

## **COVER STORY**

Interview with Syed Suroor Anwar, Vice-President (APAC), Strategy and Commercial at RS Components







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## Publisher's Message

e are already on our Jun-Aug 2021 issue, time sure passes quickly. These few months we have seen Malaysian involved in the vaccination program runs by the government. The government has removed AstraZeneca from the national immunization program after data shows that there was vaccination hesitancy. Around 8,000 people canceled their vaccination registrations on MySejahtera and the number of registration spikes by 80% after the vaccine was removed from the mainstream program.

On May 2, the coordinating minister of the National COVID-19 Immunisation Programme, Khairy Jamaluddin has launched the opt-in voluntary program for AstraZeneca which people can sign up for it. Due to the increase in demand, the Science, Technology, and Innovation Minister stated that the next batch of AstraZeneca vaccines will no longer be available voluntarily but will be reincorporated back into the National COVID-19 Immunisation Programme (PICK).

We also have seen the vaccination roll out around the world with the United Kingdom (UK) is racing ahead with its immunization program, also being the first country to approve its first COVID-19 vaccine. The United States has administered at least one vaccine dose to 50.3% of its population, make it the 11th most heavily vaccinated country. While New Zealand is ahead of its game with the Prime Minister, Jacinda Ardern's impressive way of handling the spread of the COVID-19 pandemic with only 2,673 cases up to this day.

Let's be hopeful that the vaccination program runs smoothly and more people will sign up for it to at least achieve herd immunity. It's important to play our part in encouraging each other to take the vaccine and help those with little information and sources. While the vaccination is rolled out, be mindful not to spread false news and propaganda that can defeat the whole purpose.

On behalf of the editorial team, I thank you for your massive support to Automate Asia Magazine. Stay in touch with us at www. asiaautomate.com for more updates.



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## MIDA and MDEC set up Malaysia's Digital Investment Office



The government has set up the Digital Investment Office (DIO) to facilitate digital investments in Malaysia.

In a joint statement, the Malaysian Investment Development Authority (MIDA) and Malaysia Digital Economy Corporation (MDEC) said the establishment of the office was endorsed by the National Council of Digital Economy and Fourth Industrial Revolution (MED4IR) chaired by Prime Minister Tan Sri Muhyiddin Yassin.

The DIO is a fully-collaborative digital platform between MIDA and MDEC, which aims to create awareness of digital investments in the country and strengthen coordination among all investment promotion agencies (IPAs) in promoting and attracting new investments in this fast-evolving segment.

According to MIDA and MDEC, the office will cater for rapidly-growing demand for digital infrastructure, with a goal of anchoring global technology leaders, building local champions and nurturing future-ready talent in Malaysia.

"In the long term, with the shift in the global digital landscape, the government anticipates the DIO to play a vital role to position Malaysia as the preferred digital hub and firmly establish Malaysia as the Heart of Digital ASEAN in the Southeast Asian economic region," the statement read.

Senior Minister and International Trade and Industry Minister Datuk Seri Mohamed Azmin Ali called the establishment of the DIO timely and in line with the evolution of the investment landscape in the region towards digitalisation and Industry 4.0 — as it will create a unique value proposition for upcoming digital investments.

"We are optimistic that with this structured governance of investment promotion and facilitation, Malaysia's digital ecosystem will be further strengthened and primed for the future, ensuring that the country remains competitive on the path of post-COVID recovery," he added.

Meanwhile, MIDA chief executive officer (CEO) Arham Abdul Rahman said the DIO builds upon Malaysia's aspirations to position itself as a digital hub in the region.

"In the long run, this will enhance Malaysia's competitive advantage, offering undeniable pull factors for investors, both foreign and local alike," he said.

MDEC CEO Surina Shukri, on the other hand, said the DIO is a significant milestone for investment facilitation, which combines MIDA's global infrastructure with MDEC's expertise in the digital economy ecosystem to draw high-quality digital investments to benefit local businesses and people, in line with MDEC's agenda of Malaysia 5.0.



# Globetronics Embarks on RM50 Million Industry 4.0 Transformation Programme for Business Sustainability

Globetronics Techology Bhd., a leading miniaturised optical sensors manufacturer in Malaysia, announced the establishment of a cloud-based state-of-the-art platform through the adoption of Industry 4.0 processes in their high volume mass production operations. The expansion worth RM50.2 million will incorporate Artificial Intelligence (AI), big data analytics and Extended Reality (AR + VR) into their end-to-end intelligent supply chain and manufacturing which enables higher levels of customisation, reduction of cycle times and superior quality traceability for a diversified product portfolio and dynamic customer needs.

The move towards integrating intelligence into the company's machines and business processes is timely in addressing the non-skilled labour acquisition challenges as well as increasing the resilience in response to the COVID-19 pandemic. The implementation of automation to its processes will also help Globetronics to focus on high revenue generation activities such as predictive and prescriptive data to maximise machine operations. The initiative maps the path for the Company's "Lights off" factory within the next five (5) years.

Mr. Arham Abdul Rahman, Chief Executive Officer of MIDA, expressed that "In line with the Government's aspiration to spearhead rapid digital transformation in the manufacturing sector, Globetronics' expansion will pave the way for enhancement in productivity, job creation and deepening the Malaysians skill set by leveraging on cutting-edge technology and emerging AI capabilities."



"The introduction of Industry4WRD policy, served as a strategic direction for Malaysia to fully embrace Industry 4.0, including smart manufacturing and smart cities, smart grids, as well as smart solutions. While digitalisation is the antidote for business survival and growth in innovation-led value creation, Globetronics' Industry 4.0 adoption will complement the electrical and electronics industry by producing advanced semiconductor photonic products through the utilisation of autonomous robots and smart manufacturing", he added.

Globetronics' IR4.0 transformation focuses on workforce transformation, reimagining manufacturing and workforce training via Extended Reality (ER). The Company's ER technology will bridge the gap between the digital and physical world by superimposing live-streamed images with its extensive database of machines learnt data from research and development (R&D) as well as manufacturing phases. Subsequently

a digital guru may be utilised to ensure a seamless work action and reduced human errors in day-to-day operations. The closed-loop integration of product, process and quality data via AI will serve as an inadvertent error prevention guarantee of its quality excellence. This will be the enabling technology to directly uplift lesser skilled workers and proportionally bring up the minimum wage.

The new characterising of Globetronics' manufacturing processes will be the testbed to proliferate and intensify the use of big data across its end-to-end supply chain and manufacturing system. The workforce transformation will position the company to be the front runner in Malaysia in establishing a data-driven culture and hub to attract data science talents, locally and globally. Besides, the expansion would also demonstrate Globetronics' commitment to continually invest in emerging technologies that are critical to support the constantly evolving landscape to ensure its business sustainability.

Globetronics' new platform is set to gear up for exciting next generation semiconductor wafer-level packaging technology including the 2.5D, where the stacking of dies will be replaced by flipchip on a silicon interposer.



## IBM, Samsung, M1 Unveil 5G Industry 4.0 Studio

- Studio simulates operational use cases to help business harness digital tech
- Has seven areas of focus, from visual recognition to 5G end-to-end solutions

IBM, Samsung Electronics and M1 have opened the IBM Industry 4.0 Studio, an initiative which the company said will combine advanced 5G connectivity with artificial intelligence (AI), hybrid cloud and edge computing capabilities to develop and test innovative Industry 4.0 solutions for enterprises in Singapore and across the region.

The studio simulates operational use cases that demonstrate how businesses can harness the power of hybrid cloud and AI technologies, and advanced 5G capabilities to transform critical operations and drive new value, the companies said in a statement.

This include improving quality and productivity in production lines to empowering service and quality control personnel.





The studio will develop, test and benchmark real-world Industry 4.0 use cases involving autonomous guided vehicles, collaborative robots, 3-D augmented reality, and real-time AI visual and acoustic recognition and classification.

IBM has worked with Samsung and M1 to deliver solutions that take advantage of the ultra-low latency, high reliability, and security of 5G connectivity.

It combines Samsung's state-of-the-art standalone (SA) 5G network solutions and mobile devices with IBM's hybrid cloud, edge computing, and AI technologies.

Network operator M1 meanwhile contributes to the engineering and network services expertise in the design and integration of 5G SA solutions and formulation of 5G test cases to meet regulatory requirements.

Built on Red Hat's OpenShift, the Industry 4.0 use cases employ IBM's AI solutions for visual and acoustic analysis and augmented reality technologies, they said

Supported by Singapore's Infocomm Media Development Authority (IMDA) as part of Singapore's 5G journey, the studio hosted the country's first 5G Industry 4.0 trial.

The trial tested real-world applications that can be applied in the manufacturing sector, while measuring and optimising the performance of enterprise 5G for industrial use.

The launch is the next step in Samsung and IBM's global strategic partnership to advance 5G and edge industry innovation through enterprise networks and cross collaboration with global mobile operators, the companies said.



"5G presents an enormous opportunity for enterprises to drive new value and transform their operations to harness the next era of industrial connectivity," said Brenda Harvey, general manager for IBM Asia Pacific.

"This project builds on IBM's longstanding strategic partnership with Samsung and a shared vision with M1 and IMDA aimed at helping businesses tap into emerging hybrid cloud and AI technologies that will define their future success.

"It is crucial these businesses have an opportunity to test and evaluate these technological investments, and we are committed to working shoulder-to-shoulder with them to ensure they make the best decisions that will truly propel their businesses forward."

## Some areas of focus

There are seven focus areas being explored via the studio that could deliver transformative value for customers by applying ultra-low latency, high-bandwidth, and stable and secure 5G connectivity to Industry 4.0 applications. Some of the application include:

- Visual Recognition solutions using IBM Maximo Visual Inspection. With 5G, this enables real-time, streaming video analytics to power use cases such as faster identification of defects on the manufacturing line or rapid sorting of parts in a warehouse environment.
- Acoustic Insights. Applies AI to analyse audio captured by phones and tablets to uncover potential defects in server fans, for example. Combined with 5G, this enables audio streaming and more rapid analysis to enable continuous monitoring in real time.
  - Augmented reality (AR) solution. A collaboration between IBM Singapore and IBM Haifa Research Lab. Users can point the camera of their mobile device at equipment and view step-by-step instructions that are superimposed on the image on their screen to walk them through a procedure such as setup, testing, or repair. 5G enables rapid, dynamic access to multiple procedure models, so a technician could browse quickly from step to step without long delays to download new models. If the technician encounters a problem not covered in the procedure model, 5G enables a remote expert to provide real-time, live, peer-to-peer assistance using on-screen AR guidance.
- Complex use cases for automated guided vehicles and collaborative robots. Enabled by the low latency of 5G, a robot arm uses a phone to visually scan an item, which is then sent to the server, analysed and the result returned. The robot arm then takes action to sort or reject the item based on the visual inspection result. The low latency of 5G enables this process to take place in near-real-time, allowing the robot arm to immediately sort or reject parts.
- 5G end-to-end solutions and vertical use cases for private networks. Delivering private networks that combine Samsung's latest 5G end-to-end solutions, including the radio access networks and the core networks, with IBM's open hybrid cloud technologies.

"5G is a potential game changer for Industry 4.0. It is the critical connectivity layer that can enable smart manufacturing," said Lew Chuen Hong, chief executive, IMDA.

"It is important for Singapore to be the place where innovative 5G solutions can be developed and deployed globally. A strong 5G ecosystem will provide more opportunities for businesses and our people."



## MTDC, SG Akademi Ink MoU to Develop Drone Tech, Talent



- Co9P drone and IoT Centre to provide drone-related training, solutions
- Launch of Malaysia's first FPV Certified programs

The Malaysian Technology Development Corporation (MTDC) and SG Akademi Sdn Bhd (a TVET college) has signed a memorandum of understanding (MoU) with the goal of strengthening talent development in the drone industry via MTDC's Centre of 9 Pillars (Co9P<sup>xx</sup>).

With this, MTDC and SG Akademi will collaborate in the areas of capacity-building, training, technology development and Industry 4.0-related technological services specifically in the area of drone technology and Internet of Things (IoT), MTDC said in a statement

Born from this would be the Co9P Drone and IoT Centre, which will provide drone-related trainings and solutions for the country.

According to MTDC, local drone-related industries has seen growing demand for skilled talents that are not just trained to operate the drones, but are also proficient in all aspects of drone technology including hardware maintenance and drone-support software application.

MTDC added that the establishment of the centre, coupled with the technical expertise from SG Akademi, will enable MTDC to further assist Malaysian businesses in identifying local talents for their customised drone needs and also in the creation and development of "drone technopreneurs."

The centre will focus on providing training and certification programs as well as production of drones for the local industries, it said.

MTDC's Centre of 9 Pillars is a dedicated centre for industry 4.0, which houses Industry 4.0 partners and relevant ecosystem companies. It facilitates networking with other business professionals, researchers, academicians, and industry experts to collaboratively develop local Industry 4.0 technologies, services and solutions.

There are now more than 20 locally developed Industry 4.0 technology solutions readily available at the Co9P that industries can tap into, MTDC claimed.

## The FPV view

The MoU signing ceremony also witnessed the launching of what is touted as Malaysia's premier First Person View (FPV) certified programs, as well as the presentation of certificates to the participants from Institut Kemahiran Baitulmal who had earlier attended the drone training.

FPV.drone.edu.my is a platform providing drone piloting training utilising FPV tech, which allows pilots to navigate the drone in a first-person perspective, MTDC explained.

