

THE ELECTRON

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ELECTRONICS IN LOCKDOWN

The last three months have been hard going not least in the electronics sector. With public events cancelled and much of manufacturing and service laid off, producing this issue of *The Electron* has presented a challenge, but things have still been happening.

In piecing together this issue The Institution would like to continue to thank the publishers of *Controls, Drives and Automation*; *Med Tech Innovation News*; *Industrial Technology*; *Electrical Review*; *Data Centre Review Magazine*; *Data Centre Management*; *Industrial Plant and Equipment*; and *Mission Critical Power* for continuing to supply us with complimentary subscriptions to their publications.

In addition to the above, the Editor would also like to thank especially James Orme and Martyn Landi of Technerati and Closer Still Media Limited, Mike Newsom of LouVan Communications, Claire Fletcher of Data Centre Review, and What's New in Electronics, for their online contributions.

SUBMARINE DATA CENTRE PROCESSES COVID-19 RESEARCH WORKLOADS



An experimental data centre sunk by Microsoft in the sea off the Scottish coast is being used to process workloads that could help scientists understand, and develop treatments for, COVID-19.

The data centre, placed off the coast of Orkney in June 2018 as part of Project Natick, is using a computing project called Folding@home to harness processing power to conduct research into the viral proteins that cause COVID-19, and subsequently design therapeutics to combat it.

The Folding@home research project simulates protein dynamics which in turn can identify sites on a viral protein that potential treatments could bind to.

It is what is known as a distributed computing project, which means that its research is powered by the accumulated power of personal computers located in many different places.

Microsoft's experimental sunken data centre is said to be "perfectly suited" to the project, since, unlike the company's commercial Azure data centres that are packed with high-end servers, the Project Natick facility is stacked with 864 generic servers that resemble thousands of high-end personal computers.

The research data centre continually monitors distributed computing projects so that it can assist where it has spare capacity. This is because one of its major research goals is to evaluate the facility's temperature control when working at full capacity.

Microsoft has also provided the project with more commercial Azure artificial intelligence resources, which have revealed sites on the virus that could be suitable for potential drugs to bind to.

Project Natick is a long-term research project designed to investigate the feasibility of manufacturing and operating prefabricated data centre units that can be left to operate on the seabed over many years.

[Contribution by James Orme].

COVID-19 IMPACTS ON CLOUD ADOPTION

MariaDB Corporation has announced the results of a global survey into the impact of COVID-19 on businesses moving to the cloud and the opinions of IT professionals on what has changed and what they believe might change.

Evidence showed that the overwhelming majority (99 per cent) of respondents from the UK, US, Germany and France said that COVID-19 had impacted on their business with 84 per cent expecting the impact to continue into 2021. In the UK 78 per cent anticipated a second wave with 49 per cent stating that they were making plans to move more applications to the cloud as a result. In addition, some 39 per cent of UK respondents were reportedly accelerating their move to the cloud, 31 per cent expect to be 100 per cent in the cloud, and 18 per cent had started moving to the cloud. Only 12 per cent of UK respondents stated that they were slowing down movement to the cloud as a result of the impact of COVID-19, although this rises to 36 per cent in the US.

With the high level of anticipation of a second wave in the UK, technologists have begun implementing measures to prepare for future shutdowns, such as forever-work-from-home (WFH) strategies (adopted by 59 per cent of UK respondents) and setting up remote access for all employees (54 per cent).

Franz Aman, CMO for the MariaDB Corporation, commented:

"The survey data surfaces trends we have been seeing with our MariaDB SkySQL cloud database business over the last few months, such as the increased movement to the cloud due to COVID-19's global impact.

By default, cloud infrastructure is designed and secured for access from anywhere, no need to enable or figure out remote working, that is the native lifestyle. Companies realise that many structural changes are here to stay and future disruptions - be it another pandemic or an entirely different disaster - need to be anticipated and planned for.

The outcome is an acceleration to the cloud for mission-critical applications, and the cloud databases and analytics they rely on. An enterprise-grade DBaaS becomes the foundation for any crisis-resistant, essential enterprise application."

MariaDB is one of the top five most used databases globally, with availability on all of the leading cloud platforms and 75 per cent of Fortune 500 companies using it.

[Contribution from Data Centre Review].

