THE INTELLIGENT HOME

If the promise of the smart home is to be realised there needs to be common standards and infrastructure in place.
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MISSION STATEMENT
‘New Electronics keeps designers and managers abreast of the latest developments in the world’s fastest moving industry’
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www.microchip.com/FlexiblePower
The impact of the coronavirus appears to be growing and concerns are mounting that component shortages will start to have a serious impact in a matter of weeks.

The analyst group, Oxford Economics, has warned that should the virus spread beyond China there will be serious consequences for the global economy while the virus is already having a “chilling effect” on China, with extensive factory closures. Should the virus spill over into neighbouring countries then it’s likely that companies will struggle to source components and finished goods.

Apple has warned investors that it’s not going to meet its quarterly revenue target, because of the “temporarily constrained” supply of iPhones and a dramatic drop in Chinese spending during the crisis. In the UK, Jaguar Land Rover has said that it will run out of car parts at its British factories if the coronavirus continues to prevent parts arriving from China.

Apple is a prime example of the type of demand and a supply shock that electronic suppliers and customers may be facing, and while the company says that production will return to normal that process is taking far longer than expected.

Interestingly, according to market analysts Omdia, the semiconductor industry appears to have escaped the impact of the coronavirus crisis - so far – but should the virus spread then it’s possible we could see production reduced or even suspended, as factories are closed.

For the moment, despite logistical, packaging and test challenges, fabs in China appear to be functioning normally, but any disruption could have profound global repercussions.

The semiconductor market represents a huge component of the global economy, generating an estimated $424.8 billion last year alone, so the danger lies with any possible disruption to manufacturers – many of whom operate in China and are already functioning at below 20 per cent capacity.

Problems with import and export logistics are growing but are being mitigated by the fact that the first quarter tends to be the slowest period of the year for the global electronics business.

The worry has to be that if the coronavirus continues to spread and spur significant public-health problems beyond China, it will raise serious long term problems for electronics suppliers and manufacturers who may be forced to slow manufacturing further or even shut down their operations.

Rather than the green shoots of a recovery, we may just be seeing brown weeds instead.

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

“Apple has warned investors that it’s not going to meet its quarterly revenue target, because of the constrained supply of iPhones.”
Bluetooth Low Energy v5.2 IP

IMAGINATION UNVEILS NEW iEB110 BLUETOOTH LOW ENERGY V5.2 IP. NEIL TYLER REPORTS

Imagination Technologies has unveiled its latest Bluetooth Low Energy (BLE) IP, designed to support the Bluetooth SIG version 5.2 specification.

According to the company, the iEB110 is a complete BLE solution, that includes RF, controller software and Bluetooth Low Energy host stack. By providing a complete solution using the popular open-source Zephyr Cordio host stacks together with a comprehensive set of profiles, companies looking to integrate BLE IP into their solution can take advantage of reduced integration and development costs, resulting in a much quicker time to market.

Designed for integration into complex communication systems-on-chips (SoCs), the iEB110 provides a fully featured, ultra-low-power BLE v5.2 solution. It offers high performance, efficient RF, with optimum silicon area and external bill of materials (BOM). The architecture allows seamless integration with Imagination’s Wi-Fi IPs to create cost-effective multi-standard, wireless communication SoCs.

iEB110 takes advantage of the new Low Complexity Communication Codec (LC3) and efficient software algorithm to deliver clear audio at low power, enabling manufacturers to create small form factor, low power audio devices such as earbuds and hearing aids.

iEB110 supports advanced Bluetooth 5.2 features such as Angle of Arrival/Angle of Departure (AoA /AoD) allowing sub 1m location and tracking accuracy, LE long-range operation for extended indoor and outdoor coverage, and LE-2M PHY for higher throughput.

Richard Edgar, Senior Director of Product Management, Imagination Technologies, said, “We believe that with the new rich set of features provided by the latest BLE specification, the ability of BLE to provide low-power audio solutions and accurate indoor positioning will enable a new range of applications. The iEB110 has been developed to enable silicon vendors who want to integrate the latest BLE features into their products, as a quick and cost-effective solution to do so.”

ST and TSMC collaborate

STMicroelectronics and TSMC are collaborating to accelerate the development of Gallium Nitride (GaN) process technology and the supply of both discrete and integrated GaN devices to market.

This collaboration will see ST’s GaN products manufactured using TSMC’s leading GaN process technology.

GaN is a wide bandgap semiconductor material which offers significant benefits over traditional silicon-based semiconductors for power applications, such as greater energy efficiency at higher power, leading to a substantial reduction in parasitic power losses.

GaN technology also allows the design of more compact devices for better form factors. Power GaN and GaN IC technology-based products will enable ST to provide solutions for medium and high-power applications with better efficiency compared to silicon technologies on the same topologies, including automotive converters and chargers for hybrid and electric vehicles.

Maxim Integrated accelerates innovation in Europe

Maxim Integrated Products has announced the opening of a new design centre in Dublin, Ireland. The centre will focus on product development and conducting research and development in the areas of analogue semiconductor design.

The company is looking to recruit a team of mixed-signal and analogue design engineers at this facility. The $25m investment will be primarily geared towards recruiting talent, equipment and building costs, as well as research and development. Located on the south side of Dublin, this is Maxim’s seventh design centre located in Europe.

“I am delighted that Maxim Integrated has chosen to establish their new design centre in Ireland,” said Martin Shanahan, CEO of IDA Ireland. “Tech talent and investment are integral to the country’s continued growth, and this investment will enhance the technology offering in the engineering and design space in Ireland.”

NEWS
Altium looks to redefine PCB design

CLOUD-BASED APP WILL REDEFINE PCB DEVELOPMENT. NEIL TYLER REPORTS

Altium has launched a new cloud-based application that looks to redefine the way that printed circuit board designs are shared between designers, part suppliers, and manufacturers.

The A365 Viewer, powered by the Altium 365 cloud platform, is a new way to view and share electronic designs through a browser on any web-enabled desktop, phone or tablet. Schematics, PCB layout, and 3D visualization provide an interactive eCAD experience with no downloads or installations required. The A365 Viewer is part of Altium’s cloud strategy and newly launched Altium 365 cloud platform.

Designers have usually been forced to share their PCB designs through PDFs or static images. With the new A365 Viewer, an interactive experience is created that retains all of the key relevant information that’s typically lost when sharing static files. For example, the A365 Viewer allows users to search for, select, cross-probe and inspect components and nets while moving seamlessly between schematic, PCB and 3D views of their board.

Using the A365 Viewer requires no CAD tools or experience. It has been designed to work with multiple eCAD formats, currently supporting Autodesk Eagle and Altium Designer. Other popular PCB design software formats will be supported in the near future.

The A365 Viewer protects the IP rights of design owners while retaining the CAD design details via a new process called Published Design Impression (PDI). The Viewer processes the design source files to create a Published Design Impression, or PDI. The PDI is a CAD-aware, perishable snapshot of the design that captures limited information such as components, net connectivity and basic geometrics, excluding design primitive data that would be required to fully comprehend and author changes to the design.

The design sources are discarded immediately after being used solely for the purpose of creating a PDI. The design is available for the duration of the user’s browser session and is automatically removed when the browser tab is closed.

Samsung wins 5nm modem chip contract with Qualcomm

Reports suggest that Samsung Electronics’ semiconductor manufacturing division has won a contract to make Qualcomm’s latest 5G chips using its most advanced chip-making technology.

According to sources, Samsung will fabricate at least some of Qualcomm’s X60 modem chips, which will connect devices such as smart phones to 5G wireless data networks. The X60 will be made on Samsung’s 5-nanometer process, the sources said, which makes the chips smaller and more power-efficient than previous generations.

TSMC is also expected to fabricate 5-nanometer chips for Qualcomm.

Samsung is the world’s second-biggest chip manufacturer through its foundry division, self-supplying many of its own mobile phone parts and also fabricating chips for customers including IBM and Nvidia, and if this report is accurate it suggests that it’s making progress in winning new customers.

Qualcomm would represent a flagship customer for Samsung’s 5-nanometer manufacturing technology, which it is looking to ramp up in 2020. According to TrendForce, Samsung currently has a 17.8% market share of the fabrication market.

