ROBOTICS

Dec 2021 Edition : Robotics and I4.0

SINGAPORE WELCOMES THE CONCLUSION OF THE

INSIGHT OUT

WTO JOINT STATEMENT INITIATIVE ON SERVICES DOMESTIC REGULATION

4 FEATURE STORY

''SERVICE ROBOTS'' HIT DOUBLE DIGIT GROWTH WORLDWIDE

STARSHIP: CONTACT LESS FOOD DELIVERY ROBOTS

SUCCESS STORY

PRODUCTS & TECH

AMECA ROBOT SHOWS OFF NEW LEVEL OF HUMAN-LIKE FACIAL EXPRESSIONS

CONTENTS PAGE

FEATURE STORY

INSIGHT OUT

TECHNOLOGY

HONEYWELL TRANSMISSION RISK AIR MONITOR

SUCCESS STORY

GREAT OPPORTUNITY

EVENT CALENDER

PRODUCT COMMUNIQUE

22 MINUTES

Dear Industrial Folks,

This is the last issue of magazine for this year, it has been another year full of trials. In this edition, we are touching on the topics of i4.0 and robotics.

We have looked at what is needed to get ready for the future and how AI has been changing the way people work in recent years. AI has been a great aid in bringing more efficiency to businesses and if we can find a way to use it effectively then that will be a great step forward for us all.

Robots are becoming more and more of a necessity in the manufacturing industry. These machines are able to do repetitive tasks that human workers can't, like sifting through dust for small pieces of metal.

Robots don't need breaks to eat, sleep, or take care of themselves. This makes them an ideal solution for repetitive tasks that humans would normally be burdened with. They also do the job faster than humans can sometimes, which is helpful for production companies who want to increase output.

Robotic, or i4.0, has changed the manufacturing industry by increasing product quality and reducing cost of production. However, this increased automation also causes an increased unemployment rate for factory workers because robots take over their jobs.
The use of robotic has been well sought all across industry during this pandemic to increase product quality and reduce cost of production.

This year has been a rollercoaster for all of us again. From the continued strife in our world to the end of an era and the completion of a lifelong dream for many, we've all had our challenges and successes. Many businesses fail and new businesses arise.

We hope that this coming new year will be better than all the others. We hope that you will continue to push yourself and reach for your goals, because it may be another year of trials and tribulation, but we're holding on to this promise: if you can dream it, you can do it.

We wish you a Merry Christmas and a Happy New Year!

With love,
Team Industrial Guide Asia

"SERVICE ROBOTS" HIT DOUBLE DIGIT GROWTH WORLDWIDE

The market for professional service robots reached a turnover of 6.7 billion U.S. dollars worldwide (sample method) – up 12% in 2020. At the same time, turnover of new consumer service robots grew 16% to 4.4 billion U.S. dollars. This is according to World Robotics 2021 – Service Robots report, presented by the International Federation of Robotics (IFR).

Service robots for professional use. Top 5 applications
Unit sales 2019 and 2020

'000 of units

■ 2019 ■ 2020

Transportation and logistics AP5: 33 / 44
Professional cleaning AP2: 18 / 34
Medical robotics AP6: 7 / 18
Hospitality AP8: 13 / 15
Agriculture AP1: 7 / 7

Source: World Robotics 2021
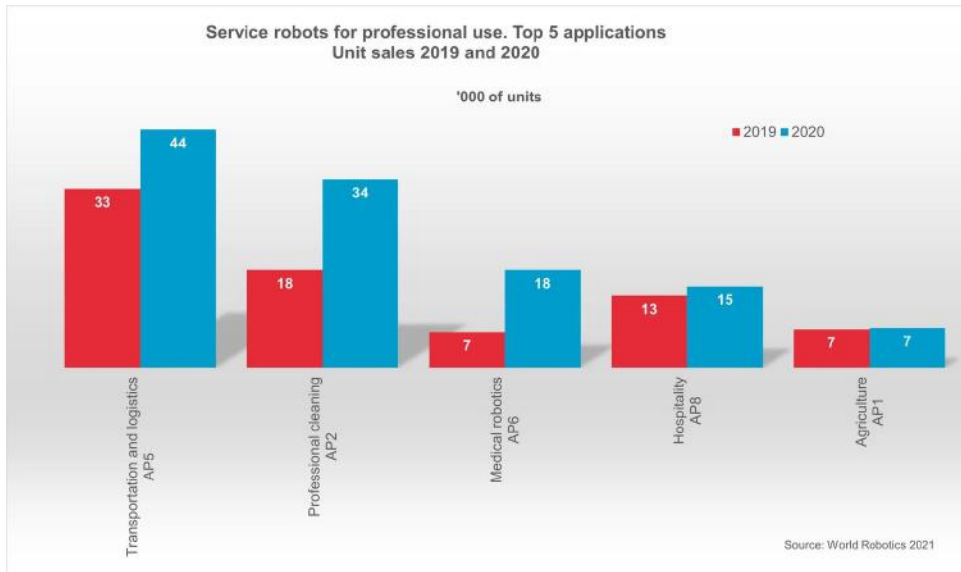
"Service robots continued on a successful path proving the tremendous market potential worldwide," says IFR President Milton Guerry. "Sales of professional service robots rose an impressive 41% to 131,800 units in 2020."