CYBER ATTACKS SHUT DOWN SUPERCOMPUTERS WORKING ON COVID-19 RESEARCH

Early May saw a string of related cyber attacks hit several European high-performance supercomputers which forced a number of academic institutions to take systems offline. Many of these were processing COVID-19 research workloads.

According to the European Grid Infrastructure security team, which coordinates European supercomputing research, two different attacks operated against academic data centres across Europe, with mining malware detected on affected servers. This led to the belief that the hackers were attempting to steal system power in order to mine cryptocurrency for financial gain, rather than to steal sensitive data or intellectual property.

UK security firm Cado Security said that the malware was uploaded to servers in Germany, the UK, Spain and Switzerland.

In the UK, the University of Edinburgh's ARCHER supercomputer, one of the UK's most powerful machines, had to be taken offline so that all passwords and server access keys could be rewritten. The National Cyber Security Centre and HPE/Cray, who helped to build ARCHER, are now working with the University to bring the system back online.

In Germany supercomputing research organisation bwHPC had to shut down five of its high-performing computing clusters, including the Hawk supercomputer at the University of Stuttgart, and the systems at the Karlsruhe Institute of Technology, Ulm University and Tübingen University. Other German institutions affected were the Leibniz Computing Centre, the Jülich Research Centre and the University of Dresden, whilst in Switzerland the Swiss Centre of Scientific Computations in Zurich also had to shut down its systems.

The hackers allegedly gained access through compromised server logins in Canada, China and Poland.

[Contribution by James Orme].

AUSTRALIAN RESEARCHERS RECORD FASTEST EVER INTERNET SPEED

A team from Monash, Swinburne and RMIT universities in Australia claim that they have recorded the world's fastest ever internet speed, with 44.2 terabits per second being sent over 75 kilometres of glass fibre from a single chip. This is the equivalent of 1,000 HD movies in less than a second, and compares with a UK average broadband speed of around 64 megabits per second.

The results were recorded outside a laboratory setting for the first time and were achieved using a new device that replaces around 80 lasers in some existing telecoms hardware with a single piece known as a micro-comb, which was planted inside existing infrastructure similar to that used by the Australian National Broadband Network (NBN).

According to the research, the result was the highest amount of data ever produced by a single optical chip. Such chips are frequently used in modern fibre-optic broadband systems.

Dr. Bill Corcoran, co-lead author of the study and Lecturer in Electrical and Computer Systems at Monash University, states:

"We're currently getting a sneak peek of how the infrastructure for the internet will hold up in two to three years' time due to the unprecedented number of people using the internet for remote work, socialising and streaming. It's really showing us that we need to be able to scale the capacity of our internet connections.

What our research demonstrates is the ability for fibres that we already have in the ground, thanks to the NBN project, to be the backbone of communications networks now and in the future. We've developed something that is scalable to meet future needs. And it's not just Netflix we're talking about here - it's the broader scale of what we use our communication networks for. This data can be used for self-driving cars and future transportation and it can

help the medicine, education, finance and e-commerce industries, as well as enable us to read with our grandchildren from kilometres away."

Professor David Moss, Director of the Optical Sciences Centre at Swinburne University, adds:

"This work represents a world-record for bandwidth down to a single optical fibre from a single chip source, and represents an enormous breakthrough for part of the network which does the heaviest lifting. Micro-combs offer enormous promise for us to meet the world's insatiable demand for bandwidth."

[Contribution by Martyn Landi].

BREAKTHROUGH IN COHERENT OPTICAL NETWORKING AND DATA CENTRE INTERCONNECT

NeoPhotonics Corporation, a leading developer manufacturer of silicon photonics and advanced hybrid photonic integrated circuit-based lasers, modules and subsystems for bandwidth-intensive, high-speed communication networks, has announced that it has completed experimental verification of the transmission of 400 Gbps data over data centre interconnect (DCI) ZR distances in a 75 GHz spaced Dense Wavelength Division Multiplexing (DWDM) channel.