UK government ‘neglecting industrial strategy’

In a critical report, the Industrial Strategy Council (ISC), the watchdog set up to monitor progress with the government’s industrial strategy, has said the government’s support of key sectors of the economy had made only limited progress since it was unveiled three years ago.

The strategy comprises about £45bn of government funds that has been committed to plans to improve the quality and scale of housing, transport, digital infrastructure and research and development.

The ISC report warns that much of the funding is too narrowly focused and that the majority of the 142 policies in the strategy have received very limited funding, or no funds at all.

In a rebuke to ministers, the report said: “As a result, they are very unlikely to be operating at a scale necessary to have a material impact on the economy.”

The watchdog said it remained unclear whether the strategy had led to policy being better coordinated across government.

Andy Haldane, the ISC chair, said: “An effective industrial strategy is central to tackling some of the deep-seated structural challenges facing the UK economy. At present, these policies are not yet operating with the consistency and coordination, nor with the scale, necessary to meet these challenges.”

The strategy has faced criticism for a lack of progress from employers groups, while within the government itself there are growing calls that the industrial strategy should be dropped altogether.

www.newelectronics.co.uk    25 February 2020
Filtronic launches generation E-band transceiver module

Filtronic has launched Morpheus II, its new generation of mmWave transceiver modules for E-band (71 – 76GHz and 81 – 86 GHz) applications in carrier grade mobile backhaul.

The company said the Morpheus II is based on Filtronic’s proven E-band transceiver platform, of which over 36,000 units have already been shipped and deployed.

The module contains all the transmit and receive functions necessary for the RF section of an E-band radio link, and provides a simple connection to a high data rate full-duplex modem. It is designed for easy incorporation into outdoor units, giving OEMs the advantage of a rapid time-to-market while requiring minimal engineering resource.

Demand for E-band mmWave radio links is growing rapidly, as they can provide high capacity and high data rate XHaul for the latest 5G networks.

In 2018 E-band accounted for around 7% of wireless links and is expected to see year-on-year growth rates of around 36%, according to research from the Dell’Oro Group.

Standard modules have a linear transmitter power control range of -4dBm to +16dBm, with an output third order intermodulation product (IP3) of typically up to +34dBm at the top end of the range. An enhanced power option, extending the control range up to +25dBm, is also available. With a low phase noise of -112dBc/Hz at 1MHz, the transceiver modules support a channel bandwidth in excess of 2GHz. They have demonstrated system performance at data rates of 10Gbps with spectrally efficient 256QAM, and are capable of supporting even higher order modulation schemes. The internal low phase noise VCOs can be adjusted via an SPI interface in 31.25MHz steps, to support ECC/ITU channel arrangements.

A single transmit/receive interface is provided by the integrated diplexer, which connects directly to an external antenna via a standard WR12 interface. The interface between the Morpheus II E-band module and the customer modem is via a single 50-way connector that supplies all communication between the module and the modem.

These Morpheus II transceiver modules are 20% smaller and 50% lighter than the current Orpheus models.

XMOS unveils low cost, flexible AI processor

XCORE.AI DELIVERS HIGH PERFORMANCE AT A COMPETITIVE PRICE. NEIL TYLER REPORTS

XMOS has announced the xcore.ai which delivers high-performance AI, DSP, control and IoT in a single device with prices from $1.

Usually this type of capability would be deployed either through a powerful (and costly) applications processor or a microcontroller with additional components to accelerate key capabilities. The xcore.ai crossover processor from XMOS, however, has been architected to deliver real-time inferencing and decisioning at the edge, as well as signal processing, control and communications, enabling electronics manufacturers to integrate high-performance processing and intelligence economically into their products.

Smart devices typically require energy-hungry and costly connectivity to the cloud. This, according to XMOS, comes marred with challenges around latency, connectivity, privacy and energy consumption. By providing efficient, high-performance compute at the edge, the xcore.ai looks to deliver solutions to each of these challenges while at the same time keeping cost low.

xcore.ai is being described by the company as a new generation of embedded platform. It’s a versatile, scalable, cost-effective and easy-to-use processor and with its fast processing and neural network capabilities, xcore.ai has been designed to enable data to be processed locally and actions taken on device - within nanoseconds.

X莫斯 CEO Mark Lippett said: “xcore.ai delivers the world’s highest processing power for a dollar. This, coupled with its flexibility means electronics manufacturers (no matter their size) can embed multi-modal processing in smart devices to make life simpler, safer and more satisfying.”

Product demos will be available from June 2020.

Binging secure ultra-wideband solutions to market

Renesas is to license 3db Access’s UWB technology and collaborate in bringing secure access solutions to a variety of connected applications.

The collaboration with 3db Access, a fabless semiconductor company specialising in secure ultra-wideband (UWB) low power chips, combines each company’s technical expertise in performance, size reduction, ultra-low power consumption, and security to deliver multi-receiver UWB solutions.

Renesas is augmenting its MCUs and RF connectivity capabilities with 3db’s secure ranging UWB chips, which are designed for use in IoT applications.

According to the company, this will accelerate a roadmap of ICs and modules that leverage both companies’ strengths and product portfolios to bring best-in-class UWB solutions to market.

The collaboration also gives Renesas customers access to advanced UWB solutions that are IEEE 802.15.4z dual HRP/LRP compliant and utilize an RF architecture that achieves 10x lower power consumption through the support of LRP-mode. 3db devices also provide the smallest UWB silicon area compared to competitive ICs.

Commenting Dr. Amit Bavisi, Vice President of Engineering, IoT and Infrastructure Business Unit at Renesas said, “We believe that our combined technical expertise, differentiated IP, and global operations will allow us to design the smallest and highest performance system solutions that provide secure distance ranging access to our customers’ next-generation products.”

Dr. Boris Danev, CEO of 3db Access added, “The combination of 3db Access’ UWB domain knowledge and positioning products fits perfectly with Renesas’ embedded system processing and global market expertise.”
UltraSoC works with PDF Solutions to prevent in-life product failures

COMPANIES AIM TO PREVENT CHIP FAILURES IN THE FIELD. NEIL TYLER REPORTS

UltraSoC is collaborating with PDF Solutions, combining comprehensive data analytics with advanced machine learning (ML) techniques, with the aim of predicting and preventing chip failures in the field.

The solution will combine in-life information from UltraSoC’s hardware-based behavioural monitors with PDF Solutions’ end-to-end machine learning and analytics platform to identify chips that are likely to fail in the field.

It is the first solution that’s able to provide such a comprehensive view of historical data from semiconductor manufacturing, test, assembly, supply chain traceability and in-field data within a common semantic data model.

Over 100 leading semiconductor companies worldwide use PDF Solutions’ Exensio Software Platform to monitor, diagnose, and identify manufacturing issues to improve key performance metrics from the factory floor to test operations and assembly.

UltraSoC’s embedded analytics and monitoring technology will be able to deliver the final piece of the data analytics puzzle by providing data on the in-life digital behaviour of the chip or system.

UltraSoC monitoring observes functional behaviour trends over a period of time to construct a comprehensive picture of potential problems with the device while in use.

Combining in-field monitoring data, manufacturing data, and the appropriate AI powered by machine learning, holds real potential and will offer chip makers and OEMs a complete predictive analytics platform for their SoCs. The ML-driven analytics framework can be used to automatically generate alerts, actions and system reports.

Commenting Dennis Ciplickas, VP of Advanced Solutions at PDF Solutions, said, “Connecting to UltraSoC’s in-life monitors and data will enable us to extend our analytics and ML offerings to support a total preventive maintenance solution for semiconductor devices.”

Socionext introduces TSN IP

Socionext has developed a Time-Sensitive Network (TSN) IP for FPGA and ASIC implementation.

The IP, which has been developed to provide true deterministic Ethernet for industrial applications, is compliant with the next-generation Ethernet TSN (communication standard IEEE 802.1 Subset) and its evaluation environment.

Features include support for a 2-port daisy chain topology suitable for connecting industrial equipment, 1 Gbps high-speed operation, low latency less than 400 ns, and low jitter less than 0.1 µs.

The IP enables a range of industrial applications such as motion controllers, which require faster response control as well as TSN support, and remote I/O, often used in network communications to enable control of secured bandwidth and low latency. TSN also seamlessly connects and interoperates networks for IT (Information Technology) and OT (Operational Technology) making it suitable in supporting the development of smart factories.

