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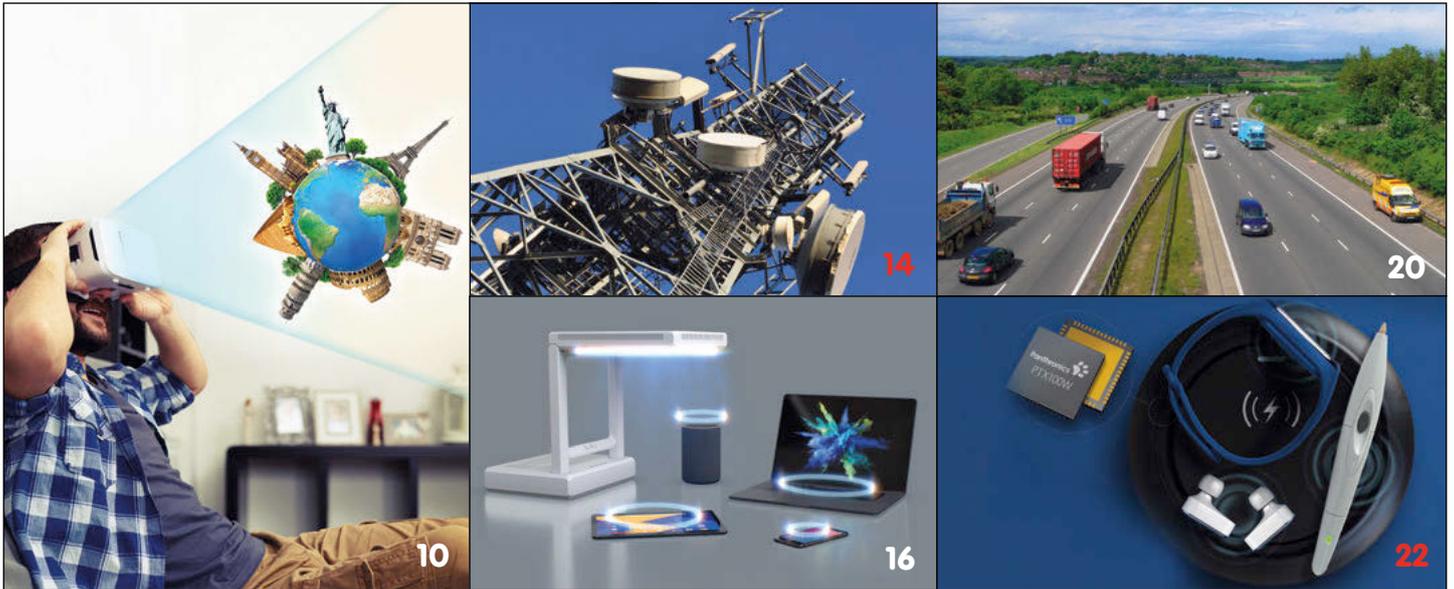


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# Monopolistic practices

THE ANTITRUST CHARGES BROUGHT AGAINST GOOGLE ARE THE MOST SIGNIFICANT YET FOR BIG TECH



**T**he times are changing, especially when US lawmakers bring antitrust charges against Google which they accuse of monopolistic practices.

Of course Google denies all the allegations and Alphabet's, Google's parent company, share price barely moved when the news of the historic lawsuit broke, but it does suggest that lawmakers and public sentiment appear to be turning against Silicon Valley.

Supporters of the legal action are hoping that at the end of what will be a long and protracted legal process, we will see a radically different company and industry.

Google, Facebook and Amazon are already facing investigations at State level regarding alleged "monopolistic behaviour", while the Federal Trade Commission is currently investigating Amazon and Facebook to determine if they are abusing their massive market power.

The charges against Google describe the company as a "monopoly gatekeeper for the internet", which uses "pernicious" anti-competitive tactics to extend its power.

When a single company has 80% of the "search" market and advertising revenues, then there is certainly the danger that it will crowd out competitors, undermine innovation and prevent the development of the "next Google".

Many years ago Google attacked Microsoft accusing it of being a technological bully that ruthlessly abused its dominance of the personal computer software market to choke off competition – what goes around, comes around!

What is particularly interesting about this, and other, legal actions are that they highlight a changing perception of the tech industry - no longer great innovators that purport to 'do no evil' but rather large corporate superpowers.

This push back against the tech sector comes after the Cambridge Analytica scandal highlighted the power of Facebook and for many the site of Amazon's chief executive, Jeff Bezos, growing richer by the day while the rest of the economy goes to 'hell in a hand cart' raises serious issues over the power and wealth of these companies.

The change in the regulatory and political attitudes clearly emerged earlier this year when the bosses of Alphabet, Amazon, Apple and Facebook appeared before a congressional hearing and, for many watching the proceedings, simply demonstrated good old-fashioned commercial ruthlessness.

This action by the US justice department could have a much wider-ranging impact and lead to investigations into other parts of their businesses going forward.

While the European commission has already conducted three investigations into Google and the UK and Australia are re-drawing the regulatory map, it's going to be the DoJ's anti-trust case that could prove the big game changer.

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

**"While the European commission has already conducted three big investigations into Google, the DoJ's anti-trust case could prove the big game changer."**

**newelectronics**

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# Project Endeavour starts first public trials

PROJECT LOOKS TO ACCELERATE AND SCALE THE DEPLOYMENT AND ADOPTION OF AUTONOMOUS VEHICLES. **NEIL TYLER** REPORTS



Project Endeavour, a government-backed autonomous vehicle R&D project, has reached a key milestone as the first live vehicle trials are set to begin on roads in Oxford. The development brings the deployment of commercial autonomous vehicles in the UK one step closer.

The Project will run until Autumn 2021 with live tests in three major UK cities. The trials will demonstrate autonomous driving in a variety of urban and city environments and will develop engagement models with local authorities and communities to help them prepare for the future launch of autonomous vehicle services.

The consortium, part-funded by the Centre for Connected and Autonomous Vehicles (CCAV) and delivered in partnership with Innovate UK, is using a combination of advanced simulations and on-road demonstrations to help accelerate and scale the deployment and adoption of autonomous vehicles.

A fleet of six Ford Mondeo vehicles, enabled by Oxbotica to be capable of Level 4 autonomous driving, will complete a nine-mile round trip from Oxford Parkway station to Oxford's main train station. Trials will be run at all times of day and night, allowing Oxbotica's autonomous vehicles to experience a range of traffic scenarios from morning commutes to school runs, in a range of weather conditions.

Launched in September 2019, the project has brought together Oxbotica, a leader in autonomous software, urban innovators DG Cities and Immense, a leading transport simulation company.

Ahead of the public trials, three new consortium partners have been added to Project Endeavour: the Transport Research Laboratory (TRL), the British Standards Institution (BSI) and Oxfordshire County Council.

The trio of new partners will focus on the development of a new safety assurance assessment scheme against PAS 1881 standard for public autonomous trials, helping to inspire trust and defining a consistent approach to safety that will enable future deployments to happen efficiently without slowing down the rate of innovation.

Dr Graeme Smith, Senior Vice President at Oxbotica and Project Endeavour Consortium Director, said: "The first live on-road public trials mark a key landmark for Project Endeavour as we work with local authorities and members of the public in London, Oxford and other major UK cities to shape the future of mobility. Alongside our valued partners, we're making autonomous vehicle services an everyday reality, right here in the UK."

## High-reliability isolation partnership

Silicon Labs has announced a new high-reliability (HiRel) isolation partnership with Teledyne e2v HiRel, a provider of high-performance, high-reliability semiconductors to the aerospace and defence market. Under the agreement, Teledyne will offer a specialised line of high-reliability products based on Silicon Labs' isolated gate driver technology.

Teledyne will market custom high-reliability solutions based on the Silicon Labs' Si827x isolated gate driver family that are optimised for markets requiring advanced technology and high reliability. The Teledyne gate drivers will be screened and qualified by Teledyne accordingly for specific market specifications, with an initial focus on satellite power systems supporting satellite communications.

The Teledyne family are suitable for GaN applications due to their faster switches rates and provide options for either a single driver or a combination of two 4 A isolated drivers in a single IC package for isolated gate drive applications.

"We anticipate a great deal of demand from our customer base with this new level of isolation reliability excellence," said Mont Taylor, Teledyne e2v HiRel Vice President of Business Development. "Our HiRel customers are seeking robust power solutions, and we are confident this new partnership with Silicon Labs will deliver a new calibre of isolated gate drivers."

# Flex Logix unveils AI edge inference chip



INFERX X1 SAID TO BE THE FASTEST AND MOST EFFICIENT AI EDGE INFERENCE CHIP TO DATE. **NEIL TYLER** REPORTS

Flex Logix Technologies has announced the availability of its InferX X1, which it claims is the industry's fastest AI inference chip for edge systems.

InferX X1 has been designed to accelerate the performance of neural network models such as object detection and recognition - the device runs YOLOv3 object detection and recognition.

Crucially, the InferX X1 comes with a high-volume price point that will enable high-quality, high-performance AI inference to be implemented in mass market products selling in the millions of units, for the first time.

"Customers with existing edge inference systems are asking for more inference performance at better prices so they can implement neural networks in higher volume applications. InferX X1 meets their needs with both higher performance and lower prices," said Geoff Tate, CEO and co-founder of Flex Logix. "InferX X1 delivers a 10-to-100 times improvement in inference price/performance versus the current industry leader."

"The technology announced by Flex Logix is a game changer and will significantly expand AI applications by bringing inference capabilities to the mass market," said Mike Gianfagna, principal at Gforce Marketing. "This is going to be a major disruptor in a market that is already forecast to grow exponentially in the future."

The InferX X1 features a new architecture that combines the company's XFLX double density programmable interconnect with a reconfigurable Tensor Processor consisting of 64 1-Dimensional Tensor Processors that are reconfigurable so that they can efficiently implement the wide range of neural network operations. Because reconfiguration can be done in microseconds, each layer of a neural network model can be optimised with full-speed data paths for each layer.

The InferX X1 and associated software will be available Q2 2021.

## Nexperia establishes new AFET category

Nexperia has defined a new MOSFET product group. Application Specific FETs (ASFETs) will feature MOSFETs with optimised parameters for specific applications. By focusing on individual applications, significant improvements can now be offered.

Nexperia said that it will be offering ASFET families for battery isolation, motor control, hot-swap and Power over Ethernet (PoE) applications. Defining the improvements that these tailored ASFETs can offer includes a 3x – 5x improvement in Safe Operating Area (SOA) for hot-swap applications, and maximum current ratings in excess of 300 A for motor applications.

Commenting Chris Boyce, Senior Director for the Power MOSFETs Group at Nexperia, said, "As designers push the boundaries of performance, it is crucial to understand how the MOSFET will be used in the application.