NeoPhotonics achieved two milestones with its interoperable pluggable 400ZR coherent modules and its specially designed athermal arrayed waveguide grating (AWG) multiplexers (MUX) and de-multiplexers (DMUX). First, data rate per channel increases from today's non-interoperable 100 Gbps direct-detect transceivers to 400 Gbps interoperable coherent 400ZR modules. Second, the current DWDM infrastructure can be increased from 32 channels of 100 GHz-spaced DWDM signals to 64 channels of 75 GHz-spaced DWDM signals. The total DCI fibre capacity can therefore be increased from 3.2 Tb/s (100 Gb/s/ch x 40 ch) to 25.6 Tb/s (400 Gb/s/ch x 64 ch), representing a total capacity increase of 800 per cent.

NeoPhotonics' technology is said to overcome multiple challenges to transporting 400ZR signals in 75 GHz-spaced DWDM channels:

'The 400ZR signal utilizes an approximately 60 Gbaud symbol rate and 16 QAM modulation, resulting in a broader transmitting signal spectrum compared to that of a standard 100 Gb/s coherent or PAM4 signals. Furthermore, it is recognised that the centre frequencies of the lasers, MUX and DMUX, will all drift due to temperature changes and ageing. Consequently, as the channel spacing is reduced from 100 GHz to 75 GHz, adjacent channel interference (ACI) becomes more critical, and can potentially degrade the optical signal-to-noise ratio of 400ZR signals.

The filters used in NeoPhotonics' MUX and DMUX units are designed to limit ACI while at the same time having a stable centre frequency against extreme temperatures and ageing. The optical signal spectrum of the pluggable 400ZR transmitter is very important for two reasons. First, the spectrum should not be too wide, as that would result in "spillover energy" impacting its neighbour DWDM channels. Second, it also cannot be too narrow, as that would degrade the signal quality or even recoverability, especially after the MUX and DMUX filtering.

NeoPhotonics has demonstrated end-to-end 90 Km DCI links using three in-house 400ZR pluggable transceivers, with their tunable laser frequencies tuned to 75 GHz-spaced channels, and a pair of passive 75 GHz-spaced DWDM MUX and DMUX modules designed specifically for this application. The optical signal-to-noise ratio (OSNR) penalty due to the presence of the MUX and DMUX and the worst-case frequency drifts of the lasers, as well as the MUX and DMUX filters, is less than 1dB. The worst-case component frequency drifts were applied to emulate the operating conditions for ageing and extreme temperatures.'

Tim Jenks, Chairman and CEO of NeoPhotonics, states:

"The combination of compact 400ZR silicon photonics-based pluggable coherent transceiver modules with specially designed 75 GHz-spaced multiplexers and de-multiplexers can greatly increase the bandwidth capacity of optical fibres in a DCI application and consequently greatly decrease the cost per bit. These 400ZR coherent techniques pack 400 Gbps of data into a 75 GHz wide spectral channel, placing stringent requirements on the multiplexers and

de-multiplexers. We are uniquely able to meet these requirements because we do both design and fabrication of planar lightwave circuits and we have twenty years of experience addressing the most challenging MUX/DMUX applications."

NeoPhotonics is based in San Jose, California, and is a leading developer and manufacturer of lasers and optoelectronic solutions that transmit, receive and switch high-speed digital optical signals for cloud and hyper-scale data centre internet content provider and telecom networks.

[Contributed by Mike Newsom].

CHEMICAL DISCOVERY SET TO REVOLUTIONISE FUEL CELL TECHNOLOGY

Researchers at the University of Aberdeen have discovered a new family of chemical compounds that they believe could revolutionise fuel cell technology.

The compounds, known collectively as hexagonal perovskites, are seen potentially as a key to unlocking the potential of ceramic fuel cells, which are highly efficient at converting chemical energy into electrical energy with very low emissions when powered by hydrogen.

These fuel cells can be used to power homes and vehicles, but their high temperature of operation has tended to limit their life span. The team at Aberdeen has therefore sought to find a new compound that can overcome this, and the latest discovery is seen as being highly significant, allowing for high conductivity at lower temperatures.

The results of the research have been published in the paper 'High Oxide Ion and Proton Conductivity in a disordered Hexagonal Perovskite' in the journal *Nature Materials* (2nd. March).

Professor Abbie McLaughlin, Director of Research at the Department of Chemistry, University of Aberdeen, and leader of the study, is quoted in *Mission Critical Power*, Issue 26, March 2020, as follows:

"Ceramic fuel cells are highly efficient, but the problem is they operate at really high temperatures, above 800 degrees Centigrade. Because of that they have a short life span and use expensive components.

