and unresponsive for a set period of time, an emergency SOS call can be made to a designated family member or friend.

While company’s like Apple are investing heavily in wearables, a
Usable pressure sensors are having a major impact on devices that offer running coaching, as they open up the possibility of delivering kinetic gait analysis, which factors in measurements of force, such as power, torque, and pressure, giving far more accurate results than visual analysis of gait alone.

Companies such as US-based IoT wearable company Boogio has developed pressure-sensitive in-shoe sensors that are thin enough to easily slip under the insole of your favourite trainers.

“The sensors have sixty-five thousand layers of pressure sensitivity across toe, heel and arch areas of the foot, theoretically providing highly accurate data on foot strike, position and cadence,” said Keenan.

While the market for fitness and health wearables is forecast to grow in the coming years another sub-sector within this space, and one that extends the concept of well-being beyond that of simply better long-term health decisions or better monitoring an ageing population, is the use of personal safety devices.

Leaf Wearables, an India-based company, has developed the ‘Safer Pro’ device which comes in a smartphone form factor – but can also be embedded into other devices, such as jewellery.

A panic button is able to transmit an alert using Bluetooth Low Energy wireless connectivity to the user’s smartphone, which then sends messages, or alerts, to selected and trusted contacts. The device is trackable via GSM or GPS, helping to pin-point the location of the user or to provide navigation to a local hospital or police station.

In the US, wearable protection is available in the form of the Automatic Injury Detection (AID) device which, via a panel fitted with a thin film sensor within body armour, can send emergency alerts to a paired device should the user be harmed in any way.

The device was developed by Datasoft and is currently being deployed in ‘man down’ vests for the US military and law enforcement agencies.

The wearables market is only just beginning to find its feet and explore novel uses. The growth in artificial intelligence and improved sensor technology are both becoming key driving forces in this fast growing space.

In addition, on-going trends including an aging population in the west, coupled with rising healthcare costs are certainly combining to strengthen demand over the coming years.

Accurate sensing

While early fitness trackers often relied heavily on step counting, the wider availability of accurate sensors is helping to transform the market.

In particular, more flexible and usable pressure sensors are having a major impact on devices that offer running coaching, as they open up the possibility of delivering kinetic gait analysis, which factors in measurements of force, such as power, torque, and pressure, giving far more accurate results than visual analysis of gait alone.

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“The sensors have sixty-five thousand layers of pressure sensitivity across toe, heel and arch areas of the foot, theoretically providing highly accurate data on foot strike, position and cadence,” said Keenan.

While the market for fitness and health wearables is forecast to grow in the coming years another sub-sector within this space, and one that extends the concept of well-being beyond that of simply better long-term health decisions or better monitoring an ageing population, is the use of personal safety devices.

Leaf Wearables, an India-based company, has developed the ‘Safer Pro’ device which comes in a smartphone form factor – but can also be embedded into other devices, such as jewellery.

A panic button is able to transmit an alert using Bluetooth Low Energy wireless connectivity to the user’s smartphone, which then sends messages, or alerts, to selected and trusted contacts. The device is trackable via GSM or GPS, helping to pin-point the location of the user or to provide navigation to a local hospital or police station.

In the US, wearable protection is available in the form of the Automatic Injury Detection (AID) device which, via a panel fitted with a thin film sensor within body armour, can send emergency alerts to a paired device should the user be harmed in any way.

The device was developed by Datasoft and is currently being deployed in ‘man down’ vests for the US military and law enforcement agencies.

The wearables market is only just beginning to find its feet and explore novel uses.

The growth in artificial intelligence and improved sensor technology are both becoming key driving forces in this fast growing space.

In addition, on-going trends including an aging population in the west, coupled with rising healthcare costs are certainly combining to strengthen demand over the coming years.
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As mobile devices become more capable the more power hungry they become, yet the research that has been undertaken into extending the capabilities of battery technology seems to have reached its limit.

The term ‘battery anxiety’ was coined by LG last year, following a survey it conducted on mobile charging habits, that revealed 90% of respondents suffer with this modern ‘ailment’.

Portable, wireless charging seems the obvious remedy but while there has been a surge in research into this technology and, according to the Wireless Power Consortium (WPC), there has been an increased uptake in wireless charger users, there remains a number of problems in the widespread adoption of this solution.

Nedko Ivanov, CEO of Metaboards, a metamaterials start-up currently developing technology in the wireless charging field, acknowledges the potential of the wireless charging market, but suggests that there are a number of challenges preventing it from being widely adopted.