Socionext will provide an FPGA evaluation board and start-up manual for IP implementation, as well as Linux open-source driver software. This will allow users to quickly evaluate and develop industrial applications equipped with TSN.

Socionext, with its extensive experience in developing devices for industrial applications, will be able to ensure a simple transition from FPGA to ASIC and help customers develop their own custom ASICs for optimum functionalities and performance with the IP.

AI multicore processor for embedded sensor applications

ETA Compute has begun shipping silicon for its ECM3532, its AI multicore processor for embedded sensor applications.

The multicore device features the company’s patented Continuous Voltage Frequency Scaling (CVFS) and delivers power consumption of microwatts for many sensing applications.

Eta Compute’s ECM3532 is a Neural Sensor Processor (NSP) for always-on image and sensor applications.

“Our Neural Sensor Platform is a complete software and hardware platform that delivers more processing at the lowest power profiles in the industry. This essentially eliminates battery capacity as a barrier to thousands of IoT consumer and industrial applications,” said Ted Tewksbury, CEO of Eta Compute.

The ECM3532 family brings AI to edge devices and transforms sensor data into actionable information for voice, activity, gesture, sound, image, temperature, pressure, and bio-metrics applications, among others. The platform addresses issues for the most important problems in edge computing: longer battery life, shorter response time, increased security and higher accuracy.

The company’s standalone AI platform includes a multicore processor that includes: flash memory, SRAM, I/O, peripherals and a machine learning software development platform. The patented CVFS, according to the company, substantially increases performance and efficiency for edge devices.

The self-timed CVFS architecture automatically and continuously adjusts internal clock rate and supply voltage to maximize energy efficiency for the given workload. The ECM3532 multicore NSP combines an MCU and a DSP, both with CVFS, to optimise execution for the best efficiency making it a suitable solution for IoT sensor nodes.
It has been clear for some time that without a standard and common infrastructure, the fast growing smart home sector could become irrevocably fragmented.

For all its promise, the sector has suffered from relying on multiple wireless and connectivity standards, making it very difficult for companies to offer secure and robust networking across multi-vendor smart devices.

That danger and the inevitable slow-down in deployments, has significantly diminished with the major announcement late last year that Apple, Google and Amazon will join forces with the Zigbee Alliance on an ambitious project that, potentially, will allow consumers to deploy a host of smart gadgets and sensors together.

Dubbed the Connected Home over IP (CHIP) project, it is an admission by the ‘big three’ that their competing visions for the sector just can’t ‘hack it’ on their own terms. The prize, it seems, is no longer about owning the smart home; it is building the plumbing for an interconnected future.

**FINDING COMMON GROUND**

In order for the promise of the smart home to be delivered there needs to be common standards and infrastructure. By John Walko

Home.

The project’s backers note the initiative is built around the shared belief that “smart home devices need to be secure, reliable and seamless to use.” They also stress they chose IP as the backbone so as to ensure seamless connectivity across, for instance, smart devices, mobile apps and cloud services.

But don’t abandon your connected hubs, thermostats, light and motion sensors and smart appliance controls just yet, or refrain from buying new ones.

The rough draft for the CHIP standard – which envisions we will all be able to connect everything via an Internet Protocol, rather than going through a hub – is unlikely to appear until later this year, and quite likely at the CES in 2021.

The long-term ambition of the CHIP group is to create an open-source, ratified and royalty-free standard for connected devices.

The companies involved – and there are dozens since the Zigbee Alliance can call upon the varied expertise and needs of the likes of Samsung’s Smart Things group, Resideo (Honeywell) IKEA, Silicon Labs, NXP Semiconductors, Schneider Electric, Signify (formerly Philips Hue) and Belkin – will be able to share data about connectable devices, and crucially, interoperate at the application layer level.

In this way, the consortium will ensure that the layers below can look and feel more commodified, making it possible for companies with strong design, quality build and established brands to differentiate their hardware, if not to establish value at the software or services level.

The group also stress they would welcome other device manufacturers, silicon providers and developers from across the smart home sector to participate in and contribute to...
the standard, helping to “define a specific set of IP-based networking technologies for device certification.”

While that is certainly commendable, more names will mean more pieces to try and fit together.

The expectation is that compliant devices will implement at least one supported networking technology, but not necessarily all.

The first specification releases for the network and physical wireless protocols will likely be for Wi-Fi, up to and including the 802.11ax (now known as Wi-Fi 6); Thread over 802.15.4 operating at 2.4GHz; and IP implementations of all existing flavours of Bluetooth (including BT Low Energy).

It should be noted that the working group is specifically not adopting the forthcoming Zigbee 3.0 spec, but what is proposed is pretty similar to what that specification is targeting.

Over time, other networking technologies are likely to be embraced, including Ethernet, broadband and cellular.

**Speeding up development**

To speed the development of the protocol, the working group will commence with components of existing smart home technologies from the Zigbee Alliance, Google, Amazon and Apple.

Any open source code the working group decides is appropriate to incorporate will then be copied into the CHIP project and modified as needed.

As such it can draw on existing and on-going developments and protocols from Amazon’s Alexa Smart Home, Apple’s HomeKit, Google’s peer-to-peer Weave and the Zigbee Alliance’s Dotdot. The latter, based on IPv6, is itself a collaboration between teams to create a common language at the application layer between Zigbee’s and Google’s Weave-related Thread protocol that, like Zigbee, is built around the IEEE 802.15.4 mesh networking principle.

As of course is the well-established Z-Wave option, but the two are currently incompatible in a home environment.

However, this means that a number of requirements will need to be reconciled, not least the fact that Alexa and Google Assistant both use a cloud-to-cloud protocol. And any new standard under the CHIP umbrella will need to satisfy Apple’s existing HomeKit requirements, notably that most communications take place locally. It is also important to note that Apple sees any new protocol as “complementing existing technologies”, which would suggest the plan is not to eliminate any of the above standards, but find common ground between them.

It is also worth stressing that the Thread Group has been working for a while on a similar concept. Indeed, Grant Erickson, president of the group, welcomed the CHIP initiative and said the group feels vindicated on two fronts.

“First, to create this unified application layer protocol Project CHIP is taking the same IP-based approach we have used, and second, they have designated Thread as a network layer for low powered devices.”

He added the project will confer tangible, meaningful benefits to both manufacturers and consumers alike, since the smart home device should ‘just work’, regardless of the radio involved.

The CHIP initiative of course joins a number of efforts that are already trying to achieve the same ends, if using different means. Some are open source, such as the Open Connectivity Foundation’s IoTrivity, which followed the once promising AllSeen Alliance’s AllJoyn specification before embracing it with bridging and plug in support. Those two groups subsequently merged.

Many companies involved with the OCF are also members of the Zigbee Alliance, but the effort is more focused on the IoT space.

In January at CES, the OCF reminded interested parties that they are still very much in the game, and one of its core members, Samsung, launched its OCF Universal Cloud Interface (UCI). The UCI is targeted more at the developer community than consumers, and aims to create an open standard that will allow different manufacturers’ cloud services to communicate with one another as well as devices.

The OCF also said that products targeting the smart home market from many of its members (such as Resideo, Samsung, LG and Haier) will complete OCF2.1 certification later this year.

“The smart home today is anything but smart; there are too many apps and competing communication protocols to make it happen and homeowners are increasingly frustrated” said Scott Harkins, VP and general manager at Resideo’s Connected Home business. He said the UCI standard will greatly simplify IoT cloud-to-cloud communications.

Despite some misgivings, analysts contacted by New Electronics have welcomed the CHIP initiative.

“It is really promising that the ‘big three’ are willing to get to the table, and that the Zigbee Alliance will be at the core of the project. Of course success for such an effort is not guaranteed, especially with the enormous corporate egos that will be present in the room,” Jack Narcotta, a senior analyst within the Intelligent Home group of Strategy Analytics told New Electronics.

But he cautioned, “the Alliance will have to tread carefully and diplomatically, not least because the likes of Google, Amazon and Apple do not have a notable track record for following an open approach in such matters.

“ar some extent, ‘they are following an ‘if you can’t beat them, let’s join them’ situation.”

Narcotta suggested the industry is likely to get a litmus test of how the collaboration is going late summer.
and should expect a big splash next year.

“The guys at the Zigbee Alliance will likely have to shoulder the bulk of the workload”, he added.