Besides that, the SGA presented a sponsorship worth US\$24,273 (RM100,000) for "Assured Certified Drone Maintenance and Repair Proficient training programs, in which RM50,000 has already been given to 10 Institut Kemahiran Baitulmal students (worth RM5,000) each in October 2020.



Ten more students will also receive the balance of the sponsorship where they will be given the opportunity to undergo a 14-day drone training course at Co9P Drone & IoT Centre.

"This partnership will see MTDC and SGA identifying more participants for trainings, workshops and seminars within the country's SMEs, students, government officials, universities/research institutions as well as individuals interested to be trained in drones and IoT," said Norhalim Yunus, chief executive officer of MTDC.

"This also underlines MTDC's commitment as the strategic enabler for Industry 4.0 and to nurture local talents in the field."

12 Automate Jun-Aug 2021 Source: www.digitalnewsasia.com

## **Festo Drives Digital Transformation of Indonesian Industry**

he Indonesian economy with 271 million inhabitants is on a growth path. Festo Indonesia has been recording double-digit growth rates for years. Also, the Didactic division with qualification solutions 4.0 developed particularly rapidly in recent years.

"The government and domestic companies have realised that they can only catch up with the global market if they have a highly qualified workforce," explained Hartono Indra, managing director of Festo Indonesia. Eighty percent of the companies in the country are manufacturing end customers. Only if employees in manufacturing can use new technologies correctly can the industrial transformation in the country succeed.

More and more products are destined for export. The emerging island nation can only manage its growth and the increasing requirements on the quality of products with a rising level of automation. Festo is in demand as a global and local partner in automation.

"We are the only company in automtion that can develop and implement both the appropriate customer applications necessary accompanying qualification concepts for the employees," clarified Hartono Indra.

Customers trust Festo's industry The food and expertise. industry relies on safe processes and high quality standards in food processing. The automotive industry needs higher productivity and automation to remain competitive. In addition, on the road to e-mobility, it needs partners, such as Festo, who already have experience in this field and can deliver customised solutions.



The electronics sector in the country needs to move away from low-tech assembly by hand to fully automated production of high-quality high-tech components. The pharmaceutical industry also has very high requirements in drug production, such as process safety and stability, clean room conditions and seamless quality monitoring.

Another focus of the Indonesian industry is the textile industry. Indonesia is developing into a sought-after manufacturer of functional clothing. The production of high-tech materials made of synthetic fibres requires the highest level of automation competence.

## Education is key to the Sustainable **Transformation 4.0**

Festo has been involved in the local "Mechatronic Skills Competitions" since 1999, making an important contribution to the qualification of skilled workers.

Today, Festo Didactic is a strong partner in the government programme "Making Indonesia 4.0." Together with the Ministry of Industry, Festo has developed implemented qualification a programme to become an "Industry 4.0 Transformation Expert", which 160 people from a wide range of industries have already successfully completed. In a second round, a further 400 people are to take part this year. Together with the Ministry of Industry, a Cyber Physical Laboratory has also been set up at the Industrial Training Center in Denpasar for the education and training of Indonesian professionals.

qualification of teachers polytechnic colleges and vocational schools plays a key role in preparing trainees and students for Industry 4.0. Festo Didactic, together with the Ministry of Industry, is running a newly developed training programme for teachers to become "Industry 4.0 Transformation Managers", which more and more teachers are undergoing.

## Industry 4.0 to Position Indonesia among Top 10 Economies: Minister



President Joko Widodo (right) in the company of Industry Minister Agus Gumiwang Kartasasmita (left) delivered his speech at the virtual opening of Hannover Messe 2021 Digital Edition on Monday (April 12, 2021). ANTARA/Presidential Secretariat/sh

he government is optimistic of the implementation of Industry 4.0 building Indonesia to rank among the 10 largest economies in 2030, as outlined in the Making Indonesia 4.0 roadmap.

"As conveyed by President Joko Widodo at the opening of the Hannover Messe 2021 Digital Edition, the development of Industry 4.0 would place Indonesia among the top 10 global economies in 2030," Industry Minister Agus Gumiwang Kartasasmita noted in a statement here on Tuesday.

Kartasasmita believes that the Making Indonesia 4.0 roadmap is a strategic initiative and national agenda aimed at revitalizing the manufacturing sector through the application of the industry 4.0 technology.

The move is expected to boost efficiency and quality of industrial production to bolster its competitiveness in the global market. "It means that digital transformation is crucial, especially so that it can support and ease public activities amid the pandemic, including in the industry sector," Kartasasmita noted.

It will additionally spur the industry's performance to accelerate national economic recovery and boost the people's welfare.

"In accordance with the president's guidelines, with the implementation of Industry 4.0, we will materialize the vision of Golden Indonesia in 2045 or a century after Indonesia's independence," he affirmed, adding that the industry contributes the most to the national gross domestic product (GDP).

In 2025, the sector is targeted to contribute US\$133 billion to the GDP. With a population of 185 million that has internet access, the fourth-largest in the world, Indonesia is the fastest player in digital economy and industry 4.0 in Southeast Asia.

"Moreover, Indonesia has until now 2,193 start-ups, the fifth-largest in the world. Among those start-ups, five are unicorn start-ups and one is a decacorn start-up. This is part of our strength toward industry 4.0 that is based on research and innovation," he noted.

The minister believes that the Hannover Messe 2021 Digital Edition would encourage the transfer of technology through Indonesia's participation to promote its national industry and connectivity to the global supply chain.

President Joko Widodo (Jokowi) and German Chancellor Angela Merkel jointly opened the Hannover Messe 2021 Digital Edition virtually on April 12.



The world's largest industrial technology expo is being held on April 12-16, with Indonesia as the official partner country.

Automate Jun-Aug 2021 Source: en.antarnews.com

## What is a Connectivity Management Platform?

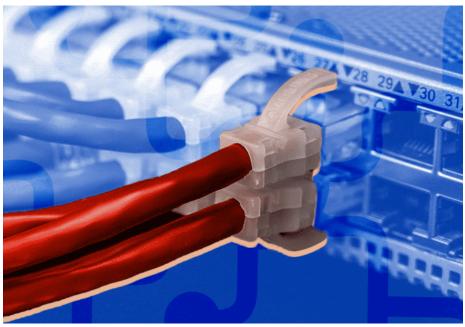


Illustration: © IoT For All

ith the number of devices in IoT deployments ranging from thousands to hundreds of thousands (or more), having the right tools to ensure optimum connectivity and manage devices and deployments is crucial to success.

The best IoT-managed connectivity cellular solutions offer access to multiple mobile networks to provide widespread and resilient connectivity.

At the heart of these solutions is a connectivity management platform (CMP) that provides a few key features. First, it needs sophisticated and intelligent functionality to connect devices to the network that best meets their individual requirements and keeps them connected no matter what. Second, a CMP must have powerful tools to manage and monitor devices, both at an individual and aggregated level, enabling deployments to be managed effectively.

In this article, we outline the key functions and benefits that a good Connectivity Management Platform provides.

**Key Functions of a Connectivity Management Ptlatform** 

## Connectivity

A CMP must manage network profiles for each device, including downloading new profiles to adapt to changing circumstances (such as when a device moves locations or to avoid roaming restrictions). It should dynamically steer devices or switch to different networks to achieve optimum connectivity and uptime within the legal, commercial, and service constraints that apply. CMPs manage interconnects to Mobile Network Operators (MNOs), notifying them of the services that need to be activated when a device is provisioned on their network.

Often, they provide an SMS messaging service for sending messages to and from devices, both for customer application messages and encrypted over-the-air instructions to improve performance (using block/allow lists to prevent unauthorized messages from reaching devices). Authenticate devices to ensure that only legitimate devices can connect. Finally, look for the ability to allocate IP (Internet Protocol) addresses to devices. And use GSMA compliant systems for all network functions.

## Monitoring

Any good CMP can record comprehensive device connection and data flow metrics to monitor performance and investigate connectivity, operational, or device issues. They can also trigger pre-configured alerts on threshold breaches or when unexpected behaviour is detected.

Providing metrics at an individual device level or aggregated and feeding global traffic flows, device performance across different network operators and throughput metrics to the connectivity engine to determine when to steer or switch networks should be key abilities.

Finally, they should provide detailed device data such as network connections, last location, events (such as when an SMS was sent or received), data sessions, and usage for highlighting trends, for example, if a device is constantly switching networks or experiences issues (such as periods of unexpectedly high – or low – data transfer).

## **Survey Drones: Rethinking the Construction Industry**



The construction industry is on the verge of a technological transformation. While the industry is often slow to adopt new tech, IoT devices and other cuttingedge technologies gain traction among construction firms. Survey drones are at the forefront of this tech adoption trend.

When thinking about tech-forward industries, construction is likely not the first sector to come to mind. There's a reason for that, too, as the industry has remained comparatively low-tech for much of its history. This trend is starting to reverse as new technologies offer more substantial benefits, and the sector's need for disruption becomes more evident.

Construction is notoriously slow and expensive. According to an oft-cited McKinsey study, large projects typically go 80% over budget and take 20% longer to complete than scheduled. Technology like survey drones can change that.

## **Survey Drones in Pre-**Construction

Today, we're finding that drones are finding their way into the construction industry in many different ways. Survey drones offer improvements in every phase of construction projects, starting with planning and design. Before a firm can start building anything, they need to survey the potential worksite.

Traditionally, workers would have to walk through the site and take measurements and recordings manually, but this is inefficient.

Drones provide a much faster option for surveying worksites. Today's drones can stay airborne for as long as 90 minutes and cover far more ground in that time than a pedestrian could in hours. As they fly over the property in question, they can collect various data types for construction teams to use.

Most drones you've come across likely capture photos or video, but they can do more. More advanced cameras and sensors can take geospatial measurements and temperature readings and create 3D digital models. These provide construction crews with an in-depth, accurate understanding of the worksite, informing any necessary design or workflow changes.

Architects can use survey drones before even designing a building. The multiple angles and range of data that drones provide can help them create the safest and most accessible design. Alternatively, this information could reveal that a potential site isn't fit for a given project so that teams can look for a new location.



## **Survey Drones in the Construction Phasew**

These technologies continue to provide value to construction companies once they start work on the project. Construction sites can be dangerous, and the industry has one of the highest worker injury rates of any profession. Drones can help prevent these accidents.

Workers can use drones to inspect parts of the work site for hazards before potentially putting themselves in danger. The near-limitless range of motion these aerial technologies have lets employees see things from every angle, spotting things they could miss in person.

By checking for hazards from a safe distance, construction crews prevent accidents, which can be costly and cause delays.

Survey drones can also help a project's various stakeholders monitor its progress. Site managers can compare drone footage to plans and blueprints to ensure there are no errors. Since rework can account for 30% of all construction work, preventing mistakes can save a considerable amount of time.

Construction projects involve many stakeholders who may have to validate work before moving to the next step. Drones are a fast, accurate way of providing them with worksite updates so they can do so with little delay. Overall project completion times will shrink as a result.

Clients typically want regular updates about their projects, including pictures. Traditionally, construction companies

would have to hire a helicopter to take aerial photos or video, which can be expensive. Drones let teams provide the same updates at a much lower cost.

## **Survey Drones in Post-Construction Phases**

When construction teams finish with the building phase, drones continue to help project stakeholders. Once construction wraps up, responsibility for the property passes on to the owner or manager. This transition requires a lot of documentation and double-checking, which drones can help make smoother.

Detailed images and videos from drones during the construction phase can show property owners that the project unfolded as it was supposed to. Videos and photos provide a more concrete truth source than written claims, giving the owner more satisfaction. This trust will help speed the transition, too, letting clients take over their properties sooner.

Once in control of the property, owners and managers can use drones for ongoing maintenance. It can be challenging to inspect some parts of a building, and some, like those in high places, may be dangerous to check in person. Drones give easy, safe access to any building point, letting property owners get a complete picture of maintenance needs.

If owners decide they want to add to their buildings, they can use drones to survey the area first. The data from these surveys can reveal if they can expand and how best to do so. Using drones for these inspections instead of doing it manually will save lots of time and money.

## **Drones and Remote Monitoring**

Another user case to keep in mind when considering where drone use may fit in the construction industry's future may lie in IoT-enabled remote monitoring. Remote monitoring offers organizations the ability to gain realtime data from critical business processes through inexpensive IoT devices. Remote monitoring can provide real-time insight and analytics drawn from critical machine or tool processes that support the underlying business. In leveraging remote monitoring, organizations can gain key insight that might indicate a tool is exhibiting stress, performing improperly, or performing its required task.

This concept of remote monitoring paired with drone use seems to be symbiotic in a sense. By coupling remote monitoring of IoT devices paired with drone surveying, one could build a system where IoT-connected devices provide key real-time data related to business processes, and drone surveying can support that data gathering through supplementing that information with data gained from the drone.

## **Drone Adoption**

The advantages of survey drones in construction are hard to ignore. Companies in the sector are well aware of this, too, and adoption statistics reflect it. Despite the industry's general hesitance to embrace technological disruption, drone adoption in construction is relatively high.

A 2018 survey found that 35% of companies that use drones are in the construction and engineering industry. That's more than any other sector. As more companies implement these technologies, adoption will only increase, too.

The construction drone market was worth \$4.8 billion in 2019. Experts predict that figure to rise to \$11.9 billion by 2027. Drone use in the construction industry is soaring, far more than most other new technologies. Technological transformation is slowly taking place in the sector, and drones lead the charge.