The problem, according to Ivanov, is the user experience – by this he means not just how the device charges, but where charging is available.

“To date wireless charging has been little more than a gimmick,” according to Ivanov. “A lot of the wireless charging solutions available require the user to place a device directly in alignment with a wireless charger. But, as every wireless charger needs its own unique power supply, users will still effectively have to rely on being close to a cable. So why use wireless charging at all?

“Imagine going into a coffee shop and being able to place your device on a table and know it will be charging, even if there are others also charging their devices on the same surface,” Ivanov muses.

“And with no need to line it up perfectly or for you to carry your own personal wireless charger,” he adds.

LG’s survey on charging habits mirrored Ivanov’s thoughts, pointing out that among the consumers it had questioned, around 1,600 across the UK, US, Germany and China, there were “high levels of interest in seeing wireless charging beyond the home and car”.

“This is the world we are trying to create at Metaboards,” Ivanov explains. The metamaterials company has developed a patented prototype that enables wireless charging through any surface (apart from metal) without the need to directly align two devices. It can also charge multiple devices on one surface from one power source.”

Ivanov suggests that the state of wireless charging is evolving in much the same way as that seen when the modem was replaced by Wi-Fi. “While the modem and Wi-Fi offered the same solution, there was a difference in how the technology worked,” he explains.

“Wireless charging is at the ‘modem stage’, we want to bring it to the ‘Wi-Fi stage’.”

Qi vs. Airfuel
Currently, there are two global wireless charging standard bodies:

• The Wireless Power Consortium (WPC) and the
• Alliance for Wireless Power (A4WP).

WPC operates the Qi certification, while A4WP is responsible for Airfuel. Although both are accepted wireless charging standards, they work in slightly different ways.
Qi is the standard for inductive charging and is found in most mobile phones. “It is based upon a one-to-one relationship with the charger and the device, relying on precise alignment,” says Ivanov.

Airfuel differs in terms of how it charges and how many devices it can charge, and this is achieved through resonant and RF technology.

It also operates in a higher frequency than Qi.

Resonate charging enables greater spatial freedom, as well as the ability to charge multiple devices at once.

Moreover, it lets the user charge devices through a range of materials including wood and stone. Whereas the RF charging technology provides low power to devices from a distance (up to a metre).

Qi is the standard found in most mobiles because it’s easily integrated into mobile devices and a more affordable option than Airfuel, explains Ivanov. Despite its popularity, he believes that Qi has prevented significant progress in terms of wireless charging.

According to Ivanov, Airfuel is the future and “we will see more OEMs switching back to this technology”. However, he identifies one key issue with the standard. “The surface is one big coil, emitting an electromagnetic field everywhere. You don’t want an electromagnetic field where it doesn’t need to be because it can damage a device.

“Moreover, Airfuel is restricted in terms of dimension, with a maximum surface size of A3.

“In our first product, a metaboard (surface) consisted of an array of coupled resonators, responsible for generating a dynamic magnetic field and other components to implement control.

“Such a system is a metamaterial environment, where waves of inter-element excitation can carry power and data,” says Ivanov. “In terms of our current solution, each resonator is formed from a spiral printed inductor and tuned to a specific frequency using appropriate capacitors. One of the resonators is designated to be the ‘driver’ and it is fed power at the chosen frequency. The power is coupled around the board by implementing a number of control mechanisms.”

He continues, “When a load, such as a mobile phone in need of charging, is placed on the surface, a software-based algorithm is used to direct power/flux to that load and is able to minimise flux where it is not needed.

“Crucially, one or multiple devices can be charged anywhere on a metaboard simultaneously without the need for device alignment.”

Creating a surface

To create this ‘surface’, Metaboards built its own set of development and simulation tools to solve problems such as how to control power flow and design coils with the right characteristics.

Integrating all the desired features into one product is not a straightforward task and some of the features or principles of their implementation can contradict each other.

“A good example of that is the compromise between efficiency of wireless power transfer and the maximised area coverage of a large charging surface,” admits Ivanov.

But he remains confident in the solution, pointing out that the difficulties associated with it, and the solutions Metaboards has come up with, are why “it’s not been done before”.

Once the environmental conditions are known – the thickness of the table, the material used, etc. – the design can be tailored accordingly to maximise the performance, suggests Ivanov.

“In our current implementation all the electronic components are populated on the underside of the surface. The top (power transfer side) of the surface comprises printed components only so the surface is essentially planar. This makes it ideal for retrofitting/integrating on the underside of tables and bars etc., or as a separate product.

“It is also possible to make it non-planar/conformal to other surfaces.”