For a number of years we've been looking for compounds that might overcome these issues in the relatively unexplored hexagonal perovskite family, but there are specific chemical features required which are hard to find in combination. For example, you need a chemical compound with very little electronic conductivity which is stable in both the hydrogen and oxygen environments of the fuel cell.

What we have discovered here is a dual proton and oxide ion conductor that will operate successfully at a lower temperature - around 500 degrees Centigrade - which solves these problems. You could say that we've found the needle in a haystack that can unlock the full potential of this technology."

3D-PRINTED ROBOTS: A MANUFACTURING BREAKTHROUGH

Engineers at the University of California San Diego have pioneered a new method of producing soft, flexible 3D-printed robots.

The innovation has derived from rethinking the method for building soft robots. Rather than considering how to add soft materials to a rigid robot body, the team commenced with a soft body and then added rigid features to key components. Inspired by the concept of insect exoskeletons, which have both soft and rigid parts, the researchers applied the term 'flexoskeleton' to their resultant creations.

These 'flexoskeletons' are made by 3D-printing a rigid material onto a thin polycarbonate sheet that serves as a flexible base. They are printed with various features that increase rigidity in specific areas so as to combine softness with rigidity for the purposes of movement and support.

The new method allows for the construction of soft components for robots in a fraction of the time previously required and at a much lower cost. One 'flexoskeleton' component takes ten minutes to print and costs less than \$1.

The new method also makes it possible to construct large groups of 'flexoskeleton' robots with minimal manual assembly, and to assemble a library of 'Lego-like' components that enables robot parts to be easily interchanged.

Printing of the 'flexoskeletons' can be achieved on most low-cost commercially available printers with printing and assembly of a whole robot taking around two hours.

Full details of the research are published in the April 7th. issue of the journal *Soft Robotics*. The May 2020 issue of *Controls, Drives and Automation* (p.5) quotes lead author Nick Gravish, Professor of Mechanical Engineering at Jacobs School of Engineering, University of California San Diego, as follows:

"We hope that these flexoskeletons will lead to the creation of a new class of soft, bioinspired robots. We want to make soft robots easier to build for researchers all over the world."

The ultimate objective is to create an assembly line that prints whole 'flexoskeleton' robots without any need for hand assembly. It is envisaged that a 'swarm' of these small robots would have the same capability or more than one large robot.

MOLECULAR ROBOTS SWARM IN JAPAN

In a related subject, scientists at Hokkaido University in Japan have pioneered ways to make millions of molecule-sized robots 'swarm' together so that they can perform multiple tasks simultaneously.

Research across multiple disciplines has led to the fabrication of these tiny robots with scientists now examining ways to interact in their millions.

One of these 'molecular robots' is typically between 100 nanometres and 100 micrometres in length, and requires an actuator, processor and sensor to perform its function. By 'fine-tuning' their mutual interactions, millions of them can move together in 'swarms' that are collectively much larger than a normal robot, offering several advantages.

These robots, which are expected to contribute greatly to the emergence of a new dimension in chemical synthesis, molecular manufacturing and artificial intelligence, owe their existence largely to supramolecular chemists, chemical and biomolecular engineers, and nanotechnologists.

Current work is now focusing on control of the movements of swarms so that multiple tasks can be performed at the same time. For this researchers have produced molecular robots with three key components, namely microtubules, single-stranded DNA, and a light-sensing compound.

The microtubules serve as the molecular robot's motor, converting chemical energy into kinetic energy in the form of mechanical work. The DNA strands serve as the information processor, providing a high ability to store data and perform multiple functions at once. The chemical compound, an azobenzene derivative, detects light and acts as the molecular robot's on/off switch.