There are 100+ parameters on a regular MOSFET datasheet but usually only a few are critical in each project. However, as the applications change, so do the critical parameters. We determine the performance of every element of our products; the core silicon technology, the chip design, the package and the manufacturing & test procedures.

"By keeping individual application requirements front and centre of our thinking, we can choose to optimise the parameters that matter most in a particular use-case, often at the expense of others of less relevance."

The ASFET category will be further enhanced with the imminent release of a new family of automotive products with guaranteed repetitive avalanche performance for driving inductive loads.

## TÜV SÜD warns of new safety standard deadline

TÜV SÜD is warning manufacturers of ICT and AV Equipment that if they do not comply with the new safety standard (IEC 62368) within the next two months, they will no longer be able to sell their products in the EU.

On 20th December, IEC 62368 will supersede two standards that the industry has been familiar with for over a decade (IEC 60065 and IEC 60950), and as a result manufacturers will no longer benefit from the "presumption of conformity" offered by the superseded standards and will have to produce a sound technical rationale as to why they comply.

IEC 62368 introduces a completely new methodology and it is the first time that a hazard-based test approach is required for these product types. IEC 62368 not only relates to the end product but to components and subsystems, such as power supplies, hard drives and fans.

Commenting Richard Poate, Senior Manager at TÜV SÜD, said, "The introduction of IEC 62368 goes beyond a merger of the two old standards as it has a different structure and demands significant changes to safety testing. Manufacturers that have not taken advantage of the standard's transition period now have less than two months to make these fundamental changes. Jumping straight into full testing can be expensive and risky, so our advice would be to conduct a pre-compliance review and identify what is needed to make the product compliant to the new standard."

Product types covered by IEC 62368 include: computing and networking products; consumer electronics; displays and display units; telecommunication products; office appliances and other types of audio/video, information and communication technology equipment.



## CRAFTING THE NEXT GENERATION OF AI

Deci, a deep learning company based in Tel Aviv, Israel, has raised \$9.1 million in a seed round led by Israel-based VC firm Emerge and global VC fund Square Peg.

The company is building an AI-based platform that can automatically craft robust, scalable, and efficient deep neural network solutions ready for production at scale.

Advancements in AI, mainly powered by deep learning, have triggered ground-breaking innovations but, prolonged development cycles, high computing costs, and unsatisfying inference performance are making it almost impossible for enterprises to productise AI.

By harnessing AI to improve AI, developers will be able to achieve up to a tenfold performance improvement on any task, be it machine vision, NLP, or audio, obtaining a significant competitive advantage as a result.

“Deci is leading a paradigm shift in AI to empower data scientists and deep learning engineers with the tools needed to create and deploy effective and powerful solutions,” said Yonatan Geifman, CEO and co-founder of Deci. “The rapidly increasing complexity and diversity of neural network models make it hard for companies to achieve top performance.”

Deci’s deep learning platform automatically gears up neural networks to become production-grade solutions on any hardware, including CPUs, GPUs, and special-purpose AI chips for edge and mobile.

The platform is powered by Deci’s patent-pending AutoNAC (Automated Neural Architecture Construction) technology, which uses machine learning to redesign any model and maximise its inference performance - while preserving its accuracy.

The platform optimises any given deep learning model and cuts its computing costs for any desired hardware.

According to Professor Ran El-Yaniv, Deci’s Chief Scientist, “Our AutoNAC performs a smart high-speed search across a huge set of neural network architectures to aggressively speedup runtime, while preserving accuracy, by optimising the fit between the neural network structure, the user’s dataset, and the target computing hardware.”

Deci has already partnered with industry leaders in autonomous vehicles, manufacturing, communication, video and image editing, healthcare, hardware, and system OEMs.

## Micron readies multichip package with LPDDR5 DRAM

HIGH-PERFORMANCE MEMORY AND STORAGE IN A SINGLE, TIGHTLY DESIGNED PACKAGE SET TO ACCELERATE 5G APPLICATIONS. **NEIL TYLER REPORTS**

Micron Technology has announced the launch of uMCP5, the industry’s first universal flash storage (UFS) multichip package with low-power DDR5 (LPDDR5) DRAM.

Ready for mass production, the uMCP5 combines high-performance, high-density and low-power memory and storage in one compact package that will enable smartphones to handle data-intensive 5G workloads with dramatically increased speed and power efficiency.

The multichip package uses Micron’s LPDDR5 memory to power advanced mobile features previously only seen in costly flagship devices using discrete products, such as stand-alone memory and storage. These emerging features - such as image recognition, advanced artificial intelligence (AI), multi-camera support, augmented reality (AR) and high-resolution displays - are now becoming accessible to more consumers.

“Moving 5G’s potential from hype to reality will require smartphones that can support the immense volumes of data flowing through the network and next-gen applications,” said Raj Talluri, senior vice president and general manager of Micron’s Mobile Business Unit. “Our uMCP5 combines the fastest memory and storage in a single package, unleashing new possibilities for 5G’s disruptive, data-rich technologies right at consumers’ fingertips.”

With LPDDR5, Micron has significantly increased memory bandwidth from 3,733 to 6,400 megabits per second (Mb/s), enabling seamless, instant experiences for mobile users, even when using data-heavy features.

“5G provides smartphones with unprecedented multigigabit speeds to connect with the cloud,” said Ziad Asghar, vice president of product management at Qualcomm Technologies, “bringing memory on par with 5G speeds to a new generation of phones and enabling best-in-class gaming, differentiated camera and AI experiences, and ultrafast file transfers.”

## Neurala looks to accelerate AI for Industry 4.0 Initiatives

AI software company Neurala has announced a strategic partnership with IMA Group to deliver AI solutions for industrial machines, focused on field testing of AI that provides actionable intelligence from data that’s collected through Industrial Internet of Things (IIoT) systems.

IMA specialises in the design and manufacture of automation equipment and its partnership with Neurala is the latest in the company’s efforts to help industrial organisations realise Industry 4.0 initiatives, with AI and automation playing a key role.

“As the IIoT becomes more commonplace – with dozens of sensors and cameras gathering product data, as well as basic diagnostics from industrial

equipment – manufacturers will need human-level AI that can extract actionable insights from that data at the compute edge,” said Max Versace, CEO and Co-Founder, Neurala. “Data without AI is not useful, and off-the-shelf cloud-based AI tends not to be cut out for the manufacturing floor. Unlike traditional AI solutions, Neurala’s technology is trained at the edge, enabling it to continuously learn based on manufacturers’ data as it varies across specific machines and production runs.”

Neurala will work with IMA to deliver its technology directly on industrial machines, at the compute edge, allowing operators to quickly and independently set up advanced AI systems without requiring specialised expertise.

# Cadence brings verification IP to the chip level

CADENCE UNVEILS A NEW SUITE OF TOOLS FOR AUTOMATING SOC TESTBENCH ASSEMBLY. **NEIL TYLER** REPORTS

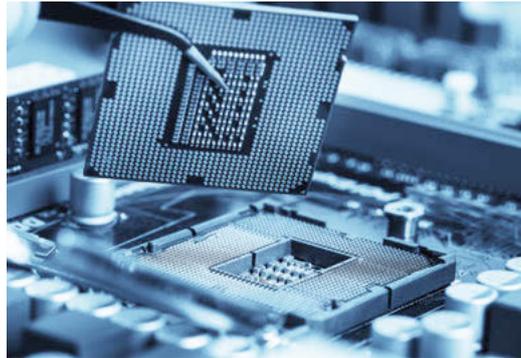
Cadence Design Systems has unveiled a new suite of tools and libraries for automating system-on-chip (SoC) testbench assembly, bus and CPU traffic generation, cache-coherency validation and system performance bottleneck analysis.

Using Cadence's System-Level Verification IP (System VIP) customers developing complex hyperscale, automotive, mobile and consumer chips will now be able to improve chip-level verification efficiency by up to 10X.

System VIP takes IP-level verification automation and brings it to the chip level. Tests created are portable across Cadence's simulation, emulation and prototyping engines and can also be extended to post-silicon bring-up.

Cadence System VIP consists of four new tools and libraries: the System Testbench Generator, which allows users to automatically generate SoC testbenches with complex memory, cache, interface and bus configurations; System Traffic Libraries; the System Performance Analyzer and a System Verification Scoreboard that provides comprehensive data and cache-coherency checks across coherent interconnects, memories and peripherals.

"Verification challenges increase exponentially as the number and complexity of integrated IP blocks on a SoC grow," said Paul Cunningham, corporate vice president and general manager of the System & Verification Group at Cadence. "Our Cadence System VIP solution dramatically improves verification throughput by automating some of today's most critical labour-intensive chip-level verification challenges."



## MathWorks updates Simulink Real-Time

MathWorks has announced a number of updates to Simulink Real-Time that are intended to enhance both rapid control prototyping and hardware-in-the-loop (HIL) testing with Model-Based Design.

In Release 2020b, Simulink Real-Time has been enabled with the QNX Neutrino RTOS, a multi-process 64-bit POSIX-compliant real-time operating system from BlackBerry. The QNX RTOS is widely used in life and safety-critical systems for vehicles, medical devices, industrial controls, rail, robotics, aerospace and defence.

The update builds on the existing Simulink Real-Time and Speedgoat integration, enabling engineers to extend their Simulink models with I/O driver blocks, automatically build real-time applications, create instrumentation, and perform interactive or automated runs on a target computer.

Engineers will be able to replace a physical system such as a vehicle, aircraft, or robot with a real-time simulation of a virtual system to reduce the cost of testing.

The QNX Neutrino RTOS enables new workflows, making real-time computing problems easier to solve, particularly when multiple tasks compete for a system's resources.

"Engineers working on complex embedded systems are constantly looking for ways to improve real-time simulation and testing with Model-Based Design," said Jay Abraham, manager – verification products, MathWorks. "With the enablement of the QNX Neutrino RTOS, they can now work with Simulink Real-Time to address design challenges that require streamlined solutions for rapid control prototyping and HIL testing."

## Tracealyzer Version 4.4 now supports embedded Linux

Percepio, a specialist in visual trace diagnostics for embedded and IoT software systems, has announced the availability of Tracealyzer version 4.4 with new support for embedded Linux.

Tracealyzer is able to provide a much greater level of insight during software debugging and verification at system level by enabling visual top-down exploratory analysis, making it easier for developers to spot issues during full system testing, and drill down into the details to find the cause.

The new version adds several views optimised for Linux tracing to the extensive set of visualisations already present in Tracealyzer, and leverages CTF, the Common Trace Format, and the widely supported LTTng open source tracing framework.

New features include the Signals and Syscalls Explorer, which is like an index over the trace, showing how each thread, process and process tree interacts with the Linux kernel through syscalls, and how signals are generated and delivered.