“We are more than able to act as honest brokers, and have proven that in the past. And we are well aware of the complexity of task we have taken on. But I am very confident, because we have been talking to and listening to executives of the big participants for a few years now, Tobin Richardson, CEO of the Zigbee Alliance told New Electronics.

“In a way, getting all three to the table was the big part. They are well aware of the challenges and opportunities, and I am prepared for some aggressive but positive discussions before we reach our goal”

Richardson admits the time-scales the group has set itself are ‘very aggressive’. But the task is really one of system integration. “It (the task) is an ambitious one, but we are not starting from scratch. I would say there is a big likelihood we will succeed, but of course nothing is guaranteed”.

And he suggests along the way, there could be some alliance agreements with others looking at the same issues, for instance with the Z-Wave Alliance or the OCF.

“There will be plenty of opportunities for innovation, including from the smaller developers, while, for instance, Apple will argue hard for greater security, surely something that will be crucial for growth and market acceptance, while Google is perhaps the biggest proponents of the IP philosophy and brings huge experience in architectural possibilities.”

Richardson also hinted that along the way, the Zigbee Alliance may opt to change its name “to capture the reality of its new role. Zigbee as a technology can certainly stand on its own achievements, so now might be a good time to look at a name change.”

Z-Wave in the mix

Another technology in the mix is Z-Wave, fronted by Silicon Labs, perhaps the largest supplier of silicon for radios in a huge variety of smart devices. This, too, is heading for major changes, following the announcement – a day before the launch of the CHIP initiative – that the company will open up part of the specification to the silicon makers and software developers.

This crucially includes the G9959 PHY/MAC radio spec, the application layer, the network layer and the host-device communications protocol, both Silicon Labs and the Z-Wave Alliance said.

The change in its business model is clearly recognition that while Z-Wave has been a hugely successful business – Silicon Strategies says 700 companies have put over 100 million interoperable devices using Z-Wave products into the market – the single source approach will not work going forward. “Anything that makes it more open will be good for the sector, and us,” Jake Alamat, VP of Home and Consumer at Silicon Labs told New Electronics.

Asked whether the move was a reaction to the CHIP effort, Alamat insisted the Alliance and the company had been working on this for a long time, and, also participating in the CHIP project, decided to bring its announcement by a few days. “We are fully on board with the goal of trying to unify the application layer over multiple radio technologies.”

Alamat added he does not believe the number of radio protocols will be reduced. “All have their values for different applications – CHIP is, rightly, targeting a unified experience.”

He also said Silicon Labs has already received ‘multiple enquiries’ for making Z-Wave compatible radio devices, but declined to name them. Alamat added the spec is expected to be opened up by the middle of the year.

In fact it promises to be a ground-breaking year for the intelligent home sector. As Strategy Analytics’ Narcotta notes, even if CHIP, or a CHIP successor, does not succeed, its lasting impact may be in being the catalyst for gathering players in the sector around an ever-larger table, and kick-start the conversation about ways to resolve the interoperability issues that have vexed consumer electronics companies – and their customers perhaps even more – for years.
Connectivity for all dimensions

New FINEPITCH board-to-board connectors

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PICMG gives a glimpse into COM HPC

PICMG CEO Jessica Isquith and Christian Eder, chairman of the PICMG COM-HPC technical sub-committee, explain what the new specification for high-end computer modules will mean for the industry

Why a new standard for computer modules?
A new computer module specification was needed primarily to address new applications with particularly high performance requirements, such as those we see emerging with Server-on-Modules at the edge layer level, or those requiring very fast GPGPU connections for AI and machine learning.

The current COM Express standard offers only 32 PCIe lanes and only supports solutions up to PCIe Gen 3.0, which means a maximum of 8 Gb/s per lane, so there are not sufficient power reserves to cope with such new high-end requirements.

Another area where HPC-COM will bring considerable improvements is module connectivity. COM Express offers 10 Gb Ethernet per signal pair. COM-HPC will support 25 Gb Ethernet and more. Transmission rates of up to 100 Gbit/s, theoretically even 200 Gbit/s, are now possible. This huge performance increase cannot be achieved by extending the existing COM Express standard, but requires the introduction of a completely new high-end Computer-on-Module class.

COM-HPC is by no means intended to replace the current COM Express standard. Both specifications will likely continue to exist in parallel for many years and possibly decades, depending on the area of application and its requirements, because almost 15 years after the introduction of COM Express, there are still modules on the market supporting the preceding ETX standard.

Which companies are currently involved in standardisation?
The PICMG COM-HPC technical committee, founded in October 2018, currently counts 20 members and so-called supporting companies, who meet in weekly calls to discuss and define the content of the new standard.

Members of the PICMG COM-HPC committee include the University of Bielefeld and Adlink, Advantech, Amphenol, AMI, congatec, Elma Electronic, Emerson Machine Automation Solutions, ept, Fastwel, GE Automation, HEITEC, Intel, Kontron, MEN, MSC Technologies, N.A.T., Samtec, SECO, TE Connectivity, Trenz Electronic and VersaLogic. Adlink, congatec and Kontron are committee sponsors, while Christian Eder, Marketing Director of congatec, acts as Chairman of the COM-HPC technical committee. He has played an important role in the development of the existing COM Express standard as draft editor. Stefan Milnor from Kontron and Dylan Lang from Samtec support Eder in their functions as editor and secretary of the PICMG COM-HPC committee.

Which board formats are being proposed?
COM-HPC modules will come in two variants with different performance requirements. COM HPC/Server modules are designed for use in edge server environments and focus on the memory capacity required for server applications, a powerful Ethernet connection of the server and the ability to provide multiple cores for consolidating high workloads. The 160x160 mm Server module is expected to host up to four DIMM sockets, while the larger 200x160 mm variant will integrate up to eight DIMM sockets.

The somewhat more compact
COM-HPC/Client module will also come in two footprints, measuring 120x120 mm and 160x120 mm. Primarily designed for use in high-end applications in the embedded computing area, the Client module – unlike the COM-HPC/Server module – integrates video interfaces such as DDI or eDP/MIPI-DSI for the control of up to 4 high-resolution displays. It further provides up to 2 GbE interfaces for network connection via NBASE-T.

In terms of power consumption, COM-HPC/Client modules can be classified as low-power components, while COM-HPC/Server modules, which are optimised for maximum connectivity and workload performance, have a correspondingly high power draw. Hence the plan is to supply up to 300W for the Server modules and up to 200W for the Client modules. The primary connector reserves a remarkable 28 power pins on each COM-HPC module for this purpose.

All COM-HPC modules can also execute up to 64 PCIe lanes to the carrier board and support PCIe up to specification Gen 5.0, which allows transfer rates of up to 32 Gb/s per lane. This makes it possible to connect several powerful GPGPUs. For the physical connection between the COM-HPC modules and the carrier board, two connectors with 400 pins each – so a total of 800 pins – are available. With almost twice as many pin connections to the carrier board as COM Express, the COM-HPC specification therefore also provides considerably more interconnect options.

What are the target markets for the new class of modules?
The COM-HPC standard addresses applications with exceptionally high performance requirements, such as those common in server-based applications for the harsher environments, in edge infrastructures for carriers and Industry 4.0 manufacturing, in the outdoor sector and in vehicles of all kinds.

COM-HPC/Server modules will be used wherever large amounts of data have to be processed with lowest possible latency – and where forwarding the data for processing in central clouds and sending them back would take too much time.

An example of this is the infrastructure for self-driving vehicles, which requires very fast response times and can therefore only be implemented via a powerful edge server layer at the edge of the cloud.

The power supply – which in future will no longer be provided by just a few large suppliers, but by an increasing number of medium-sized, small and even tiny suppliers – will also depend on such powerful edge server solutions. The power grid can then be divided into intelligent sub- and microgrids, enabling the edge server infrastructure to react instantly and in real-time to power fluctuations caused by current peaks or sinks. All these new challenges are not easily mapped with the existing COM Express standard.

What is the time frame for the standardisation of COM-HPC?
The pin-out definition was launched last November. Since then, the members of the PICMG COM-HPC committee have been able to embark on first designs. The final COM-HPC specification is to be ratified in Q1 2020. The first products, or at least “previews” of the first COM-HPC modules, will probably be presented by PICMG COM-HPC committee members in that quarter as well.
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Now VR and AR are established in several vertical markets, the next stage is adding haptic feedback.