## **Drone Use Considerations**

Despite their massive potential, survey drones come with a few considerations

construction companies. Most notably, legal regulations can limit their implementation. All drones have to be FAA-registered, and they can't fly over people other than the pilot and those under a covered structure.

FAA registration can slow down the process of introducing a drone into your operations. Not being able to fly it over people also limits where and how teams can use it on the worksite. Drone laws are still relatively new, too, so construction companies have to stay up-to-date on any changing regulations.

Most construction workers probably aren't drone experts, so it can take training to use them to their full potential. Alternatively, crews can hire freelance drone pilots, but this may raise costs, albeit not nearly as much as a helicopter.

In light of these roadblocks, construction companies should approach drone adoption slowly. Teams should use drones in just a few projects to understand how to capitalize on them before expanding their investments. As they get used to working with these technologies, they can start to buy more and use them more frequently.

## **Transforming Construction** with Survey Drones

Despite being a relatively new technology, survey drones have already made a considerable impact on construction. As technology improves and adoption increases, the benefits of these machines will multiply. This infamously behindschedule and over-budget sector will transform into something more efficient and affordable.

While the construction industry isn't famous for innovation, survey drones are starting a new era. Construction sites are becoming increasingly tech-centric, with drones being a leading example. Before long, these machines could forever change the industry.



## Could Your Robot be Spying on You?

## ~ Cybersecurity tips for manufacturers employing robotics ~

Researchers led by the National University of Singapore recently demonstrated that household robot vacuum cleaners could be hacked to act as listening devices that spy on their unsuspecting owners. But what are the risks for industrial robots? Can they be hacked? Here, John Young, APAC country director at automation parts supplier EU Automation, assesses the risks for industrial robots.

Hackers have exploited Lidar technology, the same used in the latest iPhone, to turn a household vacuum cleaner into a spying device. If that is not sinister enough, in another experimental stunt designed to demonstrate the vulnerabilities in an increasingly connected world, a friendly-looking humanoid robot was hacked to act like Chucky from the horror films *Child's Play*. A video showed the robot attacking a tomato while emitting an evil laugh.

The idea of having household robots hacked is scary because they are, quite literally, so close to home. Yet while the Chucky hacking sounds sinister, the robot in question is far too small to cause direct physical harm.

That is not the case for most industrial robots, where the consequences of hacking could be greater. These robots have been designed and manufactured with safety in mind, but if a hacker were able to override the safety protocols then these robots, unlike the household humanoid in the example above, would have the potential to cause serious harm to workers in the factories that use them.

That is not the only threat. Industrial robots could be hacked to steal trade secrets or other commercially sensitive data. A hack where the perpetrator physically takes control of the robot at least has the benefit of being identified by the victim. Another threat is the possibility of hackers making much smaller, subtler adjustments to the commands or



parameters of a robot. The change would not be visible to the naked eye but could render an entire product line defective through the insertion of microdefects.

Whether phone it is smart manufacturing, car-making or the food and beverage sector, factories around the world are already equipped with robots and other automated technologies. So how much of a threat is the possibility of these robots being hacked and what can manufacturers do about it?

## **Assessing the threat**

For industrial robots, the priority has always been making sure the robots are safe to operate around humans. Until recently, cyber safety has perhaps received less attention. Yet many of the same basic techniques that researchers have used to expose the vulnerabilities in consumer robotics have proved just as effective in an industrial setting.

Typically, hackers use scanners to survey Internet of Things (IoT) devices for weaknesses and vulnerabilities. This might be usernames and passwords unchanged from the factory defaults, or glitches in the software that can be discovered through reverse engineering. It is less the robots themselves, but the growing reliance on connectivity and IoT devices, that increases the vulnerability.

Having hacked a small humanoid to act like a devious toy doll, researchers from the cybersecurity firm IOActive pulled off similar feats with industrial robots. They were able to hack an industrial robot arm made by Universal Robotics, overriding the safety protocols of the machine.

In another prominent example, Trend Micro discovered flaws in software produced by ABB. The Rogue Automation details how researchers report encountered an Appstore created by ABB and by downloading and reverse engineering the apps, they were able to pinpoint a vulnerability. This allowed them to exfiltrate sensitive data. ABB has since fixed the issue.

Open source software is a double-edged sword. On the one hand it allows an army of well-intentioned computer boffins to spot and resolve any potential vulnerabilities or glitches. On the other hand, it means those with less benign intentions can exploit those same vulnerabilities, if they get there first.

To demonstrate this, the researchers used their scanner to search for flaws in the popular open source software Robot Operating System Industrial (Ros-I), which was adapted for ABB by Kuka. They found flaws in the software component for Kuka and ABB robots that could have allowed hackers to interfere with the movements of the robots. Users can rest assured that this vulnerability no longer exists.

## Preparing for the future

Results like these are worrying and manufacturers and regulatory authorities will need to change their approach. In future, cybersecurity will require more focus, as more and more devices are connected to the internet.

In the meantime, sensible manufacturers can continue to exploit the benefits of automation while ensuring they observe the basics of cyber health. This means downloading and installing the latest software and patches, as well as educating staff on cyber security.

In many examples of hackers taking over robots - such as the Chucky example at the beginning of this article – the hackers need access to your local network or at least the ability to tamper with it. Securing that will be key, and in some instances it is simply a case of updating the passwords and usernames from the factory default settings.

It may be the case that newer devices are more vulnerable. Robots or other automated devices that have been tried and tested are more likely to have had their security flaws discovered and resolved, such as in the example from Kuka and ABB above. The risk with these machines is that their components become obsolete, but partnering with a reliable automation parts supplier such as EU Automation will allow manufacturers to continue relying upon the tech they trust, whether that is new or obsolete equipment.

EU Automation is a global supplier of new, used and obsolete automation parts. For more manufacturing tips, visit euautomation.com

## **Collaborative Robotics Are Central to Successful Industry 4.0 Strategies**



is increasing excitement surrounding the seamless integration of robots in automation and Industry 4.0 strategies. However, we are a long way from writing human operatives out of the equation. The best automation strategies within Industry 4.0 rest on the recognition that the strengths of robots are best realized when they work alongside rather than in the absence of humans.

There are certainly roles that robots can perform more effectively than us. These include very repetitive, monotonous tasks (i.e., welding), jobs involving holding heavy workloads, or tasks in environments where it is dangerous for humans to be present. That said, robots can only do what they are told - they can't improvise. The incredible power of the human is to think and apply real-time decision making when a situation arises, and AI has some distance to go before coming close to replicating this.

Today's robots are predominantly costly, static, and capable of performing one task very effectively. I believe that costs must come down and systems must become more agile in terms of movement and re-programmability. Indeed, with these capabilities, we think that factories can better compete with imports. This does not mean the end of human operators. Humans have an extraordinary brain and can deploy this in partnership with robots. The skill sets of workers may well change, but I am pretty optimistic about the prospects of the use of humans in factory settings.

## Sensory functions

One way in which robots are becoming more closely aligned is in the future integration of sensors into industrial robots. We have five senses. Today, the robots mostly use just one: vision. The capabilities of these systems will continue to improve and I can envision machines beginning to understand gestures for example, in settings where there is a lot of noise as one example. But I expect to see robots adding the other senses. Future robots will be able to listen to voice commands and identify noises that indicate something in the manufacturing plant isn't behaving in a usual way. They may be able to use touch to confirm a particular product is smooth enough, and perhaps they could taste-test the mixtures of specific compounds. The only sense that may be more limited in robotics is smell, but some companies are working on sensors for this function, with fascinating future applications. For example, the smell of urine has been found to be a leading indicator for certain cancers as an example and it has been proven that bees can smell explosives. Imagine an agricultural setting where fruit can be selected based on their ripeness.



## **Expecting the Unexpected**

An important factor in the cooperation between humans and robots is sporadic cooperation. Developers need to put two key considerations at the centre of their thinking. First, when the robot is needed, it must be immediately responsive to the human. Second, these systems are being deployed in settings that are far from ideal and often unpredictable. The designer needs to contemplate nonideal circumstances and ensure that the system keeps humans safe at all times.

One experiment I saw in factories might explain my thinking. A company was exploring drones to perform inventory checking in large warehouses. This sounds like something that can be completed quickly, accurately and safely, until the deployer saw the bar codes being ripped and placed in a non-uniform way on shelves. There was also a huge amount of dust lying around which was getting pushed around by the drones. The lighting in the warehouse varied widely between the start of the day and the evening hours and the drone had to navigate ladders, forklift trucks, boxes, etc. in the aisles. All warehouses are different, which challenged the business model for the drone providers, in addition to a range of technology challenges (recharging, etc.). If the robot sees something that it doesn't recognize, the system must default to a safe state, where human intervention can restart the service



At present, robots still have to be monitored by humans, but I think artificial intelligence is going to help. We will see the robot's capabilities improve as it learns more about the factory setting it is being deployed in and the scenarios it encounters. Many people are excited by the prospects of AI, as am I. However, I am urging conservatism and the delaying of rollouts due to the need to think through all possible scenarios, instead of rushing to be first.

For instance, if collaborative robots are not connected to the outside world and only use local computing resources, this increases security on the one hand, but makes the Al's self-learning processes more difficult. I think the right balance will be the combination of local learning combined with using the power of scale achieved from the aggregated learnings accumulated in the cloud. I will sacrifice that extra learning if the connectivity cannot be guaranteed as safe.

## **Under attack**

Efficiency and accuracy are arguably the greatest strengths of AI and robotics, but critical thinking and creativity are still lacking. In a factory, there are all sorts of corner cases that aren't yet fully understood yet. We've seen this situation in the automotive industry, where regular cars have been tested with hundreds of miles of testing, and some of the new autonomous functionality is in the millions of miles driven. It is improving, but problems are still found. In a factory environment, a line-down situation is a significant hit on business effectiveness, and more importantly, an injury to a human is a significant problem. It will take a while before those autonomous systems are fully trusted.

To help with this, we must be prepared for failures in hardware and false conclusions in software. There must be safeguards in place to ensure that neither a malicious attack nor life-threatening misbehaviour becomes possible. The



system architecture is such that everything is locked down. "Lock all the doors, not just the front one," Microsoft announced during its Azure Sphere initiative a few years ago, an analogy that has stuck with me.

When we leave our homes, we lock the front door. In the world of IoT, we need to lock every door—inside the house and those that connect outside. From a network perspective, if there's a breach, the entrant only gains access to a subset of the valuable assets. Software and hardware have to partition systems to isolate functions, and for this to happen, they have to realize immediately when they have been compromised and send a real-time alert.

It's one way AI can play a role in industrial IoT applications: identifying out-of-the-norm behaviour for that system, and alerting a user to then decide the correct course of action. Options would include disconnecting the system from the network, blocking a specific IP address, and disabling certain system functions. Quite simply, developers must plan on being hacked. There are no 100 percent foolproof systems. IoT systems need to continue to raise the bar over time in terms of the level of immunity from attack, but equally, the system must quickly recover to a known, safe state if it becomes compromised.

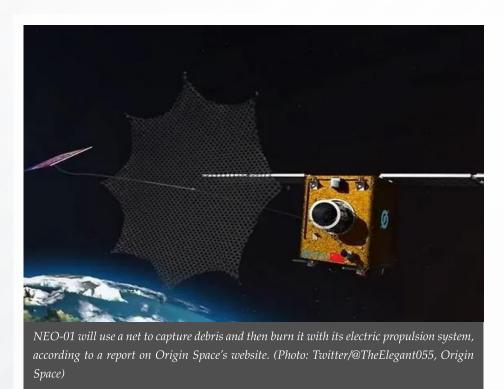
## Conclusion

The automotive industry has so far been considered a pioneer for smart factory solutions. I think there are a wide variety of opportunities for autonomous mobile robots. As mentioned previously, the scale of automotive plants is such that it can justify complex machines that perform one task both efficiently and effectively. Car manufacturing economics (and indeed certain consumer areas like smartphone assembly lines) make the costs justifiable. However, I see robots being able to improve the effectiveness of a wide set of applications when the cost, mobility, power, and reliability issues can be addressed.

New markets such as the food and beverage industry have also discovered the robot in the manufacturing sector. Some argue it has the power to render the traditional production line obsolete. Though robots can replace repetitive tasks in the food and beverage industry, I believe that for maximum effectiveness, the production line must be adjusted to harness the skills of robots and humans. I do not believe this is something where we will see a major change in the next couple of years on the factory floor. The pandemic is such that many companies are thinking about adding technology to adjust process flows in their existing facilities, whereas the more significant opportunity for robots will be for brand new facilities.



## **China Launches Robot Prototype Capable Of Catching Space Debris with Net**



Chinese space mining start-up launched into low Earth orbit on April 27 a robot prototype that can scoop up debris left behind by other spacecraft with a big net.

The NEO-01, which will also peer into deep space to observe small celestial bodies, was launched on the government's Long March 6 rocket along with a handful of satellites, state-run Xinhua news agency reported.

The 30kg robot developed by Shenzhenbased Origin Space will pave the way for future technologies capable of mining on asteroids, according to the company.

Since the establishment of the world's first asteroid mining company Planetary Resources in 2009, more than a dozen firms across the world have entered the fledgling sector, including 3D Systems of the United States and Japan's Astroscale.

Unlike Astroscale's technology, which uses magnets to gather up space junk, NEO-01 will use a net to capture debris and then burn it with its electric propulsion system, according to a report on the company's website.