Another is the Communication Flow view, which has been optimised for Linux and shows a visual graph over the process interactions with respect to file descriptors, signals and pipes.

An Actor Tree field in the main trace view will allow users to see how processes and threads are spawned over time, including their parent/child relations.

Commenting Percepio's CEO and founder Dr. Johan Kraft said, "Percepio Tracealyzer is firmly established for visual trace diagnostics in the RTOS space. Linux is the single largest platform for embedded and IoT systems today and has an even greater need for better debugging support at system level."

Other improvements for Linux developers in Tracealyzer 4.4 include: Quick Zoom; a rich set of high-level overviews for top-down exploratory analysis, including process interactions, process forking, CPU usage, RAM usage, I/O usage, file usage, state machines and user-defined metrics; an intuitive trace view for showing details, scalable for large Linux traces with respect to both responsiveness and clarity; and user-defined advanced analysis – Adapt Tracealyzer – for specific use cases via customisable event interpretation, user-defined data sets such as Intervals and State machines and display in highly configurable views.

# GOING VIRTUAL

Could VR replace physical travel helping the leisure and tourism industry to reinvent itself in a post Covid-19 World? By **Neil Tyler**

Since the beginning of 2020 Covid-19 has had a profound impact on the way we live, work and play and industries around the globe are having to adapt to what is often referred to as the 'new reality'.

One industry that has been particularly badly affected has been leisure and tourism. Air travel has collapsed and travel restrictions have had an enormous impact on tourist numbers. According to figures from the OECD the sector could see a decline in business of as much as 80 per cent over the course of 2020.

Different nations have responded with various schemes to support industry and the tourism sector has called on national, regional and local governments to help, whether in the form of immediate financial aid or by simplifying visa rules in a bid to attract visitors once the pandemic starts to recede.

However, in addition to actual financial help is it possible that technology could be used to support the sector? Could we see the use of virtual reality (VR) not only as a marketing tool but as a travel substitution, replacing real, physical travel?

VR has certainly got the potential to create experiences and memories for customers and has already been used effectively by some travel companies to help customers plan holidays or 'virtually' visit venues.

Looking to the future, many in the tourism industry see it has having a significant role to play in a post-Covid-19 industry that could take years to recover.

By simply clicking a button VR has the ability to transport people to a destination using images, sounds and other physical sensations. It provides the user with a virtual world in which

they can move around and interact.

As already mentioned, VR has been used by the travel industry to provide customers with what it describes as a 'try before you fly' option and it's been found that rather than discouraging people from travelling, that VR used in this way can actually encourage customers into actively taking a trip and visiting the location in person.

According to YourTour, which has developed a mobile platform that uses AR and VR to provide immersive and on-site 'touring experiences', "While we don't see VR replacing traditional travel, it will help to enhance travellers' experiences whilst also meeting their ever-rising expectations. The use of VR is rapidly increasing as the most



forward-thinking companies in the travel industry realise it has incredible potential to attract, engage and amaze potential customers.”

While VR has been viewed more of a marketing tool, it has also been deployed in a number of other ways too, such as booking holidays via virtual booking interfaces. For example, the booking engine Amadeus developed a VR booking procedure that enabled customers to buy a ticket and then select a seat on an aircraft by taking a walk through the plane itself – a process that made what was always a mundane chore more interactive, seamless and enjoyable.

There are also virtual tours providing the user with the ability to view locations and hotels before travelling, allowing a potential guest to scope out a destination before booking.

Hotels are able to provide customers with the opportunity to ‘walk’ through a room getting a sense of the space, light, and ambience of a room with a 360-degree viewing angle and, by deploying ‘hotspots’, enable them to interact with their environment to find out more about it or to buy highlighted products or services.

### Creating an experience

The impact of the pandemic is forcing cities, organisations and venues to consider using VR to create new virtual experiences.

In Finland Virtual Helsinki, which was launched in 2018, uses a combination of 3D modelling from open data, as well as drawings and images, to provide users with a VR experience of visiting key landmarks in an exceptionally realistic way.

In an interview with the Guardian newspaper Laura Aalto, CEO of Helsinki Marketing said, “We are embedding digital innovation into all of the city’s activities. Simply, digitalisation builds better cities – it means personalised services and more choice.”

The Covid-19 lockdown has helped to spur further innovation and the

Vappu Eve (the festive night before May Day) was turned into a virtual gig in the city’s Senate Square with over 150,000 people in ‘virtual attendance’.

Zoan, a Helsinki-based VR studio, was able to pull the event together in a matter of weeks and the project has raised some interesting ideas around not just how to organise virtual events, but how to develop virtual tourism in general.

“The travel industry needs to reinvent itself and I hope this encourages other destinations to experience with digital platforms,” said Mikko Rusama, chief digital officer at City of Helsinki.

With customer behaviour expected to change radically as a result of the pandemic, thousands of tourist destinations are already developing or enhancing existing virtual content in order to keep visitors interested.

From the Smithsonian Institute in Washington to London’s Tate Gallery online tours are now available and proving exceptionally popular although how these tours are monetised and curated remains a challenge.

Dr Timothy Jung, founder and director of the Creative AR & VR Hub at Manchester Metropolitan University suggests, “The role of VR will increase. The tourism industry may need to consider hybrid experiences – a combination of real and virtual – in the future.”

According to Dr Jung, people are going to become more open to virtual experiences as an alternative way of socialising and enjoying life and it could become, yes, ‘the new normal’ within tourism.

### A big opportunity

While VR can offer a 3D taste of a destination, the development of haptic and 3D spatial audio technologies will also help to influence the way in which travel is booked and travellers prepare for it.

And while VR will be able to encourage visitors to existing tourist hotspots it can also be used by

destinations that may not have been viewed as a ‘top-tier attraction’ in the past, so encouraging travellers who may not have considered it as now a place worth visiting.

VR could certainly serve as an introduction to some places ‘off the beaten track’ and, in time, may even help to boost tourism.

Technology isn’t new to the travel and tourist industry - artificial intelligence is being used to replace human intervention and is speeding up processes; the Internet of Things has been deployed to track passenger luggage baggage via apps; voice technology is used in hotels as a way of interacting with customers while travel and tourism companies have been developing wearable technology, offering customers a more personalised experience.

A growing number of companies are reaping the benefits of VR headsets that provide better customer service and delivering a lifelike experience and a better understanding of the services that they offer, through simulation.

According to Jessica Driscoll, Head of Technology – Immersive at the Digital Catapult in London, “There are plenty of examples whereby VR is being used and developed by the industry.

“You can point to 360 degree films of locations and hotel rooms, 3D tours and assisted tours using AR to help

Below: Mobile platforms are being used to provide immersive on-site ‘touring experiences’



people explore local areas in more depth and which can be consumed via a mobile device, PC or a headset, such as the Oculus Rift.”

As Driscoll points out a growing number of gaming events, film and music festivals have taken advantage of VR during the pandemic to develop virtual live events.

“Available in 360 degrees and providing high quality immersive audio, these events provide an interesting template for the leisure and tourist industry. The Wireless Connect music event held at Finsbury Park in London over the summer used the MelodyVR app, which is available on iOS and Android, as well as on Oculus VR devices and it’s these types of events, using the latest production technologies, which could provide ideas for the wider tourist industry going forward.”

However, among many conventional operators such as Thomas Cooke and the Marriott Group within the leisure and tourist industry, who have dabbled with the technology, the use of VR “just hasn’t taken off.”

“That can be attributed to the cost and the fact that the technology in this space tends to move very quickly,” Driscoll suggests. “Critically the networks are still too slow so it’s hard to provide a live event, although as mentioned previously MelodyVR was able to create a great concert experience.”

Another company that Driscoll mentions in passing is US-based Niantic which although focused on gaming is among a growing number of VR specialists who are looking to create new experiences beyond gaming and are now focussing on tourism.

According to Driscoll the roll-out of volumetric video, a process whereby moving images of the real world can be captured and then viewed from any angle will be a ‘game changer’ for both VR but also for those sectors, like leisure and tourism, that are looking to use the technology.

“Volumetric video will enable users to navigate a world on their own, choosing their own ‘shot’.”

#### **A new audience**

“Prior to Covid-19 there was certainly an audience for online cultural experiences and high quality tours of heritage sites. For example, there was a big audience in China for people who couldn’t make it to the UK or, if they did, didn’t have the time to visit all the sites. An alternative was an online experience that they could enjoy at a time of their choosing,” explains Driscoll.

Driscoll makes the important point that Covid-19 may end up altering the business models associated with VR and tourism.

“If this crisis continues then I think business models will have to change. If I can’t go to somewhere physically, to experience the sites and the smells, then what do I do?”

“I think things like volumetric video and 3D audio spatial technology will lead to the creation of much higher quality VR products and we could end up with a market that splits, with those willing to pay for the experience enjoying a much higher quality that can be tailored specifically for them. Why not have David Attenborough taking



**“If this crisis continues then I think business models will have to change. If I can’t go to somewhere physically, to experience the sites and the smells, then what do I do?”**

Jessica Driscoll

Below: Live events could provide a template for VR tourism

you on safari or guiding you through the Amazon?

“Experiences will need to be much richer and people will expect it to be tailored to their specific needs.”

#### **A better future?**

Could Covid-19 be giving us a glimpse at how things could be different for the tourist and leisure industries, as virtual travel experiences see a surge in popularity or is this just a temporary phenomenon? With worries about the environment and our carbon footprint will more people want to ‘enjoy’ the world’s sites using VR?

We’ve certainly seen acceleration in technological innovation in the tourism sector, with companies embracing new ways, such as online virtual reality tours, that look to bring new experiences to their customers.

However, while new production technologies will provide vastly improved experiences on line they are not able to replace the experience of ‘doing’, which is for many at the heart of being a tourist.

Is virtual tourism little more than as one expert described it, “the most authoritarian of guided tours,” or might it be the critical component that will help a struggling industry to survive the fallout from Covid-19?



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# NAVIGATING THE PATHWAY TO 5G

The road to delivering the full promise of 5G is a long one, but it appears that the industry is making good progress.

By Neil Tyler

Is 2021 set to be the year that 5G delivers? With the construction and upgrading of base stations and other infrastructure and the roll out of mobile 5G devices, are we about to see the realisation of the many promises associated with the technology?

Taiwan Semiconductor Manufacturing Co. (TSMC), for example, is gearing up to meet strong demand for 5G mobile devices like Apple's new iPhones and high-performance computing. As the main chipmaker for Apple's iPhones, it has been investing heavily in new equipment, in anticipation of strong demand for 5G smartphones.

"Covid-19 is accelerating digital transformation, while 5G and HPC applications continue to drive demand," said the company's Chief Executive Officer C.C. Wei at a media briefing and he said that, along with Apple, more manufacturers were set to deliver 5G devices going into next year.