By Elliot Mulley-Goodbarne

Elsewhere, in manufacturing, Unity Studios Aps chief design officer Thomas Fenger explained that companies are now interested in using haptic response systems and, in particular, VR and AR to make sure production runs smoothly.

“Right now, companies that deliver industrial robots are branching into using AR/VR for controls. Mostly I see this as sort of the pre-installation of the controls. We have already seen ABB using virtual reality to be able to set up controller robots in a digital copy of the sort of the environment that they come to use. The idea is to not interrupt production. The operator will set up the procedures that the robot will follow and can pre-simulate without actually interrupting processes. That’s probably where we see the most benefit right now.”

True replication

The challenge that system developers are now facing is replicating true interaction through robotics. According to Professor Robert Stone, Director of the Human Interface technologies team and Emeritus Professor, XR and Telepresence at the University of Birmingham, these technologies have not developed much from systems in the 90s.

“We saw a lot of early VR applications using master slave manipulators from the nuclear industry and for a long time, people were asking if these things could be adapted. Even the original exoskeletons in the 1960s were being looked at as a means by which you could interact more intuitively with virtual worlds.

“It’s only recently that haptics has come to the fore because a lot of people are coming out with quite outlandish products but, when you look at these products, very little has changed since the 90s. We’re still looking at pneumatics and at electromechanical devices that are built in pulley-like systems that restrict or restrain the movements of the hand or arm; we’re still looking at exoskeletons.

“The big issue from my perspective, as a human factor specialist, is that we are still in the position today where there is not one system, be it the robotics, or VR that is able to satisfy all the needs of the sensors that are built into our fingertips, the skin of the fingers, the muscles, the tendons. It’s still incredibly primitive.”

“The important thing with touch is that everyone feels things slightly differently” added Vincent, “I feel a table surface and say it’s quite smooth, you might say it’s a bit rough. Neither of us are wrong but the point
VR & AR

HAPTIC TECHNOLOGY

is we can feel it and therefore we know it’s there and that’s what we’re trying to achieve with our technology. “Is it exactly the same as real life? No. But is it enough to create the learning experience? Yes. And that’s the difference.

“What haptics do is lift the cognitive load, to make it easier for people to learn because you’ve got more than one sensory experience going on. They accelerate the learning speed because, again, you’re learning through different behaviours, not just theoretical observation. You’re doing it.”

Good vibrations?

Despite his “primitive” description of the haptic response technologies, when it comes to touch sensation, Stone said that there is a place for certain haptic systems in non-mission critical situations.

He pointed to the use of piezoelectric transducers built into a joystick that vibrates to give the user some form of touch sensation as a good application of haptic technologies.

“One of the best haptic feedback systems I’ve ever used for a robot, was developed by L3Harris over in the US for bomb disposal. They used a joystick to develop a haptic feedback controller and we put a power tool onto the end of the robot with a rotating piece of sandpaper to strip stuff away.

“Using this hand controller platform and a multi axis platform we were able to strip the plastic sheath of a wire remotely without sanding or burning through the actual wire itself. You couldn’t have done that with a glove or any of these other techniques for that application.”

Fenger said that approaches by companies to incorporate haptic feedback seemed to follow two routes, a precise system that mimics real interaction or ditching such complicated systems in favour of feedback designed to notify the user of their surroundings. These systems are similar to those outlined by Stone in which “rumblings in an Xbox controller” signalled changes.

“Most VR headsets give different versions of vibrations as feedback. That’s kind of a more interesting way to go, because you learn to accept a certain type or speed or rumble as another kind of haptic feedback,” said Fenger. “So basically, it will be a suspension of disbelief. You accept the tools are different when you are inside of the VR helmet and you accept you touched something when you get a slight rumble.”

When it comes to the realistic haptic feedback, Vincent accepts that his FundamentalVR solution is not quite the finished product. The aim is to get to be as realistic as cadaveric training but he pointed out that the price and convenience comparison weighed heavily with technology.

As for the use of VR and haptics in surgery a lot has been made in the run up to the release of 5G networks of remote surgeries and using new, faster signals to conduct operations from a different room, hospital, country or even continent.

Vincent warns that such systems still have issues to address and there are questions as to whether it is the right technology.

“I’m not sure why you’d want to go there with VR because you really want AR rather than VR. You’d want to enhance the view rather than necessarily replace it.

“But the biggest issue is the weakest link, which is the latency issue because there is the possibility that the moment you’re just about to sever an artery and try and stitch it up, that you get that one millisecond blip in the signal. That could, quite literally, be terminal.

“We’ve had a number of conversations with manufacturers of surgical robots around how some of our haptic intelligence could be used in live robot activity. We’ve not deployed any of that yet, but that’s certainly an area of interest with the people who are specialising in that production.”
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Bio-inspired electronics that are already transforming outcomes for patients, Charlotte Hathway finds out more

In the world of technology, a lot of big words get bandied about so frequently they stop meaning big things. ‘Pioneering’, ‘revolutionary’, ‘innovative’… the list goes on. Yet when I spoke to Imperial College London’s Dr Pantelis Georgiou a few weeks back, those were the only words that felt appropriate to describe the research he and his team carry out in the university’s Faculty of Engineering, Department of Electrical and Electronic Engineering.

He is the head of the Bio-inspired Metabolic Technology Laboratory in the Centre for Bio-inspired Technology where a multi-disciplinary group invents, develops and demonstrates advanced micro-devices to meet global challenges in biomedical science and healthcare.

“A lot of the research we do is something that has evolved over millions of years. Now it’s at a state where it does what it does extremely efficiently, with low amounts of power. The human brain, for example, is seven orders of magnitude more efficient than the world’s best microprocessor and, if you look at the components it uses, they’re not entirely precise.

“The neurons in your brain or the receptors that sense glucose in your cells are not working with 32-bit accuracy. They’re slow and noisy components, yet they manage to holistically carry out bodily function with extreme accuracy, precision and robustness.”

“In our group, we look to biology and see the way it’s architected and behaves. Then we try and create microelectronic systems which perform the same function with similar efficiencies, and we also draw parallels between the two mediums. In microelectronics, we have transistors; the currents that flow through those transistors are governed by physical laws which govern the movement of electrons.
and CMOS transistors.” Georgiou explains that, because of these parallels, electronic systems can be architected using transistors that obey the same physical laws as biological cells. This approach was originally pioneered in the early 90s by Carver Mead at The California Institute of Technology.

Mead established neuromorphic electronics – a new area of thought where he drew analogies between transistor physics and neural cells in the brain – and came up with the hypothesis that because the laws which govern both are the same, you should be able to architect systems which are similar to the brain. Georgiou says neuromorphic electronics are arguably the foundation for artificial intelligence and machine learning.

Extending neuromorphic electronics

“About 15 years ago, I thought I’d take that approach a step further and ask, ‘can we do something similar with metabolic systems?’” I wanted to see if we could create an artificial pancreas for the management of diabetes and looked at the biological cells in the pancreas responsible for glucose management, called beta cells. I saw that there were analogies between the way those cells behaved and CMOS transistors.”

In the human body, blood glucose levels are regulated by the gradual release of the hormone insulin. Type 1 diabetes is an autoimmune disease where a person’s immune system kills off the beta cells that ordinarily create insulin.

Based on the thinking that electronic systems can be architected to mirror biology, Georgiou developed a ‘silicon beta cell’ as an artificial replacement for the biological beta cell. He then used that silicon beta cell as the chip within the bio-inspired artificial pancreas, a fully closed loop system designed to act as a substitute to the biological pancreas for the treatment of diabetes.

This research was originally Georgiou’s PhD project and, since then, it’s gone on to grow as an initiative in his lab. Georgiou says, “We’ve now clinically trialed the device on 65 patients and I’m pleased to say, as of last December, we have sent the device home fully unsupervised in a free-living environment.”

He explains that the trials that had been carried out prior to this were within hospital environments, and the closed loop system has been shown to manage diabetes. Now, a new direction in his research lab is to bring in wearables to try and monitor additional parameters.

Stress and exercise are important factors in managing diabetes, so being able to detect these and feed those into the artificial pancreas system will hugely improve the treatment outcome. The artificial pancreas system itself uses an insulin pump to replace insulin injections.