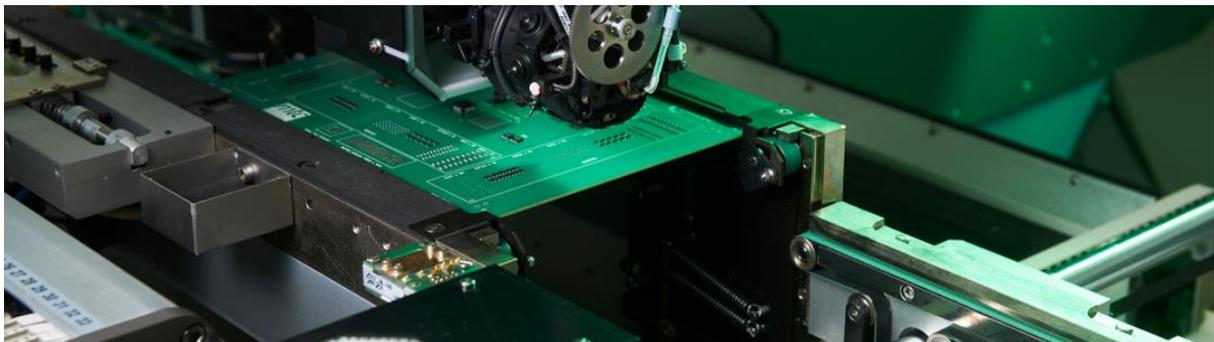
Scientists have made huge moving 'swarms' of these molecular robots by utilising the ability of the DNA to transmit and receive information to coordinate interactions between individual robots. They have then been able to successfully control the shape of these 'swarms' by tuning the length and rigidity of the microtubules. Relatively stiff robots swarm in uni-directional, linear bundles, whilst the more flexible ones form rotating, ring-shaped 'swarms'.

A continuing challenge is that of learning to make separate groups of robots swarm at the same time, but in different patterns, which is what is required for the performance of multiple tasks simultaneously. One group of scientists has claimed to have achieved this by designing one DNA signal for rigid robots, which was directed into a uni-directional bundle-shaped swarm, and another DNA signal for flexible robots, which simultaneously rotated together in a ring-shaped swarm.

Work is ongoing to improve the processing, storing and transmission of information, energy efficiency, reusability, and improving the lifetime of the molecular robots.

[Contribution by Clair Fletcher, Editor, *Data Centre Review*, adapted from the journal *Science and Technology of Advanced Materials*].

FIRST EUROPEAN SMART FACTORY USING LEGACY MACHINES



Specialists in the Industrial Internet of Things (IIoT) and Industry 4.0 at the Manufacturing Technology Centre (MTC) have developed the first stage of Europe's first smart factory

demonstrator for the manufacture of electronic assemblies, helping electronics manufacturers to 'go digital'.

MTC's digital experts are continuing to work with key vendors to develop and evolve a range of digital processes that help electronics manufacturers to improve quality and productivity, as well as meeting tight time-to-market constraints.

The smart factory demonstrator is powered using the IPC Connected Factory Exchange (CFX), which is a standard developed by the IPC Connected Factory Initiative Subcommittee that enables industrial machines to communicate with other machines and systems across manufacturing facilities, including the supply chain, using standardised machine communication message sets. IPC CFX therefore provides the baseline, powering the development of the MTC demonstrator test bed for electronics manufacturing, enabling any electronics manufacturer to try out and experience digital technologies in a risk-free environment without disruption to day-to-day production.

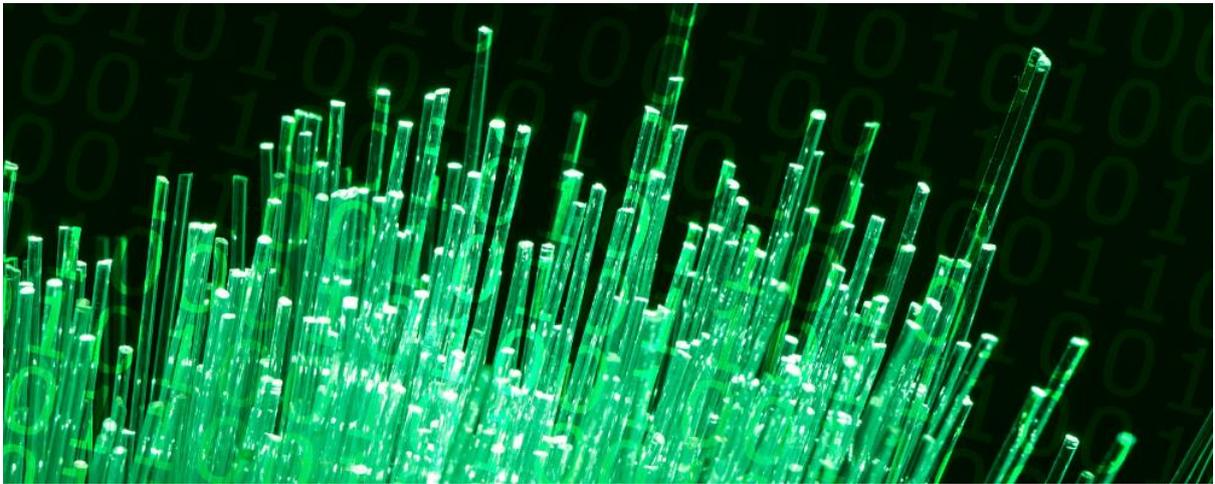
The project is supported by OEM and technology supplier members of the MTC from various industrial sectors, who have ensured that the technology applied has been integrated and approved within the demonstrator. This includes such technology as augmented reality, for example.