Apple recently unveiled its latest iPhone line-up and expects to build at least 75 million 5G iPhones this year. With Apple now entering the 5G handset market there are growing expectations that it will help to drive significant interest and adoption around this next generation of cellular technology.

"Market players have anticipated

5G as being a major growth driver," said GF Securities analyst Jeff Pu and, by 2022, around 750m 5G smartphones are expected to have been shipped.

According to figures from Qualcomm around 2.8bn 5G connections are expected by 2025 as more businesses see the benefits associated with 5G.

In fact, according to research conducted by Nokia and Nokia Bell Labs, a combination of 5G, edge computing, data analytics, and private networking will combine to accelerate the digitalisation of business and add billions to the world's economy.

According to Raghav Sahgal, president at Nokia's enterprise division, "Many companies see 5G as a technology for the near future and organisations are at the implementation stage – which for most, means trials, pilots or early stage deployments."

There is certainly a strong movement driving 5G across every region, with services being launched in Europe, North America, Africa and Asia and operators are using massive marketing campaigns to prepare customers for 5G.

In the UK, for example, EE, part of telecom group BT, has switched on 5G technology in 112 towns and cities across the country based on

a non-standalone 5G New Radio deployment and, from 2022, will introduce a full 5G core network, with enhanced device chipset capabilities and increased availability of 5G-ready spectrum.

A host of new mobile platforms, such as Qualcomm's Snapdragon 750G 5G Mobile Platform, are appearing and being used in a growing number of 5G designs.

"We continue to see great traction with our high-tier Snapdragon 7-series 5G mobile platforms," said Kedar Kondap, vice president of product management, Qualcomm Technologies. "As we continue to build out this relatively new tier of our mobile roadmap, we're always looking for ways to support the growing needs of our OEM customers."

The Snapdragon 750G's X52 5G Modem-RF System supports both mmWave and sub-6 GHz, SA and NSA modes, TDD, FDD and Dynamic Spectrum Sharing (DSS), which are all critical in helping to deliver the full promise offered by 5G.

"We have spent many years discussing 5G and the market opportunities," says Ben Timmons, Senior Director of Business Development at Qualcomm Europe, "and many of the concerns and 'blockages' to the roll out of 5G have been overcome. It's been an incredibly successful launch, to date."

But, as Timmons explains, "we are only at the start,

Below: Apple expects to build 75 million 5G iPhones this year



Scilite2010/stock.adobe.com

and the road to realising 5G is not a straight one.”

So where are we when it comes to realising the full promise of what Timmons describes as the ‘5G pathway’?

**The road to 5G**

“We are still some way from delivering a complete standalone 5G system – the end point,” Timmons explains. “We are only at the beginning when it comes to enhanced mobile broadband. There is a long process ahead; a series of steps, often in parallel involving technological developments that will enable new capabilities and ensure 5G delivers on the ‘hype’ that has surrounded it.

“5G has been launched with an architecture known as non-standalone (NSA) which uses the existing 4G infrastructure and adds 5G radio on top as an additional capability to enhance download speeds and to improve latency.”

The next and pivotal stage in the roll out of 5G will be Dynamic Spectrum Sharing (DSS) according to Timmons, which will use legacy 4G bands, now shared with 5G, to expand coverage quickly and facilitate the transition to 5G.

“This is going to be the critical next step,” explains Timmons. “I think, for many, it’s hard to understand its importance and just how different DSS is to any previous network technology migration involving mobile technologies.

“The idea is that you will be able to

deploy 5G in a frequency band without taking out the existing technology or turning off aspects of the network. DSS will simplify the roll out of 5G, both in terms of the economics as well as the technology.

“Admittedly, it’s not something that can be done instantly but for many operators it will simply involve a software upgrade that will allow them to develop more 5G coverage, in more places, for more of the time,” says Timmons.

With DSS a reality, operators will be able to roll out new services by sharing 4G spectrum with 5G; base stations will be able to get a software upgrade and new antennas will be added to 4G mid/high band levels.

“This is happening already, so we’re not talking about trials but real launches, with operators across Europe using DSS to achieve nationwide 5G coverage,” explains Timmons.

Beyond DDS, the next step is mmWave which will bring super-fast download speeds, more bandwidth and will help to future-proof networks enabling them to handle more data that will be made possible by the abundance of spectrum above 24Ghz.

It is, according to Timmons, another vital step in delivering the full promise of 5G.

“There have been numerous launches involving mmWave around the world, and we are seeing substantial momentum to deliver mmWave. All the major operators in the US have launched 5G services



**“There is a long process ahead; a series of steps, often in parallel involving technological developments that will enable new capabilities and ensure 5G delivers on the ‘hype’ that has surrounded it.”**

Ben Timmons

using it, and over 120 operators around the world are investing in its commercial deployment.

“It’s capable of delivering peak download speeds of up to 2Gbps and even at an average speed of 900 Mbps it is four times faster than sub-6Hz.”

Europe has been slower to adopt mmWave but now spectrum has been auctioned in Italy and Finland, while spectrum auctions are being planned both in the UK and Germany.

“In Russia, all four carriers are in active pilots,” says Timmons.

“Outside of Russia, it’s likely that in the European market we will see mmWave used in specific locations. Those that are densely populated such as transport interchanges and stadia where, for example, there’s lots of video being downloaded and uploaded and huge amounts of video is being transmitted.”

The next, and final step, on the road to full 5G is standalone where networks will maintain 5G networks using low and mid-band levels while supporting mmWave, all without any reliance on the 4G network.

The 4G network will be replaced by a 5G Core network (5GC) that will include a new core, with hardware and software that is totally separate from 4G.

“You will finally have a network designed for 5G,” says Timmons, “and that will enable us to bring in the applications that 5G has long promised.”

5G SA will enable industries to do things like network slicing, that will allow the use of dedicated network resources to guarantee reliability, latency and security.

“We have been talking about the promise of 5G for some time and just a year ago much of it sounded like fantasy, but today it’s happening. Companies like Vodafone and Ericsson are demonstrating 5G SA in practice. The future potential of this technology is actually being demonstrated now.”



Left: mmWave is suitable for densely populated locations such as transport interchanges and stadia

The ability to send an electric current through the air, from one location to another, may not be a new idea but it has certainly taxed the minds of engineers for many years – that is the ability to transmit power wherever it is required and without the need for wires.

A number of companies have been working on over-the-air charging, among them Pasadena-based GuRu Wireless, a start-up that has developed a number of innovative prototype devices that are able to transmit electricity



# Over-the-air charging gets real

GuRu Wireless is developing a range of wireless charging devices that can transmit electricity without the need for wires. **Neil Tyler** finds out more

without the need for wires.

It does this by remotely powering devices by using high-frequency radio waves. GuRu demonstrated its technology at CES earlier this year and showed how it could be used to charge up devices from smartphones to IoT devices.

Founded by a team of Caltech engineers and scientists it uses mmWave to transmit power directly through the air, at distances of up to three feet or more, by using a proprietary 24GHz “RF lensing” technology that can be applied to charge several different devices at the same time.

By operating in the mmWave spectrum it should be possible for engineers to create much smaller devices and a more efficient power transfer. The company’s smart lensing technology enables the use of focused energy beams for power transfer, pinpointing specific targets for power delivery rather than flooding an entire room with wireless energy-power. So power, where you want it and when you need it, as the company says.

According to GuRu Wireless CEO Florian Bohn, “When we demonstrated

the technology at CES, we received incredible feedback. We’ve also recently launched a new evaluation kit to help designers assess potential use case scenarios and implement wireless power.”

Bohn quit his job as a Caltech scientific researcher to work full-time on the technology and to set up GuRu.

“The foundational research had been going on for over 20 years,” says Bohn. “We founded the company to commercialise the products coming out of this research and do so at scale. We were able to raise venture capital in 2017 to fund the business’s development.

“The commercialisation of the technology is moving at pace,” he says.

“We certainly benefitted from appearing at CES. The reaction was very positive and we generated a lot of new leads. We are now working with different companies and vertical markets developing engineering prototypes for, among others, the automotive and consumer spaces.”

## A smart piece of kit

GuRu’s wireless power modules include transmitting and receiving

antennas that are, according to Bohn, fully scalable, customisable and cost effective.

“Our technology allows for dynamic sensing and tracking of devices; the automatic alignment of power needs with a specific device and the ability to power and track multiple devices,” he explains.

It’s certainly a clever piece of kit combining generator and recovery units.

“The generator unit is the source of the power. We use mmWave energy in a controlled function that allows it to be sent to a specific location. The generator unit constantly monitors its environment and in doing so is able to change the way in which the energy is sent and to which devices by tracking them.

“Our recovery units collect the energy, taking those mmWaves and converting them into dc energy,” he explains.

At CES the company demonstrated what it called Rovi, a mobile robotic generator unit.

“This robotic device is able to move around in a large space and identify devices that need charging

**“This technology will allow IoT devices to receive an almost constant wire-free recharge and with power available over the air, battery sizes can shrink or even be eliminated entirely”**

Florian Bohn



– it's especially suitable where IoT devices might be deployed and which need to be kept charged."

According to Bohn, the company's wireless power devices, whether generating or recovering power, are scalable.

"Our focus is always on the application and associated form factors. Recovery units can be made smaller, while the generator units can be made significantly bigger – both will be dictated by the power needs of the applications.

"IoT sensors don't need as much power, for example, so could be supported by our Rovi device. If you're looking to power multiple devices across a large area, then we can place a larger generator unit in a ceiling, for example.

"The system is basically a radar - it has all the necessary components to be one. The resolution is a lot higher, however, and we are able to pinpoint with great accuracy where things actually are.

"As a result we don't need to flood a room, or location, with energy. We've created a feedback link that enables the generator unit, via software, to know where the various recovery units, which will have been incorporated into various devices, are and whether they are sufficiently charged," Bohn explains.

"In turn the recovery unit will know what is around it and where energy is coming from. When a

device makes an active request for power it will be sent it."

### IoT product development

Wireless charging will benefit both the accelerating digitalisation of industry, along with the roll out of the Internet of Things, according to Bohn.

"When combined with the roll-out of 5G networks, wireless power will have far-reaching benefits for engineers and product managers who are looking to develop IoT products-for both businesses and consumers.

"This technology will allow IoT devices to receive an almost constant wire-free recharge and with power available over the air, battery sizes can shrink or even be eliminated entirely. As a consequence you could see smaller sensors and significantly cut battery waste," Bohn suggests.

As a consequence of smaller sensors it will be possible to develop more streamlined IoT products, allowing the development of devices with more complex and varied functionalities.

Smaller batteries could also mean devices can be both lighter and have room for other components and capabilities. As Bohn points out, "most of the volume and weight of any device comes from its battery."