“The problem with insulin injections is that you still need to monitor your blood glucose through finger prick samples. Then, to figure out how much insulin you need, you need to do some mental arithmetic.

“What we offer is a fully closed loop system, which works in real-time. Every five minutes it senses glucose and calculates how much insulin you need. The insulin which is calculated is based our beta cell model so it’s physiological, and then it sends that information to the insulin pump, which then pumps in the insulin continuously.”

Improving treatment outcomes

This approach, even in this trial phase, is already showing patients can have better treatment outcomes than existing methods. Georgiou says, “There are two benefits. One is, for the first time, you’re providing patients with a fully automated way to manage their diabetes. They don’t have to inject three times a day or do finger prick samples because they’ve got continuous monitoring and infusion.

“The second, we’ve done a study where we compared [treatments] and we’ve shown that patients spend a lot more time in the healthy blood glucose range, between four and eight mmol/l, that you would expect for a healthy individual.

“We’ve also reduced the number of hyperglycemia events that patients experience.

“Hyperglycemia is very dangerous, because when you infuse too much insulin and the body is depleted of glucose, you end up fainting and it can be fatal. We showed in a head-to-head study that we totally eradicated hypoglycemia overnight. And compared to standard therapy, we actually reduced it by as much as 20%.”

With these results, bio-inspired electronics should clearly be taken seriously as a way to transform outcomes for patients with various illnesses or diseases. This research project might be focused on diabetes, but Georgiou and his colleagues at Imperial College London have developed electronic chips that mirror biology to help diagnose and treat numerous conditions. Those include a microchip-based for early detection and therapeutic monitoring of breast cancer and a chip to better understand of the role of hormones in appetite regulation and their impact on conditions such as obesity.

Electronics are already being used to carry out bodily functions, but for this to be automated, they need to be architected in a way that mirrors biology.

It’ll be interesting to see what other chips are built to replicate the extreme accuracy, precision and robustness of human organs.
When it comes to embedded design safe, reliable and secure code is paramount. By Jill Britton

As the world becomes increasingly driven by embedded systems, achieving safe, secure and reliable software has never been more important. Functional safety – part of the overall safety of a system or piece of equipment that depends on automatic protection – is firmly in the spotlight, across all kinds of markets, such as automotive, aerospace, medical devices and rail.

This puts pressure on engineers to ensure their software is safe, while continuing to innovate and maintain product performance, often against a back-drop of tight project timescales and budgets. Mega-trends such as artificial intelligence, augmented reality, blockchain and the internet of things (IoT) are driving increases in the complexity of both consumer and industrial software applications.

Most functional safety-related systems are implemented on custom-designed, embedded hardware platforms. For decades, C and C++ have been the programming languages of choice for such embedded systems. This is largely because they permit direct, deterministic control of hardware, and give flexibility to the developer. However, the use of these languages also introduces risk. Code which compiles and run can still have undefined or unspecified behaviour, or may not behave in the same way when compiled and run on different target hardware. This is clearly unacceptable in any safety-critical application such as a car braking system.

Alongside the proliferation of safety-related embedded systems, there has been a sea-change in software development culture. Across all markets, there is a move away from the traditional waterfall methodology towards Agile, Agile hybrids, DevOps and generally shorter, iterative development cycles of continuous integration, improvement, testing, delivery and deployment. This means that to remain competitive, standards compliance, safety and security should be baked into software development, from day one and across the entire lifecycle.

Standards are the starting point

Functional Safety standards, which promote consistent communication and shared understanding, enable organisations to work from a common baseline of best practice. In some industries, such as rail or automotive, the correct implementation of functional safety is even a part of the approval process, which is required to place the system...
on the market.

Although it is sometimes considered a burden to work to the requirements of the standards, it is more often the case that they reduce costs and time to market because they implement best practice throughout the development.

Functional safety involves performing a hazard analysis on a system, and then implementing safety functions where needed, to reduce the risk of a hazard occurring to within a tolerable level. These safety functions may or may not be controlled by software. In cases where there is a software-controlled safety function, the standards set out the appropriate software development and verification activities that need to be undertaken in accordance with level of required risk reduction.

IEC 61508 covering electrical, electronic and programmable electronic safety-related systems, was first published more than 20 years ago, establishing a process which could apply to any industry. Since then, almost all industries which have safety-critical software / hardware systems have created their own standards many of which are based on the IEC 61508, for example:

- Automotive (ISO 26262)
- Railway (EN 50128)
- Medical (IEC 62304)
- Agricultural Machinery (ISO 25119)

**Coding standards are key**

Of course, the whole issue of how to write code that is guaranteed to be safe and secure is not always straightforward. This is where coding standards have a big role to play. They capture many person-years of expertise and give developers a set of rules to follow, which gives them confidence in the code they write. As a bonus, they also lead to more consistent, readable and thus understandable code that helps to reduce future maintenance effort.

Functional safety standards do not specify which coding standard to use – they just indicate that a suitable coding standard should be used and its use should be properly documented.

For example, ISO 26262 mandates the use of coding guidelines and specifies the topics that are recommended - or highly recommended - to be encompassed by those guidelines. Topics such as the use of a safe language subset, and the use of naming conventions are highly recommended.

MISRA C and MISRA C++ are two of the most well-known and widely used coding standards. MISRA C was first developed in 1998 for the automotive industry and has since been extended for use in any safety-critical system. MISRA C++ followed in 2008 since when they have become leading coding standards for critical software in all industry sectors.

Later, the AUTOSAR C++14 Coding Guidelines were developed to address the need for a safety-critical standard for modern C++. The MISRA consortium is planning to merge these rules into an updated version of its C++ standard in the near future.

The CERT coding standards have been developed by a community of experts with a focus on security, coordinated by the CERT division of the Software Institute at Carnegie Mellon University. With the growing awareness of the cybersecurity issues that can be introduced through poor coding practices, the use of CERT C and C++ for embedded applications is expected to increase.

In practice, many organisations choose to fully or partially adopt multiple coding standards to meet their specific needs. Some organisations take a more flexible approach. For example, the NASA Jet Propulsion Laboratory developed a set of just ten rules that are intended to eliminate C coding practices that make it difficult to review or properly analyse with static analysis tools.

Regardless of whether they are obligatory or not, adoption of coding standards is gaining momentum in all areas of software development.

**Best practice**

There are some important issues to take into account when implementing coding standards, first of which is managing cultural change. There can be resistance to new processes and tools, so it is important to involve the development team in the selection process and adoption strategy. It is also essential for everyone to understand the business rationale behind the changes, for example: to ensure the safety of a product; meet a customer need; achieve external certification; and ultimately increase sales and ensure business success.

While it is possible to use manual code reviews to check code against a standard, an automated static code analysis tool is needed for any project of significant size. Much faster and more accurate than any human reviewer, a static analyser is capable of finding thousands of different types of potential defects at the earliest possible opportunity. Static code analysis integrates well with the ‘continuous improvement and test’ approach of DevOps.

A static analyser is able to scan an individual developer’s code changes before they are committed, as well as automatically scanning the code for the entire project as part of a continuous integration process. To help apply static analysis to a legacy codebase, some tools provide a baselining feature that gives visibility only to newly introduced issues, and other features that allow the team to easily prioritise reported issues.

The requirement to ensure the functional safety of software in embedded systems is only going to increase, so putting in place a strong foundation of coding standards, tools and processes will pay dividends both now and in the future.
Next month sees the return of PCB Design & Manufacturing Live connecting you with some of the UK’s leading suppliers. PCB Live brings together PCB design consultancies and electronics manufacturers to solve problems and streamline PCB design and production costs.

Many exhibitors will be launching brand new products and you’ll be amongst the first to discover them and what they can do for your projects. PCB Live will provide interactive demonstrations of processors, memories, enclosures, connectors, power products and much more and it will provide attendees with the opportunity to learn and understand how to best apply new techniques, products and technologies/processes that will improve their own PCB related activities.

The event is compact by design and opens early at 8:30am. So, you can get there, get in, get around, get the PCB answers and solutions you were looking for and get back to work with the minimum time and fuss.

Crucially, everything is free - free to attend, free parking right outside the hall, free Wi-Fi and free refreshments.