Thousands of satellites have been launched globally. As they outlive their use, many end up as junk, posing danger to other operating satellites.

Origin Space plans to launch dozens of space telescopes and more spacecraft to achieve the first commercial mining of asteroids by 2045, said the company's founder Su Meng in an interview with domestic media on April 6.

Xinhua reported on Saturday that China was stepping up efforts to land a probe on a near-Earth asteroid to collect samples, and also expediting a plan to build a defence system against near-Earth asteroids.

Beijing has grand space ambitions, aiming to catch up with Russia and the US and transform China into a major space power by 2030.



The NEO-01 developed by Shenzhen-based Origin Space will pave the way for future technologies capable of mining on asteroids, according to the company. (Image: Origin Space)



## **This Ceramic Ink Can 3D-Print Bones Directly Into a Patient's Body**



A newly discovered 3D-printing method could be revolutionary for bone cancer treatment.

- How can patients recover from surgery that removes parts of their bones?
- Up to now the answer has been to build a ceramic replica in a laboratory.
- But now scientists have invented a way to 3D-print bone tissue inside the body.
- Ceramic material that mimics bone structure is mixed with living cells.
- Its inventors say it will reduce suffering and speed up recovery.

A new 3D printing process which can be used inside the human body is offering hope to trauma and cancer patients who need bone replacements, reducing pain and speeding up recovery time.

The treatment of bone cancers can lead to sections of bone being removed and accident victims may require extensive bone repairs. Up to now, 3D bone printing has involved producing material outside the patient's body.

But now a new technique developed at the University of New South Wales in Sydney, Australia, offers the prospect of doctors being able to create new bone tissue exactly where it is needed during a surgical operation.

## Have you read?

- 'Bio-ink' could form a scaffold for growing human tissue
- A startup in Italy used 3D printing to make valves for COVID-19 patients
- Why we need a 'great new contract in health and healthcare'

By blending a ceramic material that mimics bone structure with the patient's own cells in a 3D printing "ink", scientists have potentially found a way to create new bone material inside the body, replacing removed sections of bone and encouraging existing bones to knit with the new artificial bone.

## Faster recovery and less pain

"It's really the first example of integrating ceramic materials that emulate many aspects of native bone with live cells," said Associate Professor Kristopher Kilian, a member of the team that developed the new technology.



3D printing new bone tissue with living cells will speed patients' recovery.

"This really opens up the opportunity where you may be able to actually directly print a patient's bone within a cavity," he added.

"During surgery, if they have some bone resected for disease, or if they have a tumor taken out, then we can actually take scans of that bone and put that on to the printer and then directly print within a cavity of a patient."

The technique uses a light, portable 3D printer which can be taken into the operating room. Previous methods relied on laboratory-based printers which were unable to operate at room temperature and needed toxic chemicals to sterilize the new bone material.

"That's going to speed things up with respect to surgery time and it's going to enable a lot of reduction in current suffering and also, perhaps, hopefully save lots of lives," said Professor Kilian.

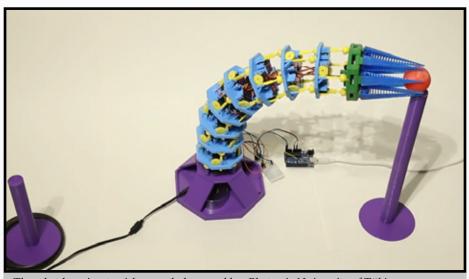
### **Precision medicine**

The World Economic Forum's 2020 report on emerging technologies highlighted the potential of using scans, like those used to create the 3D printer replacement bone tissue, to conduct virtual clinical trials of new treatments and clinical procedures without harming patients.

Forum's Precision Medicine Programmed aims to realize the benefits of precision medicine for society, including the half of the world's population that currently has no access to precision medicine techniques.

Working with leaders in the field, the programmer includes a project - Leapfrogging with Precision Medicine which is designed to help nations which currently don't have access to these techniques to introduce precision medicine into their healthcare systems.

## **Scientists Develop Low-Cost** 'Elephant Trunk' Robot Using 3D **Printing Technology**



The robot learning to pick up and place marbles. Photo via University of Tübingen.

A team of researchers from the University Industry 5.0: Elephant trunks of Tübingen and the Graz University of Technology have 3D printed a robotic arm capable of mimicking the movements of an elephant's trunk.

Equipped with a gripper on the tip, the FDM-printed robot uses machine learning to roam around and adapt to new tasks, such as picking up marbles and placing them on podiums. Developed as a low-cost proof-of-concept, the design could eventually go on to be used on an industrial production line where it would be capable of performing a wider variety of flexible operations, such as transporting automotive parts or assembling electronic devices.

Dr Sebastian Otte, a co-author of the study, told New Scientist, "Our dream is that we can do this in a continuous learning set-up where the robot starts without any knowledge and then tries to reach goals, and while it does this it generates its own learning examples."

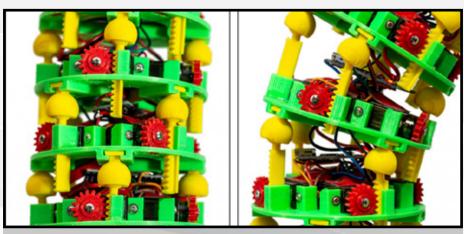
Elephant trunks are one of evolution's finest works. They are equal parts flexible and strong, and provide elephants with a level of dexterity you don't often see in the animal kingdom. As a result, they are a source of inspiration for many modern bionics projects in academia, with pneumatic actuators often acting as artificial muscle fibers to achieve bending and extension.

Otte and his colleagues opted for a modular design, which is based on a set of uniform, stackable joint modules with three degrees of freedom (DoF) each. The current design features up to ten of these modules, but the length of the robot can reportedly be doubled with the use of more powerful motors.

Each segment in the trunk houses several motors driving gears that can tilt the module up to 40° in two axes at once. As well as bending, the robotic trunk is also capable of lengthening and shortening - just like the real thing. Unfortunately, calculating the inverse kinematics for robotic actuators to perform complex operations is no easy task, even less so with this many DoFs. This is where artificial intelligence comes in.

### Spiking neural networks for navigation

The team used what's called a spiking neural network (SNN) to control the robot, which is an artificial neural network that closely mimics natural brain processes. As well as incorporating neuronal and synaptic states, SNNs



The stackable joints of the robotic arm. Photo via University of Tübingen.

also include the concept of time in their models. By observing a set of training movements, the SNN was able to map motor movements to corresponding robot poses, enabling the team to 'unroll' the models for goal-driven navigation with near-millimeter precision.

The researchers write, "We not only showed that it is possible to construct low-cost trunk-like robotic arms with basic 3D printing equipment, but we also demonstrated how they can be controlled using the latest recurrent spiking neural network architectures."

As far as future research goes, the team has expressed the possibility of radar-based incorporating distance sensors to implement collision avoidance functionality, enabling the device to work in tandem with humans. Another route could be to translate the work into a snake-like robot rather than a stationary arm, whereby it could 'slither' around for search and rescue operations.

Source: 3dprintingindustry.com



The robot at full flexion. Photo via University of Tübingen.

Further details of the study can be found in the paper titled 'Many-Joint Robot Arm Control with Recurrent Spiking Neural Networks'. It is co-authored by Manuel Traub, Robert Legenstein, and Sebastian Otte.

Low-cost robotics is a prime example of how 3D printing can be applied to solve abstract problems. A team of researchers from Meiji University, Tokyo, recently customized an FDM 3D printer to create a low-cost 'all-in-one' manufacturing robot. The Functgraph is capable of automatically printing and attaching custom tool heads to change its active

functionality, enabling users to grab, rotate, and break 3D printed objects to assemble complex mechanical systems in a single print job.

Elsewhere, scientists at China's Tianjin University have previously 3D printed a customizable robot that's capable of scaling and monitoring pipes at industrial facilities in real-time. The single-piece device features a series of soft bending mechanisms and modular grippers, allowing it to flexibly climb oddly-shaped infrastructure.



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## Siemens and Google Cloud to Collaborate on Industrial Al

Siemens and Google Cloud are working on the development of artificial intelligence/machine learning (AI/ML) solutions for industrial processes.



The partnership will seek to integrate Siemens' Digital Industries Factory Automation portfolio with Google Cloud's capabilities, allowing manufacturers to run cloud-based AI/ML models on top of factory data and deploy algorithms at the network edge on the factory floor. According to the two companies, the joint offering has the potential to improve manufacturing processes such as visual inspection and predictive maintenance.

"The potential for artificial intelligence to radically transform the plant floor is far from being exhausted," said Siemens Digital Industries' Axel Lorenz, VP of Control at Factory Automation.

"Many manufacturers are still stuck in AI 'pilot projects' today – we want to change that. Combining AI/ML technology from Google Cloud with Siemens' solutions for Industrial Edge and industrial operation will be a game changer for the manufacturing industry."

Industry 4.0 and Industrial IoT are well-worn tropes across the manufacturing sector but Siemens and Google Cloud claim their combined industrial and technology expertise can bring about holistic AI solutions that are not confined to a siloed part of the factory floor, bringing tangible benefits that go beyond the pilot projects and test cases that have become somewhat synonymous with AI in manufacturing.





"Siemens is a leader in advancing industrial automation and software, and Google Cloud is a leader in data analytics and AI/ML," said Dominik Wee, managing director Manufacturing and Industrial at Google Cloud.

"This cooperation will combine the best of both worlds and bring AI/ML to the manufacturing industry at scale. By simplifying the deployment of AI in industrial use cases, we're helping employees augment their critical work on the shop floor."

Automate Jun-Aug 2021

Source: www.theengineer.co.uk

## John Deere Pilots Intel's Al Tech for **More Efficient Welding**



he heavy equipment maker is using computer vision to speed up a slow and costly but critical process: spotting and correcting defects in its automated welding process.

John Deere, the heavy equipment maker that's been around since the 1830's, is working with Intel on a new way to bring AI into its manufacturing process. The ongoing pilot project is the latest way Intel is demonstrating how its IOT solutions can help usher in a more digitized industrial era.

A guide to artificial intelligence, from machine learning and general AI to neural networks.

In this case, John Deere is trying to use computer vision to speed up a slow and costly but critical process: spotting and correcting defects in its automated welding process.

"Welding is a complicated process," Andy Benko, quality director for John Deere's Construction & Forestry Division said in a statement. "This AI solution has the potential to help us produce our high-quality machines more efficiently

than before. The introduction of new technology into manufacturing is opening up new opportunities and changing the way we think about some processes that haven't changed in years."

At 52 factories around the world, John Deere uses the Gas Metal Arc Welding (GMAW) process to weld mild- to highstrength steel. The process uses robotic arc welding arms to consume millions of weld wire pounds annually. Arc welding is prone to porosity -- a defect in which cavities in the weld metal are formed by trapped gas bubbles as the weld cools. Porosity issues weaken the weld strength.

Manufacturers have previously experimented with automated systems to look for defects, but they typically produce a high rate of false positives. That means manufacturers typically have to rely on skilled technicians to manually spot problems. Finding these technicians can be hard and costly, and the job is especially challenging in large factory settings.

The pilot project, which began last year at one of John Deere's Construction and Forestry plants, suggests using computer

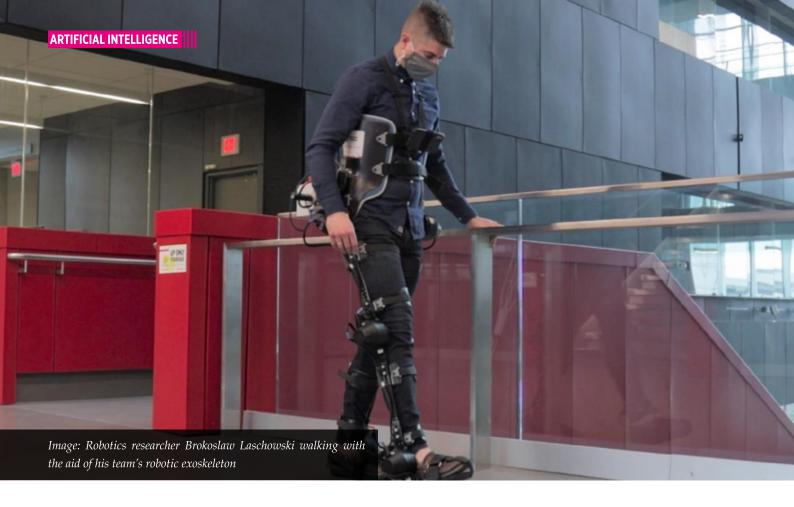
vision could make the process of spotting porosity defects more accurate and less costly. According to Intel's industrial IOT partner ADLINK, the AI-based pilot project has detected porosity defects with up to 97.14 percent accuracy. When welds have been identified as defective, the system automatically shuts down the welding robots.

The system uses a camera positioned on the welding gun to spot porosity defects in real time. Video frames from the cameras are analyzed using a neural networkbased AI action recognition model, trained on good welds as well as welds with porosity defects.

The AI defect detection system is powered by Intel Core i7 processors, Intel Movidius VPUs and the Intel Distribution of OpenVINO toolkit (free software that helps developers bring computer vision and deep learning inference to vision applications at the edge). It was implemented with the ADLINK Machine Vision Platform.

Christine Boles, VP of Intel's IoT Group and GM of the Industrial Solutions Group, explained to ZDNet that the chipmaker works closely to customers to solve specific business challenges, and from there, it can scale its learnings to other customers.