Five **top application trends** for **professional service robots** were driven by extra demand of the global pandemic:

One out of three units were built for the transportation of goods or cargo. Turnover for **Autonomous Mobile Robots (AMR)** and **delivery robots** grew by 11% to over 1 billion US dollars. Most units sold operate in indoor environments for production and warehouses. The trend goes towards flexible solutions, so that the AMR's act in mixed environments together e.g. with forklifts, other mobile robots or humans.

There is also a strong market potential for transportation robots in outdoor environments with public traffic, e.g. lastmile delivery. Marketing and monetarization options will depend on the availability of regulatory frameworks which currently still prevent the large-scale deployment of such robots in most countries.

Service Robotics – TOP 5 Application trends

- **AMR and delivery robots** flexible solutions
- **Cleaning and disinfection** + 50 companies due to Corona
- **Medical and rehabilitation** individual support
- **Social robots** telepresence – particularly during Corona
- **Automated restaurant** staff support, reduce personal contact due to Corona

Demand for professional cleaning robots grew by 92% to 34,400 units sold. In response to increasing hygiene requirements due to the Covid-19 pandemic, more than 50 service robot providers developed disinfection robots, spraying disinfectant fluids, or using ultraviolet light. Often, existing mobile robots were modified to serve as disinfection robots. There is a high ongoing potential for disinfection robots in hospitals and other public places. Unit sales of professional floor cleaning robots are expected to grow by double-digit rates on average each year from 2021 to 2024.

In terms of value, the sales of medical robotics accounts for 55% of the total professional service robot turnover in 2020. This was mainly driven by robotic surgery devices, which are the most expensive type in the

segment. Turnover increased by 11% to 3.6 billion U.S. dollars.

A tremendously growing number of robots for rehabilitation and non-invasive therapy make this application the largest medical one in terms of units. About 75% of medical robot suppliers are from North America and Europe.
The global pandemic created additional demand for social robots. They help e.g. residents of nursing homes to keep contact with friends and family members in times of social distancing.

Communication robots provide information in public environments to avoid personal human contact, connect people via video for a business conference or help with maintanance tasks on the shopfloor.

Hospitality robots enjoy growing popularity generating turnover of 249 million US dollars. Demand for robots for food and drink preparation grew tremendously – turnover almost tripled to 32 million US dollars (+196%).

The Covid-19 pandemic created increased awareness to avoid contact with food products. There is still a huge potential for hospitality robots with medium double-digit annual growth predicted.

Service robots for consumer use

Robots for domestic tasks are the largest group of consumer robots. Almost 18.5 million units (+6%), worth 4.3 billion US dollars, were sold in 2020.

Robot vacuums and other robots for indoor domestic floor cleaning were up 5% to more than 17.2 million units with a value of 2.4 billion US dollar. This kind of service robot is available in almost every convenience store, making it easily accessible for everyone. Many American, Asian, and European suppliers cater to this market.

Gardening robots usually comprise lawn mowing robots. This market is expected to grow by low double-digit growth rates on average each year in the next few years.