Located at the British Motor Museum you’ll also have the chance to explore Britain’s motoring heritage at first hand. All visitors will gain free entry and with almost 300 classic cars on display it provides an exhilarating close-up view of the cars that were at the heart of the UK’s automotive industry.

Among the exhibitors at this year’s show are: Future Facilities, which will be revealing the company’s latest release of its renowned 6SigmaET simulation software and will explain what this significant new thermal simulation software can do in the field of temperature prediction for electronics applications.

Golledge Electronics will be showing the GSX-113, an innovative addition to the company’s expanding range of fundamental mode crystals. What makes this one special is its size: available in an ultra-miniature 1.2 x 1.0 x 0.3mm 1210 form factor package, and in frequencies from 32 ~ 80MHz.

The GSX-113 is intended for wireless communication applications, including tight board stacking and miniature devices. The company says that the ESR characteristics of the GSX-113 have also been kept to exceptionally low levels in line with the latest chipset industry demands.

Samples of the GSX-113 – as well as many other leading Golledge products – will be available to view on the company’s stand.

Hitaltech offers both flexible and rigid interconnect systems, as well as other related products including wire-to-board connectors and enclosures rated to IP65. Of especial interest to PCB designers and manufacturers visiting the PCB Live Exhibition will be the company’s range of flat, flexible interconnect cables for use where vibration can be a challenge. These can either be soldered direct to board at each end, or alternatively, they can be supplied with connectors located on either one or both ends.

Following the assembly process of smartphone displays, it is important for manufacturers to be able to inspect the mounting tolerances of the various components to ensure continuous quality in all production batches. To help them achieve this, confocal chromatic sensors from PCB Live exhibitor Micro Epsilon travel over the components and inspect the required gaps with extremely high accuracy.

Almost all industries and in particular, the semiconductor, micro
lens, automotive parts, medical, glass, and MEMS industries use this sensor technology in a variety of ways. This innovative measuring equipment for electronics manufacturing, and much more besides, can be discovered, discussed and evaluated on the Micro Epsilon stand.

**OKW** recently launched two new adapters that enable any small plastic enclosures to be mounted direct onto a DIN rail – saving space and significantly speeding up installation. Suitable for a wide range of electronics applications, these adapters are designed to fit the popular TH35, TH15 and G32 DIN rails.

OKW offers a wide range of DIN rail enclosure accessories and options which can be examined and discussed on the company’s stand.

**Pico Technology** has released a new BroadR-Reach decoder/analyzer package that simplifies Automotive Ethernet integration testing and debugging. The package includes a novel non-intrusive Software Directional Coupler to separate up- and downstream traffic on full-duplex communication lines, and electronics designers will be able to see this latest advance, and other offerings in the Pico Technology portfolio.
The Digital Catapult’s Augmentor programme plays a critical part in developing a connected ecosystem for immersive technologies. By Neil Tyler

The programme comprises of a 12 week accelerator programme and concludes with a presentation to investors and industry experts.

At the end of January a showcase was held at the Catapult’s central London offices. Comprising of 10 start-ups, who have been using virtual or augmented reality to develop commercially viable products or solutions, they presented their ideas to the investment community.

“The programme supports early stage businesses that are developing innovative and commercially-focused applications of augmented and virtual reality,” explained Jeremy Silver, CEO, Digital Catapult. “By partnering with leading investment funds, it gives investors a much greater understanding of advanced augmented reality technology.”

The Catapult also connects established companies with start-ups and researchers and provides physical and digital facilities for experimentation and testing, but crucially it works to help de-risk innovation and promote new commercial applications of digital technology.

“The Catapult looks to discover businesses with the most commercially viable solutions and then gives them the skills to approach investors,” explained Silver. “Our work is all about bringing together the entrepreneurship of start-up businesses, with large corporations and academic research.”

According to Silver it’s also about stimulating the right market conditions so that the best companies are able to get to market faster and, in the process, help the wider UK economy.

For companies and investors active in the immersive space it has been described as a ‘rollercoaster experience’, but as we head into 2020 that could be about to change.

At the end of 2019 the sector started to see more use cases appearing and, critically, more tangible evidence of the benefits of using VR and AR. For many investors, these innovative technologies have lacked the necessary data to underpin specific use cases. Today, however, the conversation is much more ROI focused and less anecdotal.

Another key influencer is the growth of a more extensive ecosystem and the scaling up of capabilities making it easier to get the technology onto different platforms.

The ecosystem is developing rapidly and many of the key constituent parts are now ready, whether that’s the roll-out of 5G or the development of new hardware. Larger corporates are also now investing in AR which for many has become an R&D priority.

Another area that is supporting the ecosystem is the development of tools – Unity, for example, has developed the Mixed and Augmented Reality Studio (MARS) which has been specifically designed to help the company’s creators make better spatial experiences and games that can run anywhere.

The immersive community

Among the cohort of Augmentor teams presenting were Agile Datum, a data science company focused on improving the planning and house building market; Artificial Artists, a team of interactive and VFX specialists that has developed a 3D animation platform that empowers artists to create quality 3D content for digital and immersive media; Extend Robotics...
which is developing a drone flying platform with two robotic arms, which is guided by virtual reality technology over 5G to perform manipulation tasks remotely: Imaged Reality, a VR and AR start-up which believes immersive technologies will be able to transform training, knowledge and skill development across the Oil & Gas, mining, construction, engineering industries and universities and Resus VR, a medical training start-up looking to improve the decision making of healthcare professionals through exposure to VR simulations.

“Extended Robotics looks to provide a modular robotic system that can be installed on drones, rovers and climbing robots, for example,” explained the company’s founder and CEO Chang Lui.

“When it comes to today’s robots they tend to be handcrafted and fine-tuned for a specific task, and it’s hard to deploy robots in complex real-world situations. What we are developing is a physical avatar of a user so that they can perform manipulation tasks remotely using VR over a 5G connection - an avatar twin.”

According to Lui, it will provide a safer and more comfortable work environment for the user, and will lead to significant cost savings – pointing to the costs incurred in terms of the installation and maintenance of telecom infrastructures.

Another start-up present was Imaged Reality, that’s been set up to deploy robots in complex real-world situations, “3DGAIA helps the geologist by bringing the field to the office,” she explained. “We enable immersive learning and remote collaboration, which means it’s possible to connect expertise from around the world.

“We use high resolution field outcrop models, derived from data collected by drones, to create collaborative sessions or training courses.”

Two major oil companies have already licensed the company’s software and it has delivered its first geological field trip to Shell.

There has been a lot of hype around VR and, to a lesser extent, AR but according to Silver, “2020 is certainly looking more promising. The creative and commercial opportunities offered by immersive technologies like VR and AR are exciting and certainly diverse, but there are still challenges when it comes to raising investment and creating sustainable businesses.”

The Augmentor programme, started three years ago, has had a number of successes to date, such as Gravity Sketch, Holome and Reality Zero - companies that have gone on to raise investment and achieve commercial traction.

But while the programme is all about taking these ideas and experimenting with them, the aim has to be about turning them into strong commercial propositions.

According to Iulia Tudor, Investor Engagement Manager, Digital Catapult, “Investor appetite for immersive technologies is on a high this year, but according to our own research access to finance remains a significant challenge for start-ups operating in this space.”

“Immersive technologies offer great opportunities for investors,” according to Dave Haynes, Director Vive X, HTC EMEA. “But one of the biggest challenges for investors is actually timing. Being too early to the market can be as big a problem as picking the wrong technology. We are dealing with a niche market and investing other people’s money, but we are seeing huge growth potential in this space.

“It’s essential that we look to support start-ups that are building the products, platforms and enterprise solutions of the future. Our aim at Vive X is to help cultivate, foster and grow the global VR ecosystem and to do that by supporting start-ups with education, investment and mentorship.”

According to Tudor this year’s Augmentor programme attracted double the number of investor partners, which in itself suggests that there is real investor appetite in terms of what the sector can offer and the scalability of the technologies being developed. There do remain concerns that when it comes to immersive technology investors are more averse to investing than they would be with other technology.

“Investors are looking for traction in the market, and it’s not there yet,” admitted Haynes.

He made the point that for investors, “Business models need to be understood and proper sequencing is critical, both of which require dialogue between the investor and the company.”

According to Haynes investment in consumer oriented immersive technology is challenging.