"Weld quality is not unique to John Deere - it's an industry wide challenge," Boles said. "What is unique is Deere's approach... We worked closely with Deere and our ecosystem to build an end-toend solution to solve this challenge today, while ensuring it has the longevity needed to address other quality or efficiency requirements."



## Robotic Exoskeletons Could One Day Walk by Themselves

AI and Wearable Cameras Could Help Exoskeletons Act a Bit Like Autonomous Vehicles

ngineers, using Artificial Intelligence and wearable cameras, now aim to help robotic exoskeletons walk by themselves.

Increasingly, researchers around the world are developing lower-body exoskeletons to help people walk. These are essentially walking robots users can strap to their legs to help them move.

One problem with such exoskeletons: They often depend on manual controls to switch from one mode of locomotion to another, such as from sitting to standing, or standing to walking, or walking on the ground to walking up or down stairs. Relying on joysticks or

smartphone apps every time you want to switch the way you want to move can prove awkward and mentally taxing, says Brokoslaw Laschowski, a robotics researcher at the University of Waterloo in Canada.

Scientists are working on automated ways to help exoskeletons recognize when to switch locomotion modes — for instance, using sensors attached to legs that can detect bioelectric signals sent from your brain to your muscles telling them to move. However, this approach comes with a number of challenges, such as how skin conductivity can change as a person's skin gets sweatier or dries off.

Now several research groups are experimenting with a new approach: fitting exoskeleton users with wearable cameras to provide the machines with vision data that will let them operate autonomously. Artificial Intelligence (AI) software can analyse this data to recognize stairs, doors, and other features of the surrounding environment and calculate how best to respond.

Laschowski leads the ExoNet project, the first open-source database of high-resolution wearable camera images of human locomotion scenarios. It holds more than 5.6 million images of indoor and outdoor real-world walking environments. The team used this data to train deep-learning algorithms; their convolutional neural networks can already automatically recognize different walking environments with 73 percent accuracy «despite the large variance in different surfaces and objects sensed by the wearable camera,» Laschowski notes.

According to Laschowski, a potential limitation of their work their reliance on conventional 2-D images, whereas depth cameras could also capture potentially useful distance data. He and his collaborators ultimately chose not to rely on depth cameras for a number of reasons, including the fact that the accuracy of depth measurements typically degrades in outdoor lighting and with increasing distance, he says.

In similar work, researchers in North Carolina had volunteers with cameras either mounted on their eyeglasses or strapped onto their knees walk through a variety of indoor and outdoor settings to capture the kind of image data exoskeletons might use to see the world around them. The aim? To automate motion, says Edgar Lobaton an electrical engineering researcher at North Carolina State University. He says they are focusing on how AI software might reduce uncertainty due to factors such as motion blur or overexposed images to ensure safe

operation. We want to ensure that we can really rely on the vision and AI portion before integrating it into the hardware."



In the future, Laschowski and his colleagues will focus on improving the accuracy of their environmental analysis software with low computational and memory storage requirements, which are important for on board, real-time operations on robotic exoskeletons.

Lobaton and his team also seek to account for uncertainty introduced into their visual systems by movements.

Ultimately, the ExoNet researchers want to explore how AI software can transmit commands to exoskeletons so they can perform tasks such as climbing stairs or avoiding obstacles based on a system's analysis of a user's current movements and the upcoming terrain. With autonomous cars as inspiration, they are seeking to develop autonomous exoskeletons that can handle the walking task without human input, Laschowski says.

However, Laschowski adds, "User safety is of the utmost importance, especially considering that we're working with individuals with mobility impairments," resulting perhaps from advanced age or physical disabilities. "The exoskeleton user will always have the ability to override the system should the classification algorithm or controller make a wrong decision."



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## Push the Limit of Your IoT Device's Battery Life

he prolonged period of pandemic and the need for social distancing is presenting an opportunity to extend the automated solution into a range of industries. Smart retail could be one example. New IoT applications are now focused on using sensors to monitor and control physical things. Sensors, electronics systems, and smart devices are sending data to each other, capturing, analyzing data, and sending it to the cloud for storage or further processing. On top of that, there is an increased interest in artificial intelligence processing at the edge, making a smart device even smarter. And the growing need for applications and data processing on smart devices has created a challenge for device designers: how to get more out of the battery.

Battery life is a key concern when designing portable IoT devices. Device designers need to identify the critical events that contribute to power consumption and how frequently those events happen. They also need to make

design changes or trade-offs to optimize battery life. Design engineers will always find ways to conserve energy — balancing active functions and deep sleep mode. However, there is a baseline of power consumed by a certain part of the circuitry that needs to be on at all times. One example would be a pacemaker. A certain part of the circuitry will need to be always on for continuous monitoring, therefore limiting the battery life.

Fortunately, many techniques are available to make electronic circuitry more power-efficient, helping to extend the battery life of the device.

Here are a few examples:

Energy harvesting is an example of how one can prolong battery life - or maybe even eliminate it altogether! It is a method of collecting energy from the environment and converting it to useful energy that can power electronic circuitry. For example, RF energy harvesting

ambient captures electromagnetic energy and converts it into a usable continuous voltage (DC) with an antenna and a rectifier circuit. The presence of ambient RF energy in the environment results from numerous high-frequency technologies including Wi-Fi signals, microwave ovens, and radio broadcasting. Other energy harvesting methods include thermoelectric conversion, solar energy conversion, wind energy conversion, and vibrational excitation. Today, several companies are creating energy harvesting chips that eliminate the need for battery replacements for low-power IoT devices here is an example.

Wireless connectivity standards, cellular and noncellular, have developed features and optimization techniques to help maximize IoT device battery life. Wireless standards such as LTE-M and 802.11 wireless LANs have features such as power save mode (PSM) and extended discontinuous reception (eDRX) to lower power consumption.



PSM allows the IoT device to be in a sleep or "dozing" state at a fixed time, waking up only to transmit and monitor data before going back to sleep, all the while remaining registered with the network. The device and the network negotiate and optimize the timing based on the application's requirements. Since the IoT device is inactive during PSM mode, power consumption is lower, helping prolong the battery life.

eDRX can be incorporated into IoT devices as an extended LTE feature, working independently of PSM to obtain additional power savings. eDRX greatly extends the time interval during which an IoT device is not listening to the network. While not providing the same level of power reduction as PSM, eDRX may be a good compromise between device reachability and power consumption.

Power-efficient circuitry. Device designers strive to design electronic circuitry that is power-efficient. A certain hardware design, software, or firmware changes can cause the circuitry to draw more power. Different climatic conditions can also cause power consumption to vary. Device designers often analyze how an IoT device consumes power in different scenarios by capturing and breaking power consumption down to hardware subsystems.

Take for example an air quality monitoring sensor that uses LPWAN technology. Device designers need to optimize the sensor's design to ensure that the coin cell battery lasts for at least 10 years. They need to spend a lot of time testing many different real-life scenarios and correlating the events to the current

consumption of the product, down to subsystem level — which is incredibly frustrating. On top of that, these steps must be repeated to analyze and verify the effects of each design change. This process is known as event-based power consumption analysis. Designers need to correlate the charge consumption profile to the RF or DC event of a subsystem. As described, the process to optimize device design can be difficult and timeconsuming.

The KS833A2A event-based power analysis software, powering the X8712A IoT device battery life optimization solution, is an easy-to-use visualization tool to effectively capture and display the charge consumption profile at the subsystem level as your IoT device transitions through various operating states. It then estimates the battery life of a device based on the profile, helping to identify the contribution of these subsystems to the current draw.

Most people can relate to the anxiety caused by a low mobile phone battery. IoT devices are no different, be it a smartwatch, a medical device, or a smart sensor for agriculture applications. Battery runtime is one of the most essential criteria which influences the end-users buying decision. It can give your IoT device a competitive edge or destroy your brand's reputation. Fortunately, available technology and solutions can help product makers and device designers make informed decisions to manage power efficiently and optimize their IoT device's battery life.

Janet Ooi, IoT Industry Solutions, Keysight Technologies



Keysight's X8712A IoT device battery life optimization solution consists of a DC power analyzer, 20 W or 80 W battery drain analyzer source/measure unit (SMU) modules, RF event detector, and dedicated software in one integrated solution.

# Better Data Transfer Future-proof High Speed Interfaces



To match the ever-increasing sensor resolution and speed at the front end, high-speed interfaces on the back end keep evolving with higher bandwidth and more reliability at reasonable cost. This article will walk you through high-speed interfaces of tomorrow and provide some insights on how to select for your applications.

The vision markets have always yearned or more – more data, more details, better accuracy - all made possible by more pixels. What's more, increasing inspection speeds require large amount of data to be transferred from imaging sensors to PC fast. Therefore, it is inevitable that industry innovators would rise to these challenges, and introduce high speed, high pixel solutions.

Nowadays, cameras in the market are capable of incredible speed and resolution with a variety of imaging sensor options. Camera technology keeps evolving not just at the front end with sensor design, but also on the back end with camera interfaces. Introducing new interfaces into vision system continues to push the boundaries of imaging applications with higher bandwidth and more reliable data transfer.

What's their differences? Crack this question from the following table:

What's their directs. Or dek this question it on the following table.						
		Camera Link	CXP-6	CXP-12/CXP-10	5GigE	10GigE
Bandwidth		Base: 2.04 Gbps Medium: 4.08 Gbps Full: 5.44 Gbps Deca: 6.80 Gbps	1 channel: 6.25 Gbps Up to 4 channels	1 channel: 12.5 Gbps/10 Gbps Up to 4 channels	5 Gbps	10 Gbps
Cables	Length	max. 10m	40m	<ul> <li>40m (standard cable)</li> <li>50m (fibre-optic cable)</li> </ul>	100m	60m (standard cable)      80m (high-quality cable)
	Feature	1 cable for data/power/ trigger	1 cable for data/power/ trigger	1 cable for data/power/trigger	3 separate cables for data/power/ trigger	3 separate cables for data/power/ trigger
Connector		MDR/SDR	BNC/DIN1.0/ 2.3	Micro BNC/HD-BNC	RJ45	RJ45
Cost		***	**	★☆	*	*
CPU Load		Low	Low	Low	High	High
Matching maturity		High	High	High	Low	Low

## WHAT HIGH-SPEED INTERFACES ARE AVAILABLE IN THE MARKET?

To offer matching data transfer hardware for high pixel imaging sensors, a number of interfaces have been developed over the years, including Camera Link, CoaXPress and further development utilizing the GigE Vision platform.

For the similar performance, CoaXPress 2.0 solution will be more cost-competitive than CoaXPress 1.1 one, because cameras with either interface are in the same price range, while a two-channel CoaXPress 2.0 frame grabber costs less than a four-channel CoaXPress 1.1 frame grabber for the same overall bandwidth.

Indeed, 10GigE offers relatively longer transmission distance and its integration is easy with the familiar GigE components. CoaXPress 2.0 transmission length can be extended with some tradeoffs in bandwidth. With one channel of CXP 2.0 providing 12.5 Gbps and 10 GigE operating up to 10 Gbps, CXP 2.0 starts where 10 GigE finishes. In addition, CoaXPress 2.0 integration can be very easy if product concept like the Basler boost bundle (camera plus interface card or frame grabber) is applied.

Furthermore, using 10 GigE at full speed on copper cable can generate a lot of heat as 10 GigE chipsets have a high power consumption; other system level challenges need to be considered if the full speed of the interface is required.

## **GOING FOR SPEED**

With all the advantages of CoaXPress 2.0 explained by various manufacturers, the essential advantages of CoaXPress include:

## Very high bandwidth - maximizing throughput

At up to 12.5 Gbps using a single lane and scalable over multiple coaxial cables, CoaXPress 2.0 is currently one of the fastest interfaces on the market.

## Sufficient cable lengths - bridging long distances

Customers frequently have problems with maximum cable lengths under 10 meters, as permitted by a USB3.1 gen. 1 interface or a Camera Link interface. With up to 40 m and a much higher bandwidth, CoaXPress offers a very promising alternative. It is even possible to bridge cable lengths of more than 100 meters with a trade-off in bandwidth.

## Plug-and-play - easy to connect

CoaXPress enables data transmission as well as power supply via the coaxial cable, making it easy to establish a connection between the camera and PC. The CXP standard is also coupled to the GenICam standard and corresponds to other conventional vision standards. From a software perspective, that is why this standard offers a simple connection between the PC software and camera.

## Exact synchronization – precise control

The optimal combination of frame grabber technology with the cameras used makes it possible to get highly precise camera synchronization even in multicamera systems with very low latency periods.

## Cost benefits with easier system setup and component availabilities

Newly available electronics components as well as the option of using single-cable solutions result in a greatly improved price/benefit ratio. CoaXPress 2.0 (CXP-12) is the interface with the lowest costs per transferred megabyte!

## WHEN AND HOW TO APPLY COAXPRESS 2.0 TECHNOLOGY IN APPLICATIONS?

Machine vision applications have rapidly. Today's cuttingadvanced edge vision systems must meets far more demanding requirements such as distinguishing tiny defects in flat panel

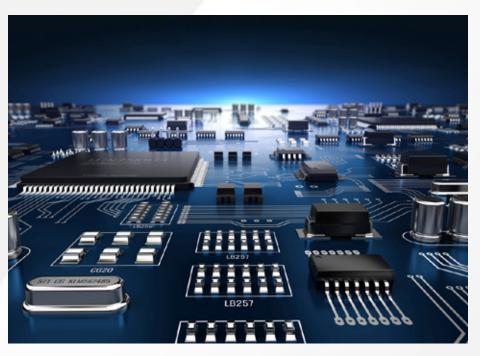
displays, wafers or solar cells, and multitasking numerous optical inspections in PCB quality assurance. These and countless other existing and emerging applications demand continual increase in camera speeds and resolution. CoaXPress 2.0 technology is able to unleash the full potential of state-of-art imaging sensors and therefore a perfect fit for demanding applications.