SERVICE ROBOTICS INDUSTRY STRUCTURE

"The service robot industry is developing at a high pace," says IFR President Milton Guerry." "Lots of start-up companies appear every year, developing innovative service robot applications and improving existing concepts. Some of these young companies disappear as quickly as they emerged. The activity remained high in the service robotics space with acquisitions by incumbents and acquisitions by companies from industries with a desire to expand and work in this exciting area."
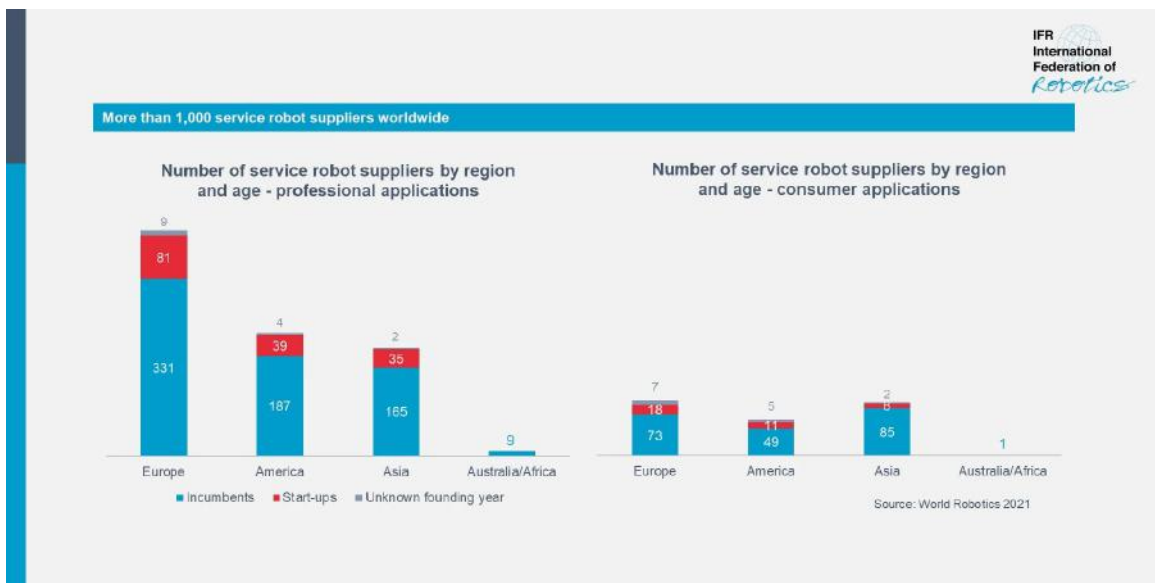
Worldwide, 80% of the 1.050 service robot suppliers are considered incumbents that were established more than five years ago. 47% of the service robot suppliers are from Europe, 27% from North America and 25% from Asia.

UNDER THE SEA:

SUBMARINE DRONES FOR OCEAN EXPLORATION

Have you ever wondered how big is the ocean and how robots can help us explore it?

According to the Smithsonian Institute, this massive body of water holds over 1.3 billion cubic kilometers of water and covers 71% of the Earth's surface.

Although it's been investigated since ancient times, the ocean is still a mystery to many researchers. Humans have been making efforts to gain knowledge about it all throughout history and robots could help us uncover its mysteries. Ocean exploration started around 5000 B.C. with the firsts attempts in ocean diving, sailing vessels, diving bells, and coastal maps. As humanity gained knowledge and technology

advanced, we explored further and farther from shores, discovering lands and connecting with cultures around the world.

After the invention of the first diving suit in the 18th century, deep-diving started to seem possible and expeditions to explore the Ocean continued underwater with the invention of the submarine. The 1900s became a turning point and humanity started to reach deep sea levels. The deep-sea is what scientists define as the part of the ocean below the thermocline, the layer where effects of sunlight cease, and above the seafloor. But there are only so many places we as a species can reach. And that's where our robotic friends get into the game.

According to NOAA **Remotely Operated Vehicles (ROVs)** are unoccupied, highly maneuverable underwater robots that can be used to explore ocean depths while being operated by someone at the water surface.

Most ROVs are equipped with at least a still camera, video camera, and lights, meaning that they can transmit images and video back to the ship. Additional equipment, such as a manipulator or cutting arm, water samplers, and instruments that measure parameters like water clarity and temperature, may also be added to vehicles to allow for sample collection. They were first developed for industrial uses but today are used for a wide range of applications, including scientific research.

There are also **Autonomous Underwater Vehicles (AUVs)**, which are computer-controlled systems operating undersea. AUVs are unmanned underwater robots akin to the Curiosity rover NASA uses on Mars.