One area of particular interest in the technology is from the medical sector, according to Bohn, who suggests that

Below:  
Rovi, a mobile robotic generator unit

it could provide not only much greater efficiencies but significant costs savings.

"Medical staff will be able to improve poor battery management avoiding the logistics associated with ensuring that medical equipment is properly charged; wireless charging can be done in a clean way, with no need for cables, which means that devices can be sealed making it easier to clean and disinfect equipment.

"It will also be possible to make equipment more mobile so that it can be moved with the patient without worrying about charging it. As a consequence it will be possible to streamline workflows within the medical space and make diagnostic equipment portable."

It all sounds too good to be true and as with all technology there are drawbacks in that it isn't that efficient.

While it's significantly better than many other devices, delivering upwards of 50 per cent of the power it sends to the devices receiving it, that still means a lot of power is being wasted.

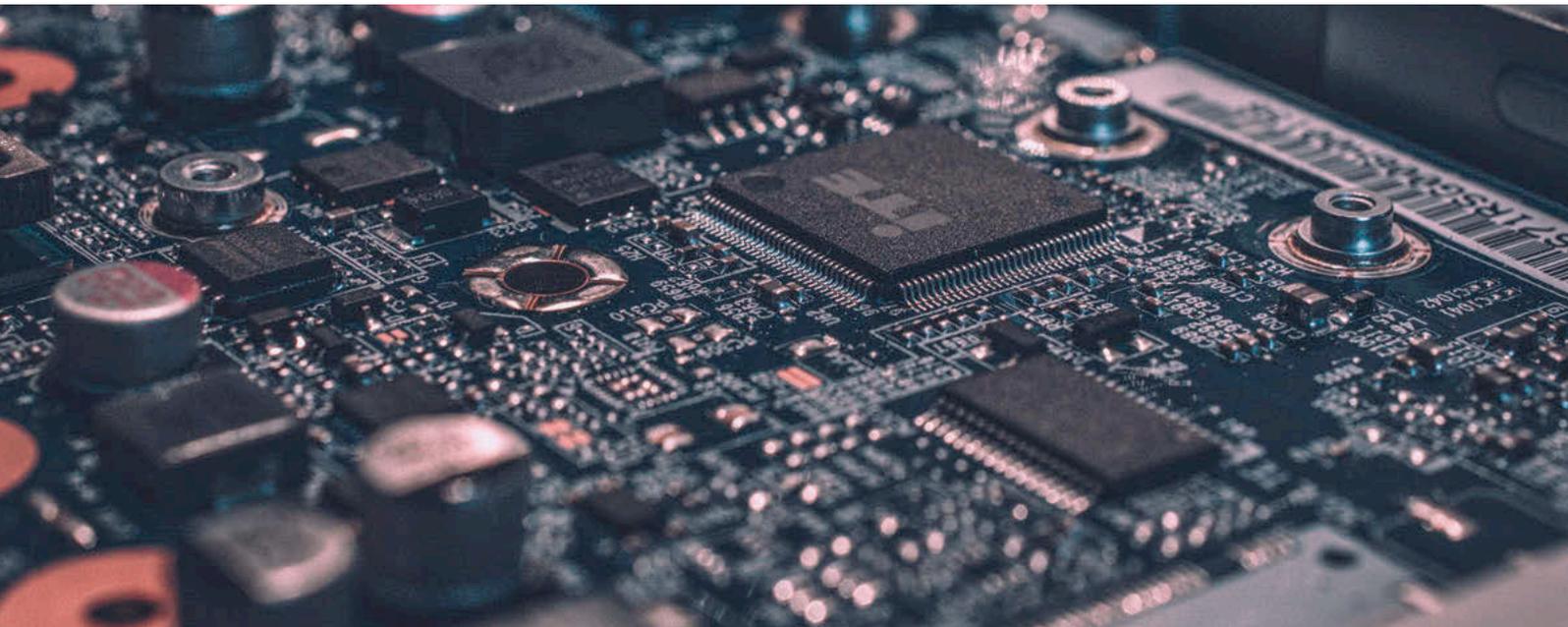
"With this type of technology, energy loss is a problem," Bohn concedes but makes the point that sending power from point A to B is relatively efficient.

"We are not losing so much that it is prohibitive. One thing all energy systems have is some form of energy efficiency loss, nothing is 100 per cent efficient.

"For the applications we are targeting, whether IoT sensors or charging consumer devices, the amount of power involved is miniscule – so even the loss of 50 per cent of the power sent is relatively insignificant."

Despite that, at a time when more consumers are looking for ways to reduce their energy consumption, this could prove a problem but, as the technology becomes more efficient at powering devices, the adoption of wireless power could become an everyday occurrence – much like logging on to your local Wi-Fi.





# THE 'RIGHT TO REPAIR'

Faced with extending a product's lifespan, manufacturers need to think about product repairability at the design stages. **Simon Vogt** explains

**E**lectronics manufacturers and the consumers that buy their devices are both increasingly focused on extending product lifespan.

In March 2020, the European Commission announced plans to extend the eco-design directive, billed as the 'right to repair', to phones and tablets in a bid to increase the repairability of electrical devices.

This is likely to be just one of a growing wave of related legislative activities in the coming years that are designed to extend the lifetime of consumer products. In the US, many states across the country are already introducing legislation to make it easier for users to repair their own equipment and electronics.

The drive towards 'right to repair' is also being shaped by environmentally aware consumer trends. There is an active right to repair movement in the US but also in several other countries including the UK and Australia. It is part of a growing backlash against

products that have a short life span, or don't have spare parts, as well as those that have been welded together or mechanically sealed in some way.

With environmental issues increasingly coming to the fore, there is a growing move away from the 'throw away' society of the past and towards a new culture where waste reduction and environmental consciousness take centre stage.

Increasingly, a growing number of consumers are looking to purchase products with a longer lifespan and repair them when needed, rather than simply throwing away the device and purchasing a replacement. All this has the potential to lead to further legislation of course, but there are also more general signs that it is changing manufacturers' mindsets around device repairability.

## **A shift in design focus**

For existing products, manufacturers will be looking to modify existing

designs, in order to make them compliant. This may well lead to new patents for designs of parts that are not currently repairable. Moving forwards, for new products we could see a tendency for designs to be chosen for manufacture based on how easy they are to repair by a consumer.

Manufacturers are also more conscious of safety. Consumers are certainly not skilled electricians or necessarily have the right tools to carry out repairs. There are concerns about what could happen when repairs go wrong, and the potential for new legislation to be brought in. Some manufacturers are considering introducing longer warranty periods to control repairs for longer and provide longer-lasting products.

## **Moving away from seals and sealants**

Recent design trends have often made electronics difficult to open without compromising the device's liquid protection mechanisms or structural integrity. This is due to rigid gaskets and seals, thick conformal coatings or glues.

Any device that is mechanically sealed or glued shut cannot currently be repaired by consumers, including for example smartphones. These sealed parts and/or products are designed to keep dust out and prevent

**"Over the coming years, the drive to repairability is likely to continue as new legislation comes on stream"**

liquid damage, but once compromised are irreparable.

As repairability becomes more important, these mechanical solutions become increasingly unfit for purpose.

If a product is dropped or broken, not only are the mechanical seals often rendered obsolete, but even if it is possible to repair a device with these features, it's unlikely to be cost effective and the device will likely end up as e-waste.

A common example of this is a dropped smartphone. The cost to repair a broken smartphone screen can be as much as 30% of the cost of the device for high end products, but for mid to low tier products the cost to repair can often outpace the cost of replacement.

All of this is in itself likely to lead to significant changes in the ways electronics products are designed. We may see welds or glued joints replaced with latches, gaskets or connectors redesigned for greater accessibility. We could also see manufacturers increasingly avoiding unnecessary LCD screens (on the latest modern fridges, for example), as they are difficult to make repairable.

Adding to the burden on manufacturers, we may even see additional safety mechanisms needing

to be added to products to protect consumers when carrying out repairs.

Driven by the prevailing market environment and most notably the right to repair legislation, manufacturers will also be increasingly focused on extending the 'time to fail' and 'time to service' a product. The more likely a component is needed to be repaired, the greater the chance of accidental damage to surrounding components, leading to a perpetual risk of device failure.

Fortunately for manufacturers, there is an alternative solution out there.

Nano coatings can continue delivering liquid protection and do not degrade over time, so will last the whole product lifetime. That's key in this context. Typically, too, nano coatings are not compromised by other types of damage and that means that even if a product does need to be reworked or repaired, the nano coating will remain effective after the repairs have been completed.

The ability to repair components and whole devices, rather than having to throw them away, saves costs, reduces the need for landfill and enables regulations around waste to be more easily met. And all this brings significant benefits both to the manufacturer and the end customer.

#### Author details:

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CCO, P2i

#### Looking to the future

Over the coming years, the drive to repairability is likely to continue as new legislation comes on stream but there will also be more focus on safety. Manufacturers will want devices to last over 10 years to avoid the need for repair.

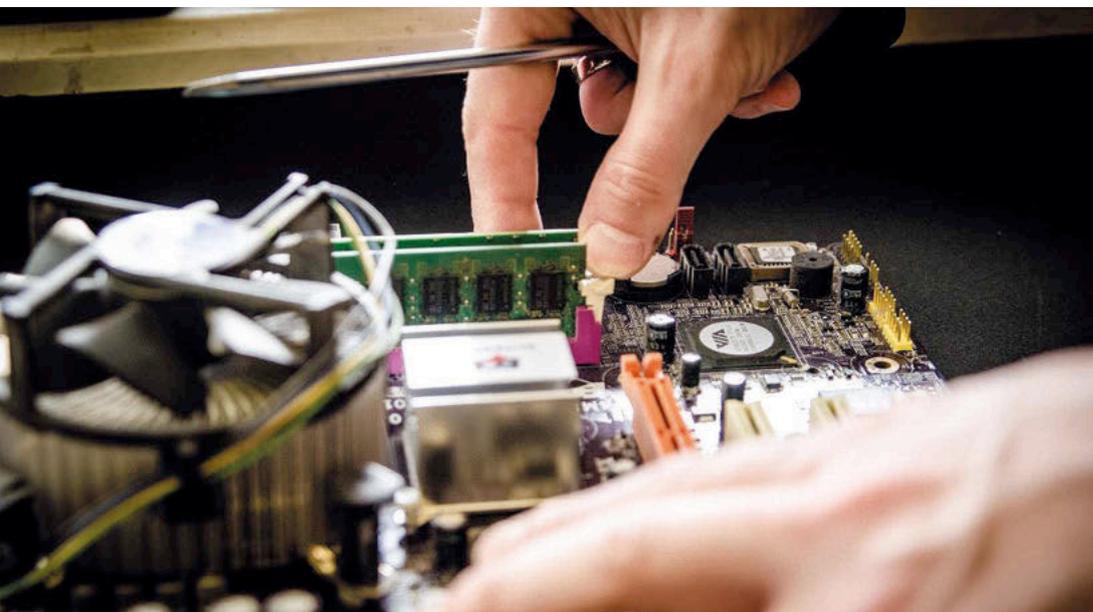
They may need to charge more or build in longer warranties. There will also be a need for the stored spare parts for repairs to be resistant to humidity, oxidation or plasticiser evaporation, for example, to avoid manufacturers facing expensive climate-controlled storage costs, which over a number of years could amount to being highly costly.