In the following, we are going to guide you how to utilize this new technology with application examples in factory automation and medical and life sciences:

## 3D AOI System for PCB Quality Control

Numerous optical inspections take place for PCB quality assurance, including completeness checking for various SMT and THT components, type recognition, polarity, offset, positioning, height, text and names as well as their colors. At the SPI (solder past inspection) stations, the shape of the solder joints are also checked.

A possible solution for these different requirements is a 3D AOI system with a high performance camera head supplemented by four side cameras, bar lightings and a frame grabber. The high performance head camera checks the SMT and THT components and 3D



solder joints for defects. It captures the very fast reflections of the bar lighting from which the software calculates a 3D representation. The side cameras supplements the head camera to display defects and features not visible by the head camera.

To achieve significantly better measurement results with very high image quality and a streamlined vision system design, the Basler concept of CXP-12 vision components, which are available as a bundle (camera plus interface card or frame grabber) offer a simplified choice at reduced cost.

## Medical

Although the requirements for the boost mainly come from factory automation, applications in the medical and life science sector can also benefit from its advantages. Some examples of suitable applications include but are not limited to surgical microscopy, pathological slide scanning and NGS (Next Generation Sequencing).

Surgical microscopes are increasingly equipped with a camera for live broadcast. In this application, key requirements are a high level of details, high bandwidth for smooth data transfer, optimal contrast to display both bright and dark areas in live images, and excellent color rendering for precise diagnostic results.





In pathological slide scanning it is important to keeping the duration of a scan in the user laboratories within acceptable limits. The scan period is affected mainly by the size of the sample and the camera properties field of view and bandwidth. The larger the area of a single image captured by the camera, the fewer scan positions are required to completely image a particular area and the faster is the scanning process itself.

In laboratory automation, ever-faster and more reliable methods are being used to analyze genetic material through gene sequencing. For high-resolution image acquisition at high frequency, a powerful vision system is required. A system with the CoaXPress 2.0 interface, consisting of camera, interface card or frame grabber and other components, meets the requirements for low installation effort and high quality of measurement results.

Easy to use, quickly integrated, pricesensitive and high image quality, high bandwidth, high-end components from one source: cameras, lenses, cables, interface cards, frame grabbers - with all the advantages of the CoaXPress 2.0 standard. The boost CXP-12 cameras are also available separately.

## **SUMMARY**

Large data volumes at high transmission speeds across long distances: the CoaXPress 2.0 standard for industrial image processing makes it all possible. Designed as a successor to the prevalent Camera Link standard, this Machine Vision interface also requires an additional

interface card in the PC. Considering the large amount of transferred data, however, this is not a disadvantage – the CPU of the PC isn't blocked by the data transmission but is fully available for the image processing application.

Image processing systems with the CoaXPress 2.0 standard are best suited for high-performance applications such as FPD inspection and gene sequencing. They achieve the required image quality with a high data throughput, which makes it possible to significantly boost system performance with reasonable investment.

Basler offers the necessary individual or bundled components that can be easily integrated and configured using single software platform. This results in less system complexity, which keeps overall costs down.

For more information contact us by phone (+65 6367 1355), by email at marketing.asia@bastlerweb.com or via our website at www.baslerweb.com.

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## Injection Moulding With 3D Printing: 55 Lubrication-Free igus Materials for Individual Wear-Resistant Parts

igus expands 3D printing service by injection moulding with printed tools for fast production of maintenance-free special parts

Wear-resistant parts are used wherever there is friction between two surfaces. For this reason, designers in many industrial sectors rely on 55 long-lasting, lubricationfree, high-performance polymers from igus. To help users quickly get their special solution made of a suitable material, igus has now integrated the Print2Mould process in its online 3D printing service. With a printed tool, the component is manufactured by injection moulding. To do this, the user simply uploads the STEP file of the wear-resistant part into the 3D printing service, selects the material and requests a quotation. Specifications on the material properties as well as the precision, flexural strength and the price help with the choice.

55 iglidur high-performance polymers: if customers are looking for a wearresistant plain bearing, they can choose from a large selection of igus materials. However, if wear-resistant parts are required - from gears up to special bushings - in any special shape, the user can either machine the component from a suitable iglidur bar stock or use igus' 3D printing for more complex geometries. For the individual component to be

made from the ideal iglidur material for the respective application, igus offers the Print2Mould process. An injection moulding tool is printed for the special solution and is then used in the injection moulding machine. The main advantage: the user can freely use the iglidur material range with its 55 lubrication-free, highperformance polymers. These include, the FDA-compliant materials iglidur A350 and A181 for use in the food industry, iglidur L500 for the automotive sector, and iglidur X for high-temperature applications. igus has now integrated the Print2Mould process online 3D printing service. The production of special parts by this process is characterised above all as a time-saving solution for prototype development and for small batches. This gives the customer the opportunity to obtain identical components in batches at an early stage of development.

## Wear-resistant components requested online

The way to a lubrication-free and maintenance-free special solution is very simple: call up the 3D printing service http://www.igus.sg/iglidur-designer, upload the STEP file of the component and select the appropriate material. In addition to the 55 iglidur materials used

in the Print2Mould process, the customer also has the opportunity to get their special solution printed cost-effectively in the SLS process with the wear-resistant materials iglidur I3 or iglidur I6 or even in the FDM process with iglidur filaments. The price for production, including the costs for the injection moulding tool as well as information about the material, precision and flexural strength are shown online. After selecting the appropriate high-performance polymer, the user can enter the quantity and directly request a quotation from igus. The injectionmoulded special solutions are delivered after 10 working days.



igus expands its 3D printing service with the Print2Mould process using printed injection moulding tools. The user can now order their wear-resistant special part online in the appropriate lubrication-free and maintenance-free iglidur material. (Source: igus GmbH)

## **5**20°

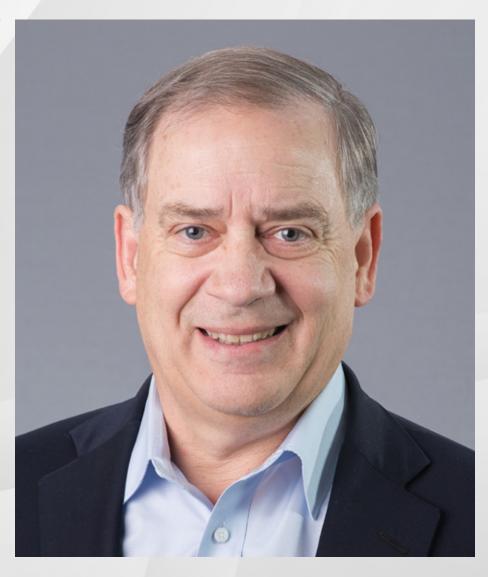
# A Depth of Insight with Internet of Things (IIoT) Advanced Analytics Software

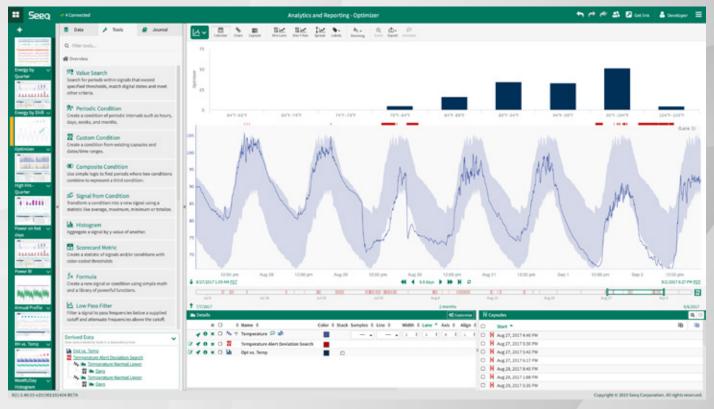
Steve Sliwa is the CEO and founder of Seeq, a customer focused, lean start-up that is changing the way industry uses industrial process data.

Prior to founding Seeq, Sliwa was CEO of Insitu, Inc. from 2002 through early 2011. During that time Insitu grew from 4 employees to 800+ employees and \$450M in revenue. Insitu is a developer of miniature robotic airplanes or UAVs (unmanned aerial vehicles) for military and civilian applications.

Prior to Insitu, Sliwa had a varied career that included serving as research manager at NASA, founder of an educational software company, VP of Product Development for a public Silicon Valley engineering-software company, and President of Embry-Riddle Aeronautical University. Many of the founding partners at Seeq were with him in previous roles.

Dr. Sliwa has engineering degrees from Princeton, George Washington, and a business degree from Stanford.





Workbench is Seeq's application for engineers engaged in diagnostic, descriptive, and predictive analytics with process manufacturing data.

1. Seeg is a leader in Industrial Internet of **Things** advanced analytics software. Could you share with Seeq's background in advanced analytics for process manufacturing data?

Seeq Corporation was founded in 2013 and develops an advanced analytics application of the same name for process manufacturing companies - oil & gas, chemicals, pharma, power generation, food & beverage, etc. - to rapidly investigate and share insights from data in historians, IIoT platforms, and cloud data services. Seeq's extensive support for time series data and its inherent challenges enables organizations to derive value from process telemetry for faster data-based decision making. The company has over 140 employees with offices in Malaysia, the US, and Europe, and has raised over \$110M in funding from Saudi Aramco, Chevron, Siemens, Cisco Investors, and other investors.

2. Could you briefly explain how Seeq has been helping companies to adopt **Industrial Internet of Things** (IIOT)?

HoT means even more data than customers already have in historians and other time-series data storage services. But most customers are DRIP: datarich, information-poor. Seeq addresses this issue of too much data and too few insights with a self-service solution that does not require users to have prior coding experience. Seeq's structured selflearning and instructor-led foundation training courses enable new Seeq users to get started with using Seeq in a matter of hours. And new users will have engagement with Seeq Analytics Engineering for consultation sessions on use case development and tool-related questions. This means to time value for using Seeq is measured in hours or days and not months or years.

3. Seeg is the first software application that enables users to get more value out of their data. How does Seeq help companies and organizations in their data analytics?

Seeg is transformative software; it enables time to insight and data-based decision making in process manufacturing organizations the way spreadsheets changed the lives of finance professionals 30+ years ago. Benefits of using Seeq include improved product quality, optimized resource consumption, and higher asset availability which enabling continuous process improvements and increased profitability. When customers talk about Seeq impact they speak in terms of millions of dollars: millions in resource savings, millions in avoided plant downtime, millions in maintenance optimization, millions in employee efficiency.

### IN THE HOT SEAT

Seeq enables these outcomes by tapping the big data and machine learning innovation known to us from consumer and IT experiences, for example, Google search or the Uber app. But where is that type of modern, software-driven experience for analytics in process manufacturing companies? It's in Seeq. Seeq builds on software innovation to power its application experience: productive, interactive, visual, engaging, and collaborative. What the user doesn't see (or have to worry about) is what's making the experience possible. The result is days or weeks of manual work in spreadsheets can be replaced with mere minutes in Seeq, an exponential change in required effort and time.

Seeq enables engineers, managers, and executives to make decisions to improve outcomes so quickly they can impact near-term production outcomes. In addition, Seeq is always connected to the underlying data which means it supports advanced techniques such as exception-based monitoring, predictions, and scheduling of analytics or reports. Finally,

Seeq supports analytics transparency so the work of users may be documented and shared for other users and departments, encouraging reuse and access across plants.

Seeq is transforming analytics for process manufacturing companies with benefits for users, teams, IT/OT integration, and, most importantly, business success.

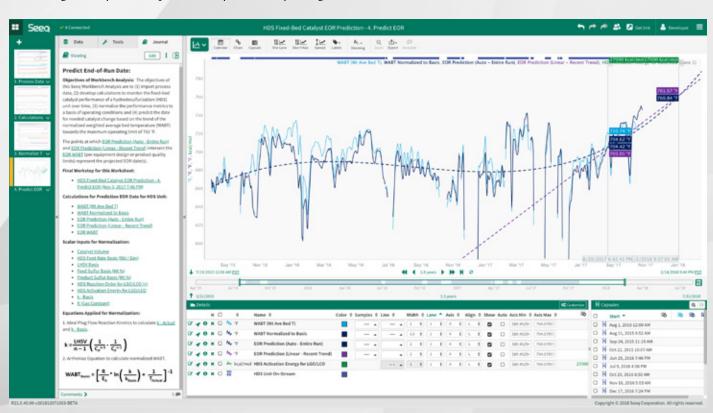
### 4. What are other partnerships that Seeq plans to venture into? Is there any new project or product underway?

Seeq's rapid growth is being fueled by its partnerships and commitment to cloud-based computing. Seeq is available in the AWS marketplace, is an AWS Industrial Competency Partner, and supports many data storage services, including Amazon Redshift, S3, plus machine learning in SageMaker, and other services.