Kaim Kapadia, Technology Specialist at the MTC states:

"Our goal is to showcase products going through a state-of-the-art digital production line, collecting data from each station and machine, creating visibility, and showing the value that can be obtained from the many uses of the data. It is essential for industry to understand that digitalisation can now be achieved using interoperable standard components, which yield immediate results and short term returns on investment, which are best seen to be believed".

[Contribution from *What's New in Electronics*].

ALL-OPTICAL DATA CENTRE BREAKTHROUGH



Groundbreaking research at University College London and Microsoft is thought to have overcome the principal barrier to the creation of the all-optical data centre, that of every optically connected server having to continually synchronise its clock time in order to transmit data.

What has been developed is a new technique that synchronises computer clocks in under a billionth of a second, eliminating the need for continual clock readjustment. It involves programming hardware to memorise clock phase values such that clock time does not have to be re-checked. Clock recovery time is reduced to under a nanosecond, which boosts optical switching performance to a level that surpasses today's state-of-the-art technology.

All-optical networks use light photons in place of traditional electronic circuitry to transmit and route data between servers in a data centre. In theory optical switching enables almost infinite bandwidth while also reducing power and cooling requirements, providing a more efficient method for cloud providers to accommodate ever-increasing server demand.

Up to now, hyperscalers have relied on Moore's Law to accommodate rising demand, but many believe this trend is unsustainable because of the difficulty in developing smaller and faster chips, which are already measured in nanometres.

Kari Clark, PhD student and lead author at University College London says that the research "makes optical switching viable for the data centre for the first time" with the technology

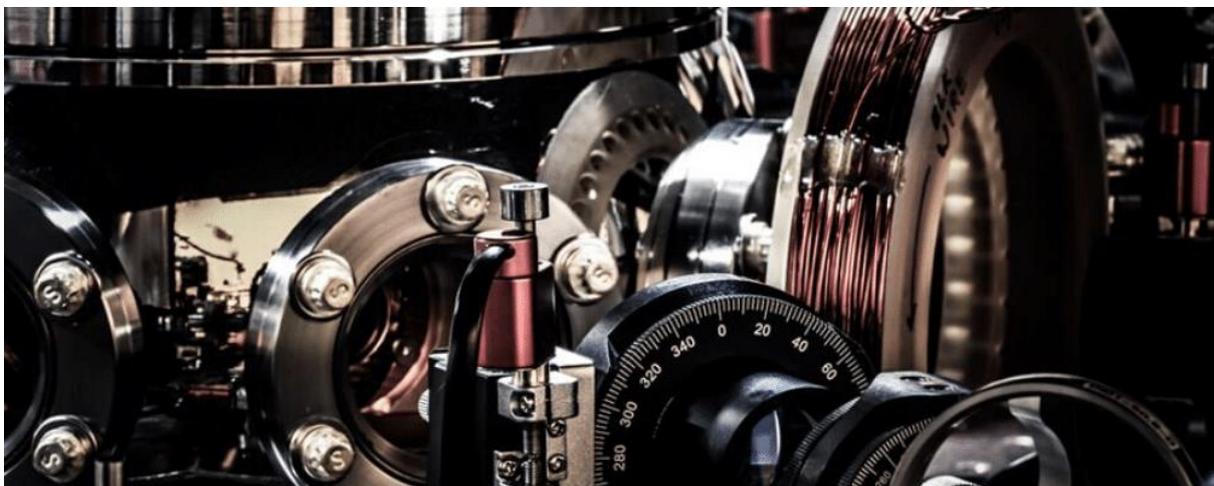
having the potential to "transform" cloud networking and make technologies such as the Internet of Things and artificial intelligence cheaper, faster and less power-intensive.