The surfaces themselves are made using the same standard production materials and processes that are used in other consumer products, so there are no additional costs associated with using custom manufacturing processes and exotic materials.

Ivanov points to the consumer market as the company’s core audience, explaining that once the technology is ready for commercialisation other verticals could be explored.

“The main aim is actually to license the concept,” says Ivanov. “To do that, we need to create the proof and give confidence to others.”

For now, Ivanov says Metaboards is designed to be integrated into surfaces such as tables or into walls, whether in commercial premises or in the home.

But, he also sees potential in the flexible electronics market too, suggesting the technology could one day be woven into fabrics.
**2mm pitch micro connector**

New metallized composite 2mm pitch micro connector from Nemicatic weighs 60% less than Micro D

EMI-proof and robust, no MOQ, short lead time.

Bon-en-Dhablis, France: Nemicatic, one of the leading manufacturers of high-performance interconnect solutions, has introduced its new DLM range of metallized composite 2mm pitch connectors that weighs 60% less than Micro D counterparts. The design also provides protection against EMI and resists corrosion, yet products are available on short lead times.

DLM connectors are available with 4-32 signal contacts, 1.8 high power or coax contacts, or a mixed arrangement of signal and high power / coax contacts in the same connector body. Devices are available in board-to-board, board-to-wire and wire-to-wire configurations for wire gauges of AWG 12-30 and in through-hole or surface-mount styles. A metallized composite backshell option is also available for additional EMC performance.

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**Bar Type TFTs**

Bar Type TFTs

Bar Type TFTs are currently the mainstream aspect ratio of TFT Display panels in the market. It is 4.3 or 5.9 but for some applications a Bar Type shape would be more appropriate.

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**Interfaces in Business Development Role**

Tom Sarfi joins Pickering Interfaces in Business Development role

Former president of Wilbus Consortium joins test and simulation leader

Pickering Interfaces, the leading supplier of modular signal switching and simulation solutions for use in electronic test and verification, has announced the appointment of Tom Sarfi, as Business Development Manager.

Mr. Sarfi brings over 30 years experience in Test & Measurement to the new role at Pickering. Most recently he held various senior management roles at AMETEK VTI Instruments along with key account responsibility for significant defense/aerospace primes. While at AMETEK VTI, Sarfi also served as president of the Wilbus Consortium and a Board Member of the UXI Consortium. He began his career as an ATE systems engineer and led field integration activities. He holds a BSEE from Case Western Reserve University in Cleveland OH.

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**New eBook**

Explore the Connected Home with New eBook from Mouser Electronics and Mozex

Mouser Electronics, Inc., the New Product Introduction (NPI) leader empowering innovation, announces a fascinating new eBook, Welcoming the Connected Home, in collaboration with MozeX. In the new eBook, subject matter experts from Mouser and MozeX examine upcoming and future trends in home automation and strategies for designing Internet of Things (IoT)-enabled devices, as well as specific smart home solutions from MozeX.

With the growing adoption of connected home technologies, the global smart home market is expected to be valued at more than $50 billion by 2022. From connected devices like light bulbs and appliances to security systems and home assistants, the smart home is allowing residents to interact with and program their living spaces to predict and react to their needs. As more devices are added to the smart home ecosystem, artificial intelligence will enable home automation to evolve and better serve our preferences.

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**FDH36 rugged bulkhead housing**

FDH36 rugged bulkhead housing

OMC introduces new FDH36 rugged bulkhead housing for fibre optic transmitters and receivers with ST connector

Suits Industrial, automotive and mass-transport applications

OMC, the pioneer in optoelectronics design & manufacture, has announced its new FDH36 rugged bulkhead-mount housing for fibre optic receivers and transmitters. The new device incorporates an ST connector and has been developed as the ST version of OMC’s popular FDH1 transmitter and receiver housing. The robust design of the FDH36 helps it withstand the harsh operating environments often found in industrial, automotive, mass transit and similar applications, including off-road vehicles.

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**Large Aperture Current Transducer**

High-accuracy, large aperture current transducer from Danisense measures up to 1200Ams

 Targets testing of high power converters for today’s electric and hybrid vehicles

Danisense, the leader in high-accuracy current transducers for demanding applications, today announced the DM1200, a high-accuracy current transducer capable of measuring signals up to 1200Ams and 1500A EC. Specifically targeting the ev and hev markets which requires higher power converters that can be rapidly charged, the DM1200 also features a large, 45mm diameter aperture which makes testing easier and more cost-effectively as frequent installation and replacement of the system under test can be performed without the need to remove the primary cable connector.

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