On Azure, Seeq has been available in the Azure Marketplace since 2018 and was recently recognized as a 2020 Microsoft Energy Partner of the Year Finalist. Support for Azure services includes Azure Synapse, Azure Data Lake, Azure Data Explorer, Azure Time Series Insights, Azure Notebooks for machine learning integration, and Power Automate.

In addition to cloud partnerships, Seeq connects to an extensive set of automation vendor data storage platforms for onpremise engagements including OSIsoft, Siemens, GE, Honeywell, Emerson Automation Solutions, Inductive Automation, AVEVA, AspenTech, Yokogawa, and others.

In addition to Seeq's direct sales organization with employees in Malaysia, North America and Europe, Seeq is available worldwide through a global partner network of system integrators, which provide local language training and resale support for Seeq.



Seeq Workbench features expedite the full arc of the analytics process, from connecting to historians to data cleansing, visualization, modeling, and calculations, enabling organizations to leverage the work of engineers with features for real-time collaboration, knowledge capture of analytics processes for easy reuse, and the sharing of workbooks and queries among teams.

5. Do share with us your opinion regarding the growth of IIOT in Malaysia. How has the pandemic stimulated adoption rates for IIOT?

Before the COVID-19 pandemic, the awareness of IIOT among Malaysia homegrown corporate companies was still new. However, the Malaysian government's initiative to introduce Industrial Revolution 4.0 in 2018 was the main driver that encourages the local corporate leaders to form a digital transformation team to adopt IIOT to increase efficiency in daily operation. The importance and relevance of the IIOT application became the focus in 2020 when lockdowns were imposed globally. Remote monitoring capability became an in-demand and essential service for

manufacturers to continue operation and continuously obtaining real-time data from the sites. Data from remote locations could provide many insights to companies' stakeholders such as monthly production capacity vs demand and forecast of next maintenance plan to name a few.

Seeq has supported oil and gas organization and other manufacturing leaders in Asia Pacific region since 2018 by equipping process engineers with data analytics skills using Seeq to quickly get insight from process data which enable timely decision to optimize production and avoid unplanned downtime.



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## Interview with Syed Suroor Anwar, Vice-President (APAC), Strategy and Commercial at RS Components

The Impact of the Manufacturing Industry on the Environment



Syed Suroor Anwar has vast international experiences in Asia, Europe, and North America, with key eCommerce and technology companies.

At present, he is the Vice President for Strategy and Commercial for RS Components – the Asia Pacific. In his current capacity, he is responsible for formulating the go-to-market strategy for RS in the Asia Pacific and implementing that through managing the overall product and supplier offer on the website and sales enablement through digital, marketing, sales effectiveness, and customer experience.

Suroor has been with RS Components for more than 7 years in multiple leadership roles across the business.

He has extensive work experience in P&L management, Transformation Sourcing, and Supply Chain with companies like SKF and Tata Motors in India where he was responsible for setting up greenfield projects and establishing their supply chain and vendor management functions.

In 2011, Suroor moved to Singapore to work with Applied Materials Inc. to formulate and drive the contract manufacturing strategy and supplier quality improvement before joining RS.

He is a mechanical engineer by qualification from the Indian Institute of Technology – Delhi. Suroor also holds a Six Sigma Master Black belt and Lean Master certifications. Suroor is also a fond writer and contributor to some of the pioneering works in Continuous Improvement books and forums.



1. Could you share with us RS Components' background and history?

RS Components is a trading brand of Electrocomponents plc, a global omnichannel solutions partner industrial customers and suppliers who are involved in designing, building, or maintaining industrial equipment and facilities.

We stock more than 500,000 industrial and electronic products, sourced from over 2,500 leading suppliers. We provide a wide range of value-added solutions to over one million customers. With operations in 32 countries, we trade through multiple channels and ship over 50,000 parcels a day.

We are not only a distributor of industrial and electronic products. We also simplify the procurement process and help engineers and procurement managers save time and costs through innovative solutions and services. This includes providing a range of energyefficient solutions and helping customers reduce their environmental footprint through responsible sourcing.

In APAC, we are present in 12 key markets with 5 local distribution centers. By holding local stock in these centers, we can provide fast and reliable delivery to our customers. We have local sales and account managers supporting key customers in different countries as well as dedicated teams providing end-toend service from sourcing and technical support to customer service and aftersales support.

2. What are the ways that RS Components has taken to assist the companies to lessen the manufacturing's impact on the environment?

Our global environment, sustainability, and governance (ESG) plan helps keep us accountable and guides all aspects of the business, including ethical sourcing and engaging our suppliers and customers to reduce their carbon footprint and energy consumption.

The transport of raw materials and parts used by manufacturers around the world contributes to emissions. Across the Asia Pacific, we've invested in distribution centers and local sourcing capabilities so that manufacturing customers can source locally and reduce their carbon footprint. Holding local stock across a broad range of products also enables us to offer reliable product availability, fast delivery, and help customers to adhere to their maintenance and production schedule, which also impacts their overall efficiency.

Our dedicated sales, technical, and sourcing staff play a key role in guiding clients to integrate sustainability in their supply chains. Our teams have the technical knowledge and access to an extended global product catalog to help customers choose compliant and energyefficient products such as LED bulbs and sensors. This enables industrial customers to consume less energy and improve productivity levels in their plants and facilities.

Lack of visibility in the supply chain leads to waste, delays, and higher costs. We provide procurement solutions to give customers more control and transparency in their supply chain through direct access to our product range and purchase information, managing spends and reducing errors with fast and secure invoicing. Customers can also save time



### COVER STORY

and gain efficiencies by working with our sourcing team who will help source products not yet published on the website and consolidate purchase orders.

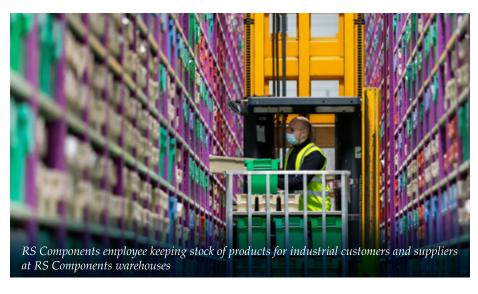
These solutions also help reduce waste in manufacturing by enabling procurement specialists to better plan their projects and maintenance engineers to stay on track with preventive maintenance schedules.

Education and creating more awareness of energy-efficient technologies among our customers also play a big role. We host local conferences and webinars in partnership with suppliers to raise awareness about industry challenges and available solutions to help manufacturing customers stay on top of their productivity and sustainability goals. We also offer educational resources and insights on our **Connected Thinking** website.

3. Data by the World Bank suggests that CO2 emissions in Malaysia from manufacturing and construction are at around 13% a few years ago. How far have Malaysian manufacturers come since then?

The Malaysian manufacturing industry is a key contributor to economic development and adoption of innovative practices, which lead to more efficient and sustainable ways of operating. The challenge - and opportunity - for Malaysia is to shape their Industry 4.0 agenda to accelerate not only productivity and efficiency but sustainable development as well. Automation and IIOT technologies not only improve production methods but also **reduce emissions and optimize energy use.** 

Manufacturing customers are looking for a strategic partner with the digital experience and distribution and logistics expertise to help unlock these business opportunities and environmental benefits for them. A strategic partner can help integrate sustainable approaches end to end, from the way manufacturers source their materials to how they can leverage



sensing and automation solutions on the factory floor, and how they can recycle packaging materials.

4. What steps have manufacturers taken to reduce the amount of pollution they emit?

Globally, organizations also have their eye on leveraging emerging technologies like AI and IoT (Internet of Things) to accelerate progress in the Sustainable Development Goals, which include clean energy and strengthening infrastructure in countries.

Through the scope of our work with industrial customers, we are supporting manufacturers in the drive to harness technology to optimize factory operations and we are also helping manufacturing firms to apply sustainable practices in their supply chain. Previously, I mentioned

the significant impact of local sourcing and stock availability in reducing the environmental footprint of manufacturers significantly.

We also help clients meet sustainability and energy efficiency targets by sourcing from a wide range of sustainable products and solutions from ethical suppliers. This gives design and maintenance engineers reliable access to critical technologies, which they can then use to implement factory solutions that reduce their energy consumption and process waste, without compromising quality and productivity.

Examples include technologies for **smart manufacturing** such as the Internet of Things, artificial intelligence, machine learning, and sensing solutions that can help practitioners reduce the energy they consume.



Infrared sensors or thermal sensors. for example, enable plant managers and maintenance engineers to avoid equipment failure or downtime, by monitoring changes in temperature or vibration. This reduces downtime due to system failures or accidents and ensures parts and machines are replaced before they break down. These technologies give manufacturers the data needed to project maintenance schedules, plan resources to avoid overproduction, and save on costs and energy used.

5. When it comes to repair and operations (MRO), practitioners carry responsibilities with less harm done to the environment?

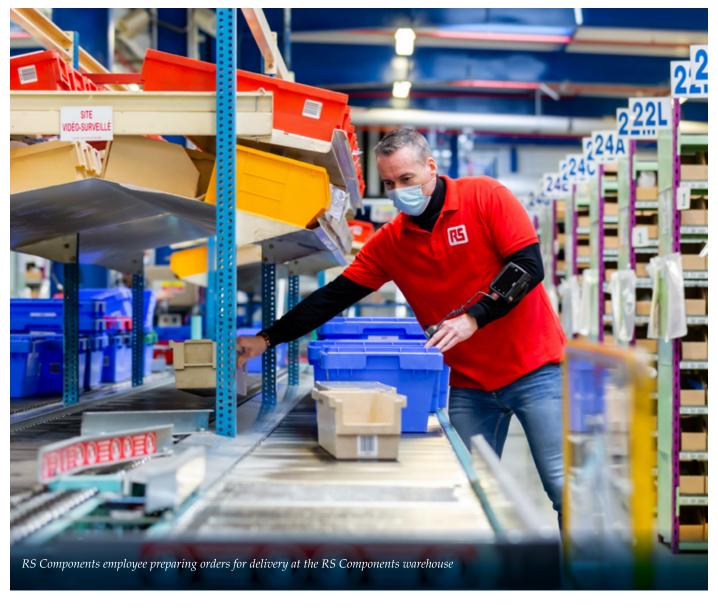
Consumers continue to expect brands to live up to high ethical standards.

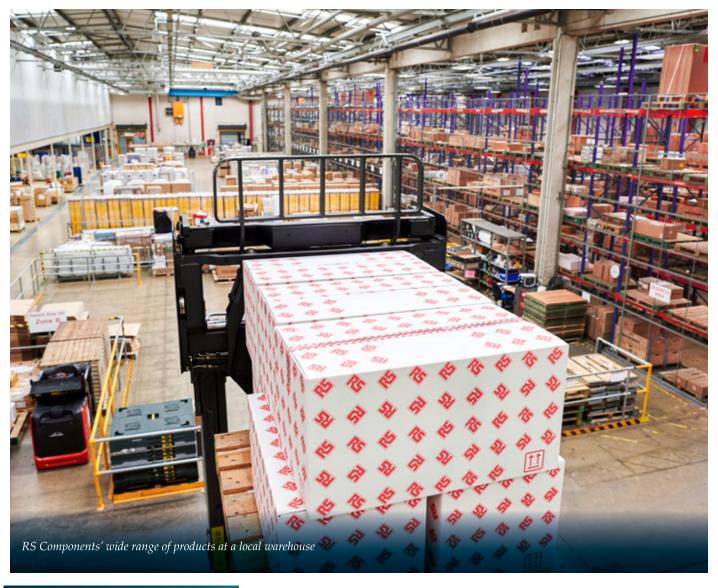
MRO and procurement managers also need to consider how they can maintain a robust supply chain by having reliable sources and breadth of choices for their requirements, managing multiple relationships with trusted suppliers, on top of having technical knowledge and making sure things are running smoothly.

To address this, practitioners must make sustainable and ethical procurement a key enabler of their business strategy. The sourcing and buying process has a significant impact in reducing the manufacturing footprint and advancing the innovation or digital transformation in the organization.

One way to carry this out is by having relationships with trusted suppliers who share the same values so that you don't compromise the principles of your team. Transparency is also important, and this can be achieved by reporting on the company practices and helping customers understand how the business is progressing on its sustainability goals. For example, in RS, we include a sustainability update on our website and annual report.

Having a strategic MRO approach also ensures businesses source components from reliable suppliers who have similar green goals and meet international compliance and ethical standards. Responsible procurement will ensure that when innovations are adopted at the factory, employees are protected and plant equipment is maintained well.





6. In a region like Asia, what are the steps that manufacturers can apply in their business such as supply chains or procurement, to reduce their harmful emissions?

When we think about future-proofing the business especially in an unpredictable situation, **supply chain management and sustainability** play a role in helping organizations make strategic and databased decisions that can influence long-term growth.

For example, last year many experienced the impact of having a single source supply chain and businesses are now looking at making their supply chain more resilient by having multiple sources and working with a few trusted partners and suppliers who can support your sustainability agenda.

Having visibility and reliable data about the procurement process also help managers to see gaps in their supply chain, if or where they are creating waste, and also seeing how they can select alternative products that can enable factories to run more sustainably and efficiently. There are systems and eCommerce solutions that enable procurement specialists or buyers to have direct access to real-time data and technical details about available products. These solutions can also consolidate procurement and purchasing tasks to speed up the process and limit errors so that manufacturers can reduce costs and waste.