Co-authors Dr. Hitesh Ballani and Dr. Paolo Costa, researchers at Microsoft Research Cambridge, state:

"With the expected slowdown of Moore's Law and ever-increasing cloud traffic, all-optical networks represent an attractive technology that has remained elusive so far. While there is still a long way to go, this technique brings us a step closer to the vision of an all-optical data centre."

[Contribution by James Orme, adapted from *Nature Electronics*].

HONEYWELL QUANTUM COMPUTER READY TO GO



Quantum computers leverage qubits instead of bits to solve problems that ordinary computers would take millions of years to solve. They can greatly accelerate applications such as drug development, weather forecasting and materials design.

A key quantum metric is quantum volume, a measure of the relative complexity of a computational problem that can be solved by a quantum computer. Honeywell's groundbreaking system has a quantum volume of 64, double that of its nearest rival

The system comprises of an ultra-high vacuum chamber the size of a basketball, which is cryogenically cooled with liquid helium such that it achieves an internal temperature of just ten degrees above absolute zero (colder than the surface of Pluto). The computing power is harnessed from just a few individual atoms. Two 5ft. x 20ft. optical cables surrounding the computer keep the algorithms under control.

Tony Uttley, President of Honeywell Quantum Solutions, states:

"What makes our quantum computers so powerful is having the highest quality qubits, with the lowest error rates. This is a combination of using identical, fully connected qubits and precision control."

The machine is expected to be available shortly via Microsoft Azure, either via the Azure Quantum Portal or Honeywell's own quantum interface.

Potential application areas include aerospace, manufacturing, construction and oil and gas.

[Contribution by James Orme].

MITIGATING RISKS WITH BLOCKCHAIN

This article, by Ian Hawkins in the February 2020 issue of *Quality World* (p.14-18) examines the technology of blockchain from a quality perspective, explaining in particular how it has

the potential to overcome deficiencies in supply chain management, how some organisations are using it, and what the implications are in the future.

The author commences with the case of a girl who, in December 2019, was shocked to open a packet of Christmas cards and find inside a message that read "we are foreign prisoners in Shanghai Qingpu prison, China. Forced to work against our will. Please help us and notify human rights organisation". This leads into a discussion about the potential of blockchain to alleviate certain supply chain issues such as low traceability and mismatched compliance.

Blockchain is introduced as 'a way of organising information in a way that gives all appropriate parties access to the information they need and keeps that information secure from people who should not see it' and 'information that is shared across a group of computers so that if one person updates that information, others are able to see it'.

The author then makes reference to the Gartner prediction that by 2023 some 30 per cent of manufacturing companies with revenues above \$5 billion will be using blockchain to drive down costs and improve traceability and transparency.

In terms of quality, a major industrial sector that could benefit greatly from blockchain is the food industry where suppliers are especially keen to protect their reputation. Here, the IBM Food Trust project has been set up, connecting its members through blockchain in a system that is described as 'a permissioned, fixed and shared record of food system data that retailers say is now crucial for ensuring quality throughout the supply chain.'

One of its members is the French retailer Carrefour SA, which is now using blockchain ledger technology to track produce from farms to stores. This is said to have 'increased customers' trust in the company with shoppers able to access information about where and when a product was farmed or processed.'

The author states:

'From an original pool of items such as meats, milk and cheeses, the chain plans to greatly increase the information available to consumers on products, including baby and non-GMO products.'

This principle is noted to have particular appeal to customers with demanding standards for ethics and food safety and the conclusion is that 'quality - especially transparent, auditable quality offered by blockchain - sells'.

Maintaining the integrity of supply, however, necessitates that companies work together, from manufacturers and growers through to logistics firms and retailers, with 'a shared record of data stored within a network of computers rather than by a single party'.

Organisations with ageing IT infrastructures are envisaged to potentially struggle to interact effectively with digitally native companies, but equally blockchain is seen as offering 'a real opportunity 'to legacy companies through its potential to replace old infrastructure and technical debt.