They may also need to take design into account. They will certainly need to add safety mechanisms in both to ensure compliance but also to protect devices during repair. Those mechanisms, like the original device, will also need protecting from moisture or dust damage and that will also have an impact on design.

Manufacturers will want to have the flexibility to be able to choose the safety mechanism most suited to their device and application and have that safety mechanism last ten years; be repairable; and be protected from dust and liquid too. Again, nano coating technology offers significant benefits in this context. Not only does it help protect the original device and any associated safety mechanism from the kinds of damage that make the need for repairs more likely, it also makes carrying out those repairs a viable option.

Nano coating technology eliminates the need for bulky mechanical seals - making devices easier to open and repair, and keeping circuit boards accessible and fully re-workable.

With this technology, manufacturers can stay competitive in a market that calls for increasing levels of sustainability - boosting product life length, reducing production costs and prioritising environmental concerns.



All around the country, at all times of the day, 365 days a year, commercial vehicles are on the move. While it might not be at the forefront of your mind, these vehicles play a crucial role in so many aspects of our daily life, from delivering food to supermarkets and delivering goods ordered online to our homes, to getting engineers from one job to another throughout the day.

Optimising productivity for a commercial fleet is vital and fleet management services currently play a major role in this along with answering other questions associated with running a fleet. While data analysis and vehicle tracking are currently in use, does the future of commercial fleets lie in platooning?

While truck platooning is expected to make considerable strides in the coming few years, the technology of automated linking between vehicles still has a long way to go before becoming a commercial reality.

So where are we today?

### Data analysis

At present, fleet managers, who are responsible for the day-to-day running and operating of commercial fleets, place a great deal of importance on data analysis.

Thanks to connected vehicle technology and telematics boxes, installed in commercial vehicles, fleet managers have access to a huge amount of highly useful data. One of the key areas this data can help is with cost control and more specifically fuel management. This is an area of real importance for businesses operating commercial fleets, as the cost of fuel can account for a significant proportion of the running costs for a commercial vehicle.

Being able to see the fuel usage statistics for each vehicle within a fleet is extremely useful. Fleet managers can work out where savings can be made and by which drivers. However, there are a number of other areas where data analysis can result in



# TRUCK PLATOONING

Data, tracking and platooning – what does the future hold for commercial fleets? By **Elodie Mescam**

financial savings for a business operating a commercial fleet.

Some businesses may be operating a larger than necessary commercial fleet, where the number of vehicles is higher than required to complete the work. Data analysis can highlight which vehicles may be surplus to requirement and by reassigning work to other vehicles within a fleet and implementing more efficient routes, a lower number of vehicles can achieve the same levels of productivity.

If the time does come to expand a fleet, data already collected from the existing fleet can inform the decision on if buying or renting additional vehicles would be more cost effective.

Choosing the right vehicles in this situation is critical so, if we take fuel usage as an example, thanks to the data generated from the current fleet of vehicles, fleet managers can make an informed decision on the efficiency levels required from new vehicles and also if moving the current fleet over to newer vehicles would make financial and environmental sense.

Data analysis can also be carried out on driver behaviour. In-coaching devices monitor and alert

drivers to dangerous and high fuel usage actions. Fleet managers and drivers can clearly see how their performance compares to others and specific aspects of a driver's behaviour, such as harsh acceleration or excessive idling, can be analysed and training can be implemented to correct this.

Overall, analysis of data produced by commercial vehicles can have a positive impact on a variety of areas when it comes to running a commercial fleet.

### Tracking

Vehicle tracking technology allows fleet managers to see a far more detailed picture of how their vehicles are operating every day. Fleet management solutions, including tracking systems, can easily be installed. Fleet management solutions and GPS tracking features can record the exact routes that each vehicle within a fleet takes. By analysing these routes, changes can be made which can lead to both businesses and customer service improvements.

Seeing areas where vehicles have been stuck in traffic or taken a route

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which took longer than it should have, can be highlighted and avoided in future route planning. This is important for businesses as it can allow for increased productivity, as the quicker vehicles can get from one point to another, the more customers they can reach each day.

From a customer service point of view a business which is using vehicle tracking is able to not only serve more customers each day, therefore reducing wait times, but also provide location updates. Being told an estimated time of arrival for a delivery or engineer coming to your home or business can be extremely frustrating. Being able to provide a more accurate arrival time, and also having the ability to update this should circumstances change during the day and inform customers about this change is vital to good customer service.

**Platooning**

Turning to platooning, it has long been held up as part of the future of commercial vehicle transportation.

In simple terms, this is the process of linking vehicles together via technology and controlling them semi-autonomously. By doing this, theoretically, vehicles can travel closer together at higher speeds on the road by using V2V communications, radar-based active braking and vehicle control algorithms.

Testing is being undertaken both in Europe and in the US as the technology is refined and the industry



discusses introducing new standards and regulations.

Field testing has been looking at the viability of the concept among different commercial vehicle brands, with the assessment of fuel economy, system robustness and customer experience.

So, what are the benefits of this? By allowing commercial vehicles to travel closer together, they can improve their fuel efficiency and also improve traffic flow.

The amount of drag a vehicle is subjected to can have a large impact on how efficient it is. With commercial vehicles often being large boxy shapes, which are not very aerodynamic, being able to have them travel closer together in a slipstream would theoretically reduce drag and improve fuel efficiency.

Critically, platooning does not involve removing the driver from the vehicle, but simply allowing vehicles within a platoon to be controlled by the lead vehicle. Maintaining a safe

Above: Platooning links vehicles together and controls them semi-autonomously

distance between the vehicles in a platoon, however, is vital for safety. Not only for the vehicles in a platoon but also other road users.

The acceleration and braking systems are automated, with driver controls linked with the truck, GPS and short-range communications.

When it comes to handling other vehicles on the roads, especially those that cut in between platooning trucks, sensors and controls are used that are able to dissolve the platooning or extend the distance between those vehicles being platooned.

Despite the potential benefits, there are some conflicting opinions over the effectiveness of platooning.

In January 2019 the Chairman of Daimler Trucks, Martin Daum, said that unless road and traffic conditions were perfect, then a predicted 4% improvement in fuel usage is actually closer to only 1%.

“Platooning is a lot of hassle, but we would go through that hassle if it meant a 4% fuel saving for our customers,” Daum said. “However, it’s not worth it for just 1%. While we cannot see a business case for platooning, we will keep an eye on it, in case we have missed something. If that is the case, we can always ramp it up again.”

So, if platooning is not going to deliver significant fuel saving benefits, is it worth it? It’s impossible to say that as technology develops that platooning won’t be the future of commercial fleets.

In the near future, the optimisation results which can be achieved with fleet management solutions described here, along with a move to electric vehicles seem to offer a more certain future than platooning. However, truck platooning is still evolving and being developed and expectations for the technology remain high both in terms of the technology and industry adoption.



**“While truck platooning is expected to make considerable strides in the coming few years, the technology still has a long way to go”**

# Bringing NFC wireless charging to consumer devices

How a new architecture for NFC transmitters brings fast NFC wireless charging to the consumer device market. By **Alessandro Goitre**

The trend to embed wireless charging capability into consumer devices has been led by the Wireless Power Consortium's (WPC) Qi charging standard, which is the most widely adopted technology for the wireless charging of smartphones.

The momentum is accelerating as more and more charging locations offer convenient wireless charging for compatible devices. As a result, consumer acceptance and knowledge are growing, leading manufacturers of other types of devices beyond the mobile phone to explore the potential for wireless charging.

The great advantages of replacing a wired charger connection with wireless charging are: reliability – every wired connection is a potential point of failure; increased design freedom – the designer can optimise the shape of the device and the use of its surface when they do not have to accommodate a connector; and it's easier to achieve a high Ingress Protection (IP) rating by eliminating mechanical connections.

For various reasons, the Qi technology is poorly suited to the charging of very small or wearable devices such as activity-tracking wristbands, wireless earphones or smart glasses. One alternative is NFC, the technology behind contactless payments and ticketing, since another of the inherent features of NFC, alongside data communication, is energy harvesting – the ability of a receiver (listener) to draw energy from a reader's (poller's) transmitted signal.

This means that any NFC-enabled device that has energy harvesting

capability can be charged wirelessly without the need for an additional antenna and other components. In addition, NFC wireless charging does not require perfect alignment of the charger's and receiver's antennas. An NFC charger works at high efficiency on the charger side even when the two antennas are misaligned by as much as half of the antenna size.

Yet despite the almost universal provision of NFC functionality in smartphones, NFC charging has been implemented in only a handful of small devices: this is because the power transmitted by the poller – typically between 1W and 1.5W at the antenna – limits the scope to charge devices which have a larger battery capacity or smaller NFC antenna.

A breakthrough in NFC system design, however, promises to double the power that can be supplied via an NFC connection, while also providing a reduction in component count, bill-of-materials cost and system size.

## NFC, a viable complement to Qi

Qi wireless charging has proven to be a successful technology for devices such as smartphones which have a

large battery – typically 3,000mAh or more – and which therefore require the >15W power capability that Qi offers.

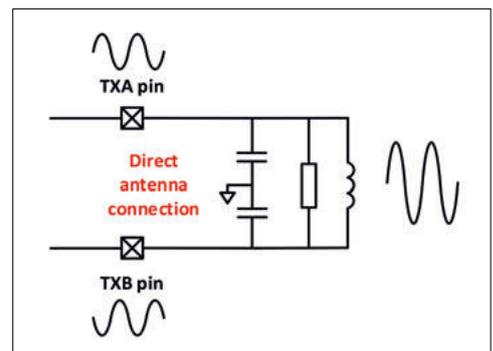
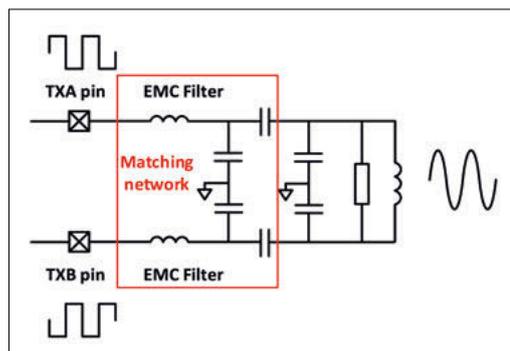
But the elements of Qi technology which make it suitable for use in these high-power applications – such as its requirement for a large antenna in the receiver – make it unsuitable for use in smaller products such as wearable devices. When a charged device needs a 1W supply rather than 15W, a Qi system is generally too bulky and too expensive. It also provides a limited data communication capability.