“That’s especially true when you compare it to the enterprise space where it’s possible to have a much clearer and more coherent business case for the technology. Investors will also be looking for meaningful revenues and a solid client base.”

Despite the obvious risks associated with any type of investment the future of the immersive ecosystem is seen as a bright one, especially here in the UK.

“The UK has an excellent foundation in manufacturing and the creative industries with expertise in all aspects of production and the ability to find and develop impactful use cases,” suggested Jessica Driscoll, Head of Technology – Immersive, at the Digital Catapult.

“With hardware becoming more mobile and affordable, cross technology opportunities with both 5G and AI, will help AR and VR demonstrate the power and value of immersive technologies.”
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ISE saw exhibitors braving storms and viruses to display the latest technology. By Elliot Mulley-Goodbarne

The terms ‘audio’ and ‘visual’ are naturally ambiguous terms, as demonstrated by the 15 halls needed to house over 1,000 exhibitors at the RAI Amsterdam convention centre for ISE 2020 (Integrated Systems Europe).

From the collaboration platforms of Teams, Zoom and BlueJeans to the capability to record, compress and distribute content in 8K, the audio-visual sector is one that is continuing to grow strongly. One clear trend this year is that resolution is being pushed throughout the industry.

This was exemplified by the release of the latest Samsung devices which have the capacity to record in 8K resolution, and with content so easy to create, the conversation is now focussed on how to consume it.

Christie, a visual display manufacturer, demonstrated projection mapping technology intended to ensure that an image stays in the area in which it was intended to be seen with applications in immersive content or in museums and art galleries.

The company was also showing off a new LED wall that had less than one millimetre between pixels, a metric also known as pixel pitch. However, Senior EMEA Channel development manager Miles Donovan said that LED and projection do not necessarily play in the same area.

“All things bright and watchable you might need a screen, it’s easier to interface and work with. The unique thing about LED is its brightness. You can have [an LED wall] in areas where there is a lot of ambient light. Projection wouldn’t typically be able to create that type of display where you would need super brightness, for example in auditoriums.”

Typically, due to these limitations, projection has not found a home in well-lit areas. However, with the invention of laser projection technology, it is possible to push brightness up to 50,000 lumens almost removing its limitations.

With this ability, Epson corporate PR manager Bruno Rost, said that users would be more interested in experiencing projected content, a trend that retailers are taking note of.

“We have done some EMEA-wide research of 10,000 consumers across 26 countries, asking them about their awareness and response to digital immersive technologies such as projection, virtual reality, holograms, even large flat screens at live events or attractions, retailers and hospitality and got some really interesting findings.

“Generally, people want to have immersive digital technologies to engage with, they don’t want to watch anymore, they want to participate.”

Epson had a demonstration of their technology, comprised of eight EB-L20000U laser installation projectors, an 8-metre turntable and a huge box, and used projection mapping software to create a 3D video on the box at any angle.

“Our research shows 80% of millennials and Gen Xers would be happy to change their shopping behaviour and go into stores if there were more engaging experiences.

“It’s definitely something that retailers can embrace. We’re working with some of the major retailers like IKEA, who are piloting the use of projection that really enhances the consumer’s purchasing experience.

“For instance, if you’re buying a sofa you can see how projection can create different patterns you might want to be interested in purchasing.”

Getting ahead of the game
Panasonic used this year’s show to demonstrate its capabilities to record, process, mix and produce an eSports event - eSports (also known as electronic sports or e-sports) is a form of sport competition using video games.
The company launched its first 50,000 lumen project with only blue lasers however, but at ISE they were debuting a new, compact 3DLP LCD projector, with an output of 30,000 lumens.

Thomas Vertommen, European product marketing manager for projectors at Panasonic said, “At the end of December, we delivered the first 50,000 lumen projectors with native 4K 3DLP, but with a light source that, instead of the traditional laser phosphor, with only blue lasers, we added a red laser on top of it. We then changed the bandwidth of the blue laser so that it improves colour reproduction and opens up the colour space.”

Vertommen also said that when it came to eSports presentations, the set up can contain a mix of panels and projection and also revealed that a black projection screen can add to the content.

“If you do these types of events, most of the time designers go for an LED wall as a back screen. We are using a 50,000-lumen projector on a special black projector screen, which can achieve a much higher contrast, and it attains the same brightness, same colours or contrast as an LED wall but with the advantage that it is more cost efficient.

“Projection is easier and quicker to set up because an LED wall takes a lot of time to build and put together every single tile, align it, make sure that all of the signals are looped through. With the combination of just a projector and a screen, it’s not something that takes hours or days.

“Most importantly, if you look at it from a camera perspective, it’s a lot easier to get better footage because you don’t have this pixel pitch, you don’t have the Moray effect that always comes in. Normally cameras need to have some technical developments to overcome that effect but with a projector, it’s completely irrelevant because that effect never happens.”

Controller
Panasonic used its own IP switching platform in order to control the content on screen. While such a system is not necessarily new, both Xilinx and Vitec were showing off compression technology that lowered the time it takes to distribute content to the desired screen.

Vitec was promoting its EZTV multicast solution that condenses content from the point or origin, or head end, sends it through to an edge server decompresses and distributes it to the end points. A solution that uses less bandwidth to distribute the content.

“We have a true multi cast edge to edge solution, which is why it’s quite unique from the headend, which is what’s bringing in your content, satellite, TV mass, we can then either take that through gateways or encode it and make up the stream that you can then distribute.

“Then we have bolt-ons to that ecosystem, one of which is digital signage which is a fully integrated compliant digital signage product that works with the EZTV system and means that any graphics and videos can be put in a layout to suit your individual needs.

“Beyond that, we also have video processing, which has the capability of having a display, put across multiple TV screens in any layout for what you want. So, if you wish to have a triangle effective you can still send the video to that.”

Bandwidth was also on the mind of Xilinx, who launched new machine learning demos with the ability to reduce the bandwidth needed to distribute content by reducing the bits applied to the areas of the screen that would not naturally attract the human eye.

However, capturing that content is still key, a fact that Xilinx has attempted to overcome. Seeing the limitation of having a few or a single camera, Director of Pro Audio, Video and Broadcast business and Consumer business Ramesh Iyer explained how the Xilinx ML system is giving more framing options.

“The machine learning engine combined with the video codec that we’ve integrated, combined with a very powerful ARM processor, a powerful graphics engine, the FPGA fabric built into the system allows our customers infinite amount of flexibility into the way they want to deploy the solution.

“For a person at a school sports event, you only have one camera. But when you want the viewers to see multiple angles of this camera, how do you do it? One option is you buy more cameras and install them but instead we’ve come up with a technique where a single camera can focus on the entire 4K frame and inside that frame, you can have multiple 1080p HD windows based on what you want the machine learning engine to focus on.

“You may want to focus on the football, or you may want to focus on ads, or you may want to focus on somebody’s t-shirt, or the player himself or herself. The machine learning engine fits all of them into different windows based on what it’s looking for. So, a single camera can then produce multiple outputs.”
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Danisense, the leader in high accuracy current transducers for demanding applications, has signed a global agreement with Digi-Key, the leading high service distributor which is now stocking Danisense’ most popular models plus accessories. Included on the Digi-Key inventory are current transducers that span 50 – 20000 A. All are based on Danisense’s innovative closed loop, flux gate sensor technology, which results in highly accurate, stable and repeatable measurement. The products are made in Danisense’s vertically integrated Danish facility and enjoy a reputation for high reliability and quality.

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Nexperia launches pioneering OPEN-Alliance-compliant ESD protection module

Nexperia, the expert in discrete and MOSFET components and analog & logic ICs, today announced the launch of industry’s pioneering silicon-based, OPEN-Alliance-compliant ESD protection for 100BASE-T1 and 1000BASE-T1 automotive Ethernet systems.

The OPEN (One Pair Ether-Net) Alliance Special Interest Group (SIG) is a non-profit alliance of automotive industry and technology providers, who collaborate to encourage a wide scale adoption of Ethernet-based networks as the standard in automotive networking applications. Its work is meant to prepare EEE and other international standards.

Nexperia is a technical member of the OPEN Alliance SIG, and has developed fully compliant ESD protection devices, based on silicon technology for 100BASE-T1 and 1000BASE-T1 Ethernet.

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