The author quotes Technology Strategist and TEDx Speaker Roop Singh as follows:

"By giving companies a shared infrastructure amongst supply chain partners, it allows greater flexibility and helps these larger, established companies behave a lot more like their agile competitors."

In relation to food he says:

"When there is a problem with a food product, the supermarket immediately has to produce a chain of custody of assets. Blockchains allow a more efficient and transparent tracing of assets than current state systems.

Blockchain can alleviate the issues with counterfeit goods and lower the cost of recalls when quality falls short of standard. These are expensive undertakings for a retailer, but probably only a small percentage of the financial damage that can be caused by a loss of reputation."

Another industry sector that has begun to embrace blockchain is the fashion industry, notorious for its waste and human rights issues. Here the author quotes Erica Stanford, founder of the Crypto Curry Club in London and mentor to blockchain start-ups and fintech:

"As fashion and clothing brands implement blockchain, it is showing up a lot of their issues, including human rights abuses and environmental degradation, excess energy usage and toxic waste, that they didn't want made public, and they're currently able to hide in layers of middlemen."

In looking to the future, Roop Singh says:

"Whatever you happen to be in, blockchain can easily combine with IoT to allow for easier inventory and warehouse management."

"From EDIs to ERPs, we are now moving towards a world of blockchain-based platforms, wherein only the relevant, value add companies will be invited to be part of the network."

FIRST BRITISH-MADE SURGICAL ROBOT

The first British-made surgical robot, known as Versius, has been deployed for the first time at Milton Keynes University NHS Trust and at the Western General Hospital in Edinburgh.

The robot performs keyhole surgery using robotic arms that mimic a human arm under the control of surgeons via a remote-controlled device which is connected to a screen in the operating theatre.

According to CMR Surgical Limited, the firm behind the technology, Versius has the potential to perform up to 700 minimal access surgery procedures a year and reduce the need for one additional doctor during operations.

The April 2020 issue of *Quality World* (p.3) quotes Richard Kerr, Consultant Neurosurgeon and a Council Member of the Royal College of Surgeons of England, as follows:

"Robotic assistance lies at the heart of future surgical techniques, and has great potential to enable more patients to benefit from 'keyhole' surgery with faster recovery times."

He warns, however, against the NHS, the first health service in Europe to use these next generation surgical robots, "rushing ahead with robotics without a clear plan for ensuring equity of access, and quality training for the clinical teams charged with using them."

Also quoted is Carol Long, CQP MCQI, Vice Chair of the British Computer Society Council at the Chartered Institute of IT (a volunteer advisory board within the organisation), who states:

"Surgical robots are technical extensions to human capability. These tools, when used by skilled clinicians, can ensure accuracy and reduce tiredness during operations. In this overlap between medical devices and computer-assisted working environments, it's important that these robots are thoroughly designed and tested by all clinicians."

Data scientists will need to manage the data collected from clinical trials to identify potential problems. The need for technologists and health informatics to support trials is also increasing the need for the professionalisation of these new roles. The Federation for Informatics Professionals (FEDIP) in health and social care, which brings together organisations and individuals working in health and care informatics to support the development of the informatics profession, will help to address this need."

BSI PUBLISHES GUIDELINES FOR AUTOMATED VEHICLE SYSTEMS

The British Standards Institution (BSI) has published Publicly Available Specification (PAS) 1880: Guidelines for developing and assessing control systems for automated vehicles.

This latest guide is designed to support developers and manufacturers of automated vehicles in the assessment and security of their control systems.

The guide was developed with the help of the UK Government's Centre for Connected Autonomous Vehicles (CCAV) and complements the international standard BS ISO 26262 that is used by engineers to assess and improve the safety of their automated vehicles and associated driving systems. It is also recommended for organisations involved in trials and other test/validation activities.

The May/June 2020 issue of *Quality World* (p.7) quotes Nick Fleming, Head of Mobility and Transport Standards at BSI:

"As the UK continues to build a world-leading environment for the trialling, testing and deployment of this innovative technology, we recognise that its foundation depends on safe design to achieve the benefits of automated vehicles. PAS 1880 will serve as an important source of guidance for the industry in achieving safe, secure and effective deployment of automated vehicles."