By contrast, NFC can charge devices wirelessly in which flexibility is a key factor:

- There is a huge installed base of billions of NFC-enabled devices in the field, so the technology is familiar both to consumers and to design engineers. Most smartphones could act as a charger for NFC devices.
- NFC technology supports bi-directional communication. Depending on the communication protocol used and the capability of the remote device, a communication speed of up to 848kbits/s is supported by

Below: the conventional architecture of NFC transmitters for wireless chargers

Below right: the Panthronics sine-wave architecture implemented in its PTX100W NFC transmitter requires no EMC filter and few antenna-matching components



NFC devices. If NFC is used as the technology for a device's communications anyway, wireless charging can enhance the product's feature set and consumer appeal at no extra bill-of-materials cost.

- NFC allows for misalignment of the transmitter's and receiver's antennas without impairing the efficiency of power transmission.
- NFC allows for a compact implementation with a smaller antenna in both the poller and listener devices.

NFC implementation is not complicated as charging capability is built into the standard NFC Forum protocols. In NFC's Wireless Charging mode, the field strength of the RF field can be increased to maximise the power transfer capability between two compliant devices.

**Reason for slow adoption**

NFC is little used for wireless charging today, mainly because NFC transmitters are based on a conventional architecture which limits the power output at the transmitter's antenna to <1.5W. In this architecture, the NFC transmitter generates a square-wave output signal.

This square-wave architecture is an attractive choice for NFC component manufacturers because it is easy to implement in silicon. But the square wave output has to be shaped as a sine wave for transmission via the antenna to avoid electromagnetic emissions exceeding the limits: this calls for an electromagnetic compatibility (EMC) filter made up of multiple external components.

In NFC charging, this has two important drawbacks:

- High power losses in the poller's EMC filter reduce the power output, and as a consequence the input power at the listener.
- The higher matching impedance of the antenna due to the tolerances of the discrete components in the EMC filter limits the output power capability of the NFC poller.

In practice, this means that the conventional NFC transmitters used in today's wireless charging devices are limited to an output at the antenna of 1.5W at best, and to a maximum of 500mW at the listener: at this low power level, the time to charge a device becomes excessively long.

Fortunately, there is another way – and its appeal is the result of the adoption of a dramatically different architecture in the transmitter and receiver.

**All-new architecture**

The new architecture – the result of a patented silicon implementation developed by Panthronics – produces a sine-wave output at the transmitter pin. As a consequence, the NFC circuit requires no lossy EMC filter, and thus enables a direct-to-antenna ('Dirac') connection from the transmitter pin.

The key advantages of this architecture are the mirror image of the drawbacks of conventional NFC controllers:

- Losses are reduced because the EMC filter and most matching components are eliminated.
- Because the sine-wave circuit eliminates various wide-tolerance capacitors and inductors, a much lower-impedance antenna matching circuit can be used, increasing the transmitter's output power.
- The reduction in component count also simplifies system matching, and eliminates the variation in production units caused by the wide tolerances in the matching components
- Homogeneous harvested power input as a function of volume
- Constantly optimised system matching as a function of displacement

Operating from a 5V supply, a Panthronics solution based on its PTX100W NFC charger can supply up to 2.5W power at the antenna. One of the main reasons why the architecture can sustain more power than a conventional NFC architecture is the

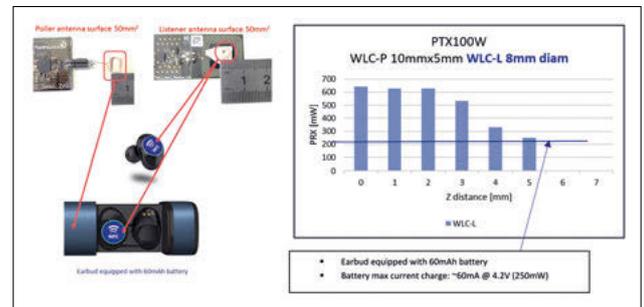
**Author details:**

Alessandro Goitre, Product Marketing Director, Panthronics AG

lower antenna matching impedance which can be achieved in a circuit with no EMC filter. An application based on the PTX100W can be designed with an antenna matching impedance of less than 5Ω, while with an EMC filter the impedance would be at least twice as high.

Importantly, the elimination of the EMC filter and other external components also produces a board area saving. This reduces the cost, size and complexity of the charged device's board – a valuable benefit for makers of wearable devices such as smartwatches or fitness trackers, where the PTX100W is capable of delivering up to 1W to the listener's battery, as measured by the power sensor on the listener board.

In the case of NFC charging of earbuds, the antenna's dimensions



Above: A demonstration circuit of NFC charging of an earbud's battery. The graph shows the reduction in power transfer when the poller's and listener's antennas are misaligned

are much smaller, reducing the overall amount of power transferred. Using the PTX100W as a poller, even with a distance up to 5mm between the two antennas, the power received by the earbud battery is still above the maximum power used to charge a typical earbud battery.

While manufacturers of consumer devices have been slow to adopt NFC wireless charging to date because of the long time required to fully charge even a small battery, the introduction of the PTX100W looks to overcome the problem, providing an output at the antenna up to 2.5W and bringing typical charging time for batteries of capacity up to 400mAh down to manufacturers' target duration of shorter than three hours.



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The AVR-DA family uses the latest Core Independent Peripherals and low-power capability to handle real-time control functions in industrial control, home appliance, automotive and Internet of Things (IoT) applications.

The Event System and Configurable Custom Logic (CCL) peripherals offer near zero latency for time-critical functions. Intelligent Analog peripherals like 12-bit differential Analog-to-Digital Converter (ADC), Zero-Cross Detect (ZCD), 10-bit Digital-to-Analog Converter (DAC) and the latest-generation Peripheral Touch Controller (PTC) put the AVR-DA family in the center of sensor interface, system monitoring and human interface applications. 5V operation for increased noise immunity and low-power features ease power supply concerns.



[www.microchip.com/avr-da](http://www.microchip.com/avr-da)



India is projected to be among the world's fastest-growing economies for the remainder of this decade and Smiths Interconnect has been trading with India and establishing relationships with key players over the last 10 year.

The Indian electronics market has been growing rapidly, whether consumer electronics or industrial electronics, computers or communications and broadcasting equipment, offering companies significant opportunities and as a result, encouraged increased levels of investment.

The Indian government has also initiated a number of projects, from Smart City to Digital India, which have created increased demand along with encouraging skills development schemes and innovation within the domestic electronics industry.

As part of the company's India growth strategy, in July 2019 Smiths Interconnect established its first legal entity in Bangalore with Giuseppe Lancella, Smiths Interconnect's General Manager India, leading a small, experienced team to focus on opportunities in the fast developing Indian economy.

"The company's investment in India has the objective to further develop the space, defence, aerospace and rail transportation market segments in the country," explains Lancella.

Smiths Group has an already established position within India through its divisions, John Crane, Smiths Detection and Flex-Tek and now with Smiths Interconnect entering the market, has an opportunity to accelerate growth and strengthen its overall brand position.

"The new team are a dedicated local sales team combined with office staff (customer service and finance) and supported by a network of indirect representatives as well as distributors," says Lancella.

There is a significant market for Smiths Interconnect's connectivity



## OPENING UP THE INDIAN MARKET

Smiths Interconnect has expanded its presence in India, as Giuseppe Lancella explains to Neil Tyler

solutions in India, Lancella explains.

"Today, we are capturing only a limited portion of our focus market segments, so there is considerable potential growth available, particularly in satellite communications, broadband and space applications. With an ambitious yet feasible target of growth, the company now has its broadest and most innovative range of products for all these applications."

In looking to penetrate the Indian communications market, Smiths Interconnect is offering a complete line of network flexible Ku-band and Ka-band SATCOM antenna systems enabled by industry-leading TECOM technology.

Below: FModules are hybrids that combine fibre optic with copper cable

"Our SATCOM antenna systems are able to provide non-stop gate-to-gate in-flight connectivity for commercial air transport, business jet and various military applications. While our KaStream 5000 MK II tail-mount antenna systems are fully integrated network agnostic SATCOM terminals featuring commercial and military band coverage and dual switchable circular polarization. This second generation of network-agnostic, high performance broadband antenna system consists of 3 LRUs (Line Replaceable Units), a Satellite Tracking Antenna Assembly (STAA), an Antenna Control Unit (ACU) and a commercially available customer-selected modem," Lancella explains.

He makes the point that Smiths Interconnect is well placed to play a leading role in bringing state-of-the-art broadband applications to the vast Indian market, as well, helping achieve reliability and efficiency.

"Our time and frequency systems, as well as our board level devices offer accuracy, stability, and remote manageability that are critical for the success of 5G applications.

"Our high reliability connectors have developed a reputation for durability in harsh environments like space. For example, Smiths Interconnect was recently awarded a key contract by Boeing to design, manufacture and supply bespoke connectors for use aboard NASA's Orion spacecraft and Lunar Gateway.

"Smiths Interconnect's docking umbilical connectors will be used to transfer vital power, signal and



communications to different modules on the space station.”

In the rail business, Smiths Interconnect has established a global presence.

“Several of our sites are IRIS (International Railway Industry Standard) certified, which complements the internationally recognised ISO 9001 quality standard adhering to rail specific requirements,” Lancellata says.

The recent acquisition of Reflex Photonics has also added another product line to the company’s portfolio.

“Reflex transceivers complement Smiths Interconnect’s product offering with the addition of a core fibre optic capability that will help address the needs arising from high speed data transmission in market segments requiring high reliability.”

**Government support and infrastructure**

The Indian market is dynamic and the country’s economy is expected to soon become the world’s fifth largest.

“India already has a very large defence and space budget and is the fourth largest in terms of capital expenditure when it comes to their rail network,” points out Lancellata. He continues, “There is a pool of talented engineers and graduates that make the country extremely attractive for our company outside of the India context.

“Bangalore offers great technicians in the electronics sector, so we found a particularly favourable environment when we started hiring.”

The government is pushing a “Make in India” policy and encouraging investment from foreign companies by offering incentives and favourable taxation.

“The COVID-19 pandemic has accelerated the journey towards economic “self-reliance”, with the objective of strengthening manufacturing capacity, expanding domestic

production and boosting the MSME (Micro, Small and Medium Enterprises) sector via economic stimulus packages and reforms,” according to Lancellata. “This has the potential to translate in to increased production of electronic equipment in the country, as well, ranging from transport to defence.”