With this kind of transparency and visibility over the supply chain, a company can further drive sustainable practices because they can make informed decisions about how and where they source

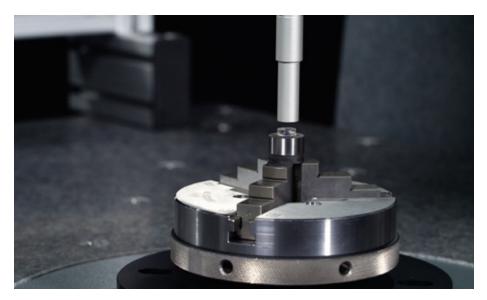
materials and can contribute to running operations smoothly and efficiently.

Across the supply chain, production and procurement, practitioners must closely vet the practices of their suppliers and partners to ensure they share similar sustainability values and goals. At RS, we openly communicate our **environmental and sustainability** journey with our clients and partners. We want to contribute to the industry's overall shift towards sustainable manufacturing and are committed to educating our clients on their sustainable options through our local teams.



## **Hexagon Ups The Ante with New Sub-Micron Accuracy Solution**

New Machinery Improves Inspection Throughput by Four Times



Hexagon, the global leader in sensor, software and autonomous solutions, recently launched its new coordinate measuring machine (CMM) via its Manufacturing Intelligence Division. Created to assist manufacturers overcome challenges when measuring delicate components, the CMM offers quality inspections up to four to six times faster as compared with conventional methods.

As technology progresses, the demand is now for gadgets such as smartphones and other wearable technology, to become smaller and smaller. With tens of thousands fragile and miniature components to inspect, manufacturers are now turning to machinery which will allow them to inspect large volumes of these components in a shorter amount of time. Conventional methods required a time commitment of 20 to 30 minutes of inspection time per part. However, the CMM will greatly reduce this by at least 15 minutes, which is translates to cost benefits in production.



Svenja Schadek, Product Manager of Hexagon Manufacturing Intelligence, commented, "As the world's largest CMM provider, Hexagon has significant experience across product teams in responding to the needs of manufacturers as they navigate new challenges to productivity and quality. combined R&D effort, we developed a CMM that features remarkably high accuracy and a smaller footprint so that our customers could bring the latest consumer products to market faster, with greater confidence in their manufacturing processes by employing rigorous, highsample-rate inspection."

Called the Leitz PMM Gold, this is the most accurate metrology machine produced by Hexagon to date. Its features include the ability to run an optical inspection of a lens barrel for about five minutes, cutting down significant time; as well as a non-contact function when inspecting fragile components. The Leitz PMM Gold's non-contact probe is particularly sensitive to deviation in geometry, a critical function when validating quality precision components.

"Designed especially for ultra-high precision manufacturing, our Leitz PMM Gold is 30 percent smaller than competing machines which saves valuable floor space. Available globally, the CMM's unique capabilities are also ideally suited to the high-accuracy inspection of precision gears for electric vehicles, as well as other precision components and the calibration of gauges and masterparts," concluded Schadek.



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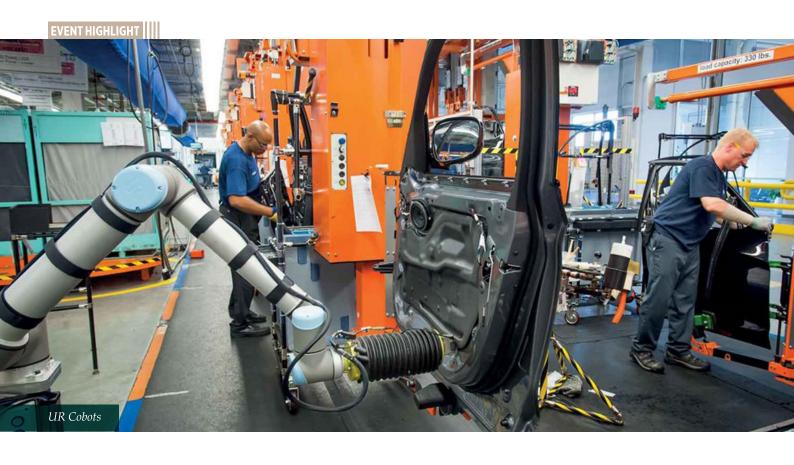












## Growth in Malaysia's Automotive Industry Drives Deployment of Collaborative Robots in 2021

Malaysia's National Automotive Policy (NAP) 2020 projects Malaysia's automotive manufacturing industry to contribute RM104.2 billion to GDP by 2030

niversal Robots (UR), Denmark-based collaborative robots (cobots) technology market leader, today urged local manufacturers in the automotive industry to explore new opportunities for the use of robotic solutions in the automotive manufacturing facilities.

Under the National Automotive Policy (NAP) 2020, Malaysia's automotive manufacturing industry is expected to contribute RM104.2 billion to GDP by 2030. NAP 2020's blueprint also outlined initiatives and strategies on robotics, targeting 730 new system integrators comprising 350 in robotics and 380 in IoT to be established by 2030. Meanwhile, the Malaysian Automotive, Robotics, and IoT Institute (MARii) expects the automotive industry, including Mobility as a Service (MaaS), to contribute up to 10% of GDP.

The industry is forecasted to produce 1.47 million vehicles annually, offering 323,000 employment opportunities.



The automotive industry was one of the earliest adopters of traditional industrial robots and one of the earliest widespread adopters of cobots. In Malaysia, there are 129 robots per 10,000 workers at automobile plants compared to 19 robots per 10,000 workers across all other industries.

"Today, automation penetrates almost every aspect of auto production, from parts and sub-assembly production at Tier 1 and 2 suppliers to the final product rolling off the line at production facilities. Universal Robots' cobots are finding increasing traction in automotive production due to their flexibility, small footprint, rapid return on investment, and consistent performance," said James McKew, Regional Director of Asia-Pacific in Universal Robots.

According to the International of Robotics, Federation cobots experienced more growth than traditional industrial robots whereby installations grew by 11%, reaching a 4.8% market share of the total of 373,000 industrial robots installed in 2019.

"Although several parts of automotive manufacturing have been highly automated for decades, there are tasks, especially on the assembly side, that remain "highly dependent on manual labor," said McKew. He pointed out that tasks such as screw driving where the flexibility and small footprint of UR's cobots could significantly benefit local automakers.

In highly regulated sectors such as automotive manufacturing, traceability is key. Cobots help manufacturers control and track key production processes such as ensuring precise torque is applied to screws when mounted to a car key.

"We see our cobots being used in the automotive sector for quality inspection, small part assembly, dispensing, and finishing applications. Our goal is to enable the automotive industry to deploy UR's cobots in every part of the manufacturing process," said McKew.

"One of the major benefits of cobots is its flexibility. They can be mounted in any orientation and can be deployed alongside humans without safety cages (upon risk assessment)," explained McKew. This is unlike traditional industrial robots which are bolted down in a cage, often dedicated to a single task.





With the development of rapid automotive market. China-based manufacturer Beijing BAI Lear Automotive System Co., Ltd. has seen its capacity steadily expanding in recent years. An effective automation solution means minimal delay in production with the shortest adaption period between workers and new equipment. Through partnership with Universal Robots, BAI Lear leverages the advantages of humanmachine collaboration and industrial automation through the deployment of 38 UR cobots, used mainly for car seat screw tightening, electrical inspection, parts picking and placing, as well as other processes.

"As a manufacturing enterprise, we have been receiving higher requirements from our clients every year, so we have to constantly enhance our production control, guarantee stable productivity and improve conformity of production. The introduction of UR cobots meets the above requirements while improving our factory production and personnel flexibility," said Song Xiaohui, General Manager of BAI Lear.

"Today, drastic changes are taking place in the global automotive industry. Local manufacturers and suppliers must be

prepared for changes in their production layout to address the changes in customer demands. Precision, efficiency, and flexibility have become key factors in the industry," concluded McKew.

#### **About Universal Robots**

Universal Robots (UR) was founded in 2005 to make robot technology accessible to all by developing small, user-friendly, reasonably priced, flexible collaborative robots (cobots) that are safe to work side-by-side with people. Since the first cobot was launched in 2008, the company considerable has experienced growth with the user-friendly cobots now sold worldwide. The company, which is a part of Teradyne Inc., is headquartered in Odense, Denmark, and has regional offices in the United States, Germany, France, Spain, Italy, UK, Czech Republic, Poland, Hungary, Romania, Russia, Turkey, China, India, Singapore, Japan, South Korea, Taiwan and Mexico. In 2020, Universal Robots had revenue of USD 219 million. For more information, please visit universal-robots.com.

# Armed With Technology: Surgeons Embrace the Benefits of Robotic Equipment.



Doctors Ghassan Boghosian, Erik Schnaser, and Patrick St. Pierre with a Mako robot. Photograph Courtesy Eisenhower Health

antasy worlds burst with the future of medicine. Sci-fi creators must weave healing technologies into their plots. After all, photon blasters, phase disruptors, and explosions in space tend to inflict immense damage on living beings.

Look it up. You can find medical technology that has stepped out of fiction into science fact. In 2017, Final Frontier Medical Devices won first place (\$2.6 million) in the Qualcomm Tricorder XPrize competition for its handheld diagnostic tool inspired by *Star Trek*. (The Roddenberry Foundation committed to contributing \$1.6 million to adapting winning devices for practical use.)

It was not a long time ago in a galaxy far, far away that the cutting edge of medicine was just that: scalpels giving surgeons access to internal organs. Only in the late 1980s did laparoscopy gain traction as a minimally invasive technique.

Undoubtedly the greatest tool with a science-fiction genesis, robotic surgical systems with camera guidance emerged in the 1990s. **Enrique Jacome, M.D.**, was beginning his OB-GYN career with laparoscopic surgery. Then in 2000, the U.S. Food and Drug Administration approved, for general surgery, a robotic system clearly named for the Renaissance Age's pre-eminent genius.

"I began to hear there might be a potential to use the da Vinci for gynecological procedures," says Jacome, directing physician at Fleur Women's Health in Rancho Mirage. "Nobody was doing robotic surgery in California," he adds. So when Eisenhower Medical Center considered purchasing a **da Vinci system** in 2008, Jacome traveled east to train with a gynecologist at Mayo Clinic in Scottsdale who was the first doctor to perform robotic surgery in Arizona.

"When I came back, I said, 'I am happy to lead the way. I will support this program fully.' That year, I performed the first robotic surgery in Riverside County," Jacome recounts.

"I encouraged other surgeons to adopt the technology. I was seeing amazing results. Patients had less pain, less bleeding, fewer infections, shorter hospitalizations, and faster recoveries. Everybody was happy. One by one, specialty by specialty, an increasing number of doctors at Eisenhower got trained in robotic surgery."

Early this year, Jacome was nearing his 1,000th da Vinci operation, using the machine for more than 90 percent of his hysterectomy, endometriosis, and uterine fibroid surgeries and reserving laparoscopic procedures for small cases.





"The more complex the case, the more a patient is a candidate for robotic surgery," he says, adding that robotics provide such a minimally invasive approach that he can perform operations on an outpatient basis.

Scott Gering, M.D., similarly recalls the evolution.

"When I was starting, all the surgeons that trained me did open surgery," he says. "By the time I was ending my residency, laparoscopy had taken over. In 2004, there was a big study in The New England Journal of Medicine that concluded laparoscopic surgery for colorectal cancer was an alternative to open surgery; and that really opened the floodgates to minimally invasive techniques."

Gering admits that making the next leap — to robotic surgery — was more of an uphill climb.

"I had to go to Intuitive's headquarters in Sunnyvale," he recalls, referring to the da Vinci manufacturer. "You have to do simulations and then go to the lab. You have to watch other surgeons. After that, you can schedule your first case with peersurgeon proctoring." For Gering, that was in 2011.

"It's the same surgery, but now you do it with a different tool," he summarizes.

Jacome's voice registers pride when he notes that Eisenhower became the first da Vinci training center in California outside of Intuitive headquarters.

"For some five years, we trained hundreds and hundreds of doctors from all over the United States," he declares.

The da Vinci system works for a range of surgeries, but orthopedic surgeons need a machine designed specifically for joint replacements.

"There have been a number of changes [in orthopedic procedures] over the last three decades, but they have been minimal with different styles of replacements and approaches," says Ghassan Boghosian, D.O. "It wasn't until robotic technology came along that the process changed completely."



In August of 2015, the FDA approved a robotic unit for knee and hip replacements that had been developed by Mako Surgical Corp. and manufactured by Stryker Corp., which acquired Mako in 2013.

"We now have the ability to plan and 'perform' the surgery before the patient enters the operating room," Boghosian says. "Once I have a CT scan, I can build a 3-D model of the bone structure. At the end of my presurgery, I am looking at the finished product, if you will. Never before have we been able to achieve that from a planning standpoint. Then the robot and I execute the plan I have set forth."

Boghosian learned minimally invasive techniques during his fellowship training at Ohio's Cleveland Clinic and gained access to the Mako system once on staff at Eisenhower Desert Orthopedic Center.



"I am considered a high-volume robotic surgeon by Stryker," he says in explaining why the Michigan-based company asked him and his colleague Erik Schnaser, M.D., to teach robotic surgery to the orthopedic community at large. "Stryker flies them out to Eisenhower to introduce them to the technology."

Eisenhower Desert Orthopedic Center notes that it is one of the top five highest-volume centers in the nation for knee and hip replacements using Mako robotics. One of the group's shoulder specialists, Patrick St. Pierre, M.D., is among five orthopedic surgeons in the world working with Stryker to help design software for minimally invasive, robotically assisted shoulder replacement.



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