Looking at sectors like defence, space and electronics the Indian government has enacted new reforms in order to attract investment and strengthen local manufacturing.

“These reforms coupled with the shift of companies outside China, due to the on-going US-China diplomatic tensions, have the potential to favour India with a shift in production by global companies to this country in terms of a safety-net approach, giving a significant boost to local manufacturing capacity within the sub-continent, as a consequence,” Lancellata believes.

This may also produce an increased demand for local testing, with a potential growth of demand for the company’s cable harnesses for test applications which is another of Smiths Interconnect’s areas of expertise. “Our high-performance microwave cable assemblies and coaxial components support critical operations, with application-specific premium interconnects for high durability.

“Our cables are also available with customised option packages and are



**“The company’s investment in India has the objective to further develop the space, defence, aerospace and rail transportation market segments in the country,”**  
Giuseppe Lancellata

especially well-suited for precision testing applications and harsh environments in aircraft, marine, space and ground applications.”

**COVID-19 pandemic**

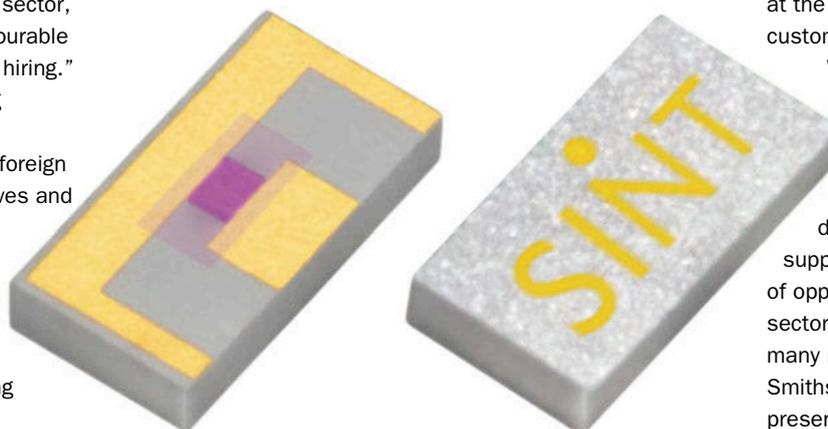
“As our products and services are instrumental to the continued operation of essential industries such as medical/healthcare, aerospace, defence, rail, communications and digital infrastructure, our sites have remained open during the COVID-19 pandemic whilst taking appropriate precautions to protect the health of our workers,” explains Lancellata. “Our primary concern will always be the safety of our people, and of all those we work with, so each of our sites support employees by incorporating safety strategies and protocols taking appropriate precautions to protect the health of our workforce.”

Lancellata makes the point that due to the on-going impact of the pandemic the company has monitored the potential effect that this ‘unprecedented situation’ could have on its supply chain and taken the appropriate measures to minimise any effect on product manufacture and delivery to customers.

“This has resulted in minimal disruption of our operations and consequently it has had very limited impact on our customer base. “Working across nationalities, time zones and cultures is at the forefront of our operating model and at the heart of how we support our customers in times of crisis.”

With India fast becoming one of the largest growing electronics markets in the world with increased levels of investment, growing demand, greater government support and an increasing number of opportunities across a variety of sectors, it’s likely that we will see many more companies following Smiths’ example and establishing a presence there.

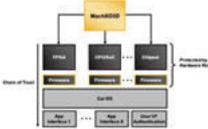
Below: The CTX SMT Series offers broadband performance up to 67GHz and supports RF and microwave applications





### Lattice Extends Industry-leading Security and System Control to Automotive Applications

**MachX03LF and MachX03D FPGAs Support Extended Temperature Range for Automotive and other Ruggedized Applications**



Lattice Semiconductor Corporation (NASDAQ: LSCC), the low power programmable leader, today announced new versions of its MachX03LF™ FPGAs for flexible deployment of robust automotive control applications and MachX03D™ FPGAs for system security that support extended temperature operating ranges for automotive and other ruggedized applications. MachX03D FPGAs augment the popular system control capabilities of the Lattice MachX0 FPGAs architecture with industry-leading security features, including hardware Root-of-Trust (RoT), platform firmware resilience (PFR), and secure dual-boot support. The MachX03D and MachX03LF devices target control, bridging, and I/O expansion applications that must operate reliably in rugged environments, including advanced driver assistance systems (ADAS), infotainment, motor control, 5G communications infrastructure, industrial robots and automation systems, and defense systems.

Emerging trends like electric vehicles (EVs), autonomous driving, ADAS, and infotainment are increasing OEMs' reliance on electronic components in automotive systems.

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### Nexperia launches industry-first LED drivers in DFN package

**Nexperia launches industry-first LED drivers in DFN package with side-wettable flanks**



Nexperia, the expert in essential semiconductors, today announced a new range of LED drivers in the space-saving DFN2020D-6 (SOT1118D) package. This case style features side-wettable flanks (SWF) which facilitate the use of AOI (automated optical inspection), and improve reliability. This is the first time LED drivers have been available in this beneficial package. The new leadless devices join Nexperia's wide range of LED drivers in leaded packages offering equivalent performance yet reducing PCB space by up to 90% compared to SOT223.

With a footprint of just 2x2 mm and a low profile of 0.65 mm, the new DFN2020D-6 LED drivers are available in NPN and PNP technology. They feature an output current of up to 250 mA (NCR32x types) and a maximum supply voltage of 75 V. Their high thermal power capability is at least equal to any other package for LED drivers.

The use of side-wettable flanks not only enables AOI techniques to be used - which is especially important for automotive customers - but also improves reliability.

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**☎: +31 6 137 111 41**

[www.nexperia.com](http://www.nexperia.com)

### Panasonic Industry presents new short puls fiber laser marker

**The new LP-RV Laser Marker System is a solution for marking different metal and plastic devices**



Panasonic Industry Europe introduces the successor of the Panasonic V-Series: the new 20W LP-RV short pulse fiber laser marker marks various materials from illuminated switches for automotive, electronic devices, medical applications to metal parts, or resin molds.

The short pulse fiber technology of the Panasonic LP-RV achieves to generate a quick pulse duration as short as only 1ns. Therefore the thermal effect on the workpiece is very short and reduces undesired effects like discoloring, burning, or deformation. This setting is perfect for marking high contrast characters on resin surfaces.

On the other side, the pulse duration is also switchable in seven steps up to 200ns (user-defined settings), which allows accurate permanent markings on metal parts. So one system achieves perfect high contrast marking on metal and plastic parts.

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### Powell Electronics expands in Europe with new headquarters

**Powell Electronics expands in Europe with new headquarters, technical staff and franchises**



Addresses wide markets; holds local stock

Powell Electronics, the supplier of connectors and more for high-rel applications including defence, aerospace and industrial, has strengthened its European presence by relocating to new premises in Dublin, Ireland, employing more technical staff to support design-in activities and signing new franchise agreements. The company has an excellent reputation in the USA offering value-add connector and cable assembly services at its headquarters in New Jersey. However, in Europe the company had focused purely on the agricultural market from small facility in Utrecht, Netherlands.

In mid-2019, Gary Evans, a seasoned connector professional who had previously occupied senior management positions at Harwin, Deutsch and ITT, was appointed to redefine the Powell's European business. As a result, major European franchise agreements have been signed with Glenair, Harwin, Amphenol Aerospace, Duell, AB Connectors, Lemo, Conesys and more.

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### Power Integrations Targets Compact Smart-Lighting Designs

**Power Integrations Targets Compact Smart-Lighting Designs with Highly Efficient GaN-Powered LYTSwitch-6 LED Drivers**



Power Integrations (Nasdaq: POWI), the leader in high-efficiency, high-reliability LED-driver ICs, today announced a new member of the LYTSwitch™-6 family of safety-isolated LED drivers for smart lighting applications – the LYT6078C. This new LYTSwitch-6 IC uses Power Integrations' PowiGaN™ gallium nitride (GaN) technology to deliver efficiency and performance benefits, demonstrated by the new design example report (DER-920) the company is also announcing today.

The PowiGaN-based LYT6078C IC incorporates a 750 V power switch and delivers flicker-free output up to 90 W with other members of the family providing up to 110 W. Including both the PFC stage and the LYTSwitch-6 LED driver, system efficiency exceeds 90%. Housed in the miniature InSDP-24 surface-mount package, LYTSwitch-6 ICs are protected by an advanced thermal fold-back system, which reduces output power to limit device temperature during abnormal conditions, while still providing light output.

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### Smiths Interconnect Expands Test Laboratory in Suzhou

**The Centre of Excellence will offer a one-stop-shop to the global customer base for the products used in semiconductor test applications**



Smiths Interconnect proudly announced the expansion of its Qualification and Test laboratory at its site in Suzhou, China. The investment represents the latest in Smiths Interconnect's ongoing investments in the new Suzhou facility following its establishment in 2018, as a Centre of Excellence. The laboratory now offers a one-stop shop for critical qualification and testing of Smiths Interconnect's semiconductor test products manufactured in China. The test lab area was re-designed and additional test capabilities were added to enhance the company's ability to quickly deliver products to the customer base in the Asia Pacific region and worldwide.

The test lab area was re-designed and additional test capabilities were added to enhance the company's ability to quickly deliver products to the customer base in the Asia Pacific region and worldwide.

"The new test capabilities are a great addition to our existing equipment of Probe Card Analysers for WLCSP Probe heads" said Frank Zhou, Director of Product Engineering, APAC (Asia Pacific). "Our testing equipment enables us to quickly develop and deliver high quality, high performance semiconductor test products that meet our customers' needs".

Please visit our website [www.smithsinterconnect.com](http://www.smithsinterconnect.com)

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### Versatile LVDT/RVDT/Resolver Simulator Module from Pickering Interfaces

**Versatile LVDT/RVDT/Resolver Simulator Module from Pickering Interfaces occupies just one PXI slot**



Multiple functionalities increase test flexibility; reduce cost

Pickering Interfaces, the leading supplier of modular signal switching and simulation solutions for use in electronic test and verification, today launched its model 41-670, a single module that can function as an LVDT, RVDT or resolver simulator. Occupying just one PXI or LXI chassis slot, the programmability of the module means that it minimizes the amount of hardware required. Also, since it sits in a PXI chassis alongside a customer's other instruments, additional control protocols/interfaces are not necessary, simplifying operation.

The 41-670 can handle up to four channels of 5/6-wire LVDT/RVDT or resolver, or eight channels of 4-wire LVDT/RVDT simulation. Each VDT bank has an independent excitation input, as well as the ability to use an internally generated excitation signal. It can operate with a shared excitation signal to each channel for synchronous test.

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