As their name suggests, AUVs operate independently of humans. AUVs have no physical connection to their operator, who may be onshore or aboard a ship. Rather, AUVs are self-guiding and self-powered vehicles. AUVs may glide from the sea surface to ocean depths and back. Others can stop, hover, and move as blimps or helicopters do through the air.

Combining the advantages of ROVs and AUVs there are also **Hybrid Remotely Operated Vehicles (HROVs)**, the vehicles operate as a free-swimming autonomous underwater vehicle (AUV), flying through the ocean like an aircraft to survey and map large areas with onboard sonar, sensors, and cameras.

It can also be converted aboard ship into a remotely operated vehicle (ROV),
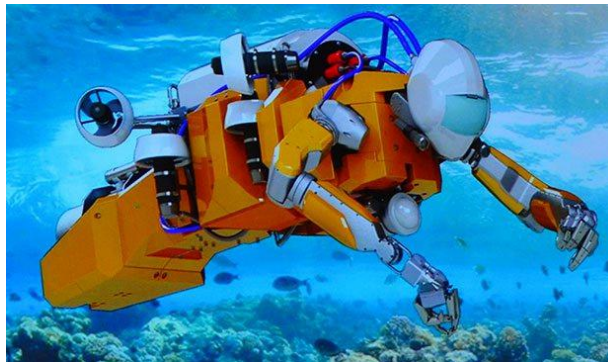
onnected to a surface ship via a lightweight, micro-thin fiber-optic tether that permits scientists and operators on the surface to control the vehicle and its manipulator arm to carry out targeted surveys and collections, and help carry out detailed experiments in the deep ocean. These kinds of robots can reach places and depths that are not possible for humans, using underwater robots could decrease costs for many activities that are currently performed by Human Occupied Vehicles, improve safety in dangerous tasks and increase performance for underwater related activities.

"Underwater robots could decrease costs for many activities that are currently performed by Human Occupied Vehicles, improve safety in dangerous tasks and increase performance for underwater related activities"

If you want to know more about the current state of ocean exploration we recommend you to read the interview with Andy Bowen director of the National Deep Submergence Facility at The Woods Hole Oceanographic Institution, Imagining new vehicles for exploration.

- Discover what lies beneath the surface

Among many applications, Underwater Robots have the potential to explore the

oceans in numerous ways, for that purpose projects like Nido Robotics Sibiu Nano, the perfect tool to perform underwater inspections, efficiently and very profitably, as well as living a completely complete underwater experience. With this robot you can get live images through your 1080p camera, specifically optimized for the marine environment.

Or Nido Robotics Sibiu PRO, a bigger underwater drone that allows performing research, inspection, and maintenance of submerged facilities in an efficient and safe way. It comes with a 1080p camera, specifically optimized for the underwater environment, together with its 4 lights of 1500 lumens allowing to obtain a clear image in low light environments.

It incorporates eight thrusters, which gives it smoothness and stability in navigation. In addition, the latest generation engineering with which it has been built and its technological innovation allows it to reach depths of up to 300m.
A great example of a use for these underwater robots could is the vital role they could play in the research of ocean species and their behavior patterns by collecting images or samples.

- **Solving challenges one AUV at the time**

Subsea Mechatronics is an R&D start-up SME focused on mechatronics developments and consultancy services.
Their toolbot offers a solution for the last mile dredging operations where spots are hard to reach, where underneath infrastructures must be maintained or when conventional methods are oversized to actuate with precision.

RobotUnion is supporting important underwater solutions that bring an innovative way to the underwater and marine industry. The range of activities in underwater exploration could be greatly improved by using ROVs, AUVs, and HROVs, we are certain that as technology continues improving will be seeing a lot more of these robots diving into the depths of our big blue ocean.

HOW TO SET YOUR AI PROJECT UP FOR SUCCESS

Picking the right AI project for your company often comes down to having the right ingredients and knowing how to combine them. That, at least, is how Salesforce's Marco Casalaina tends to think about it.

The veteran artificial intelligence and data scientist expert oversees Einstein, Salesforce's AI technology, and has made a career out of making emerging technologies more intuitive and accessible for all. With Einstein, he's working to help Salesforce customers — from small businesses to nonprofits to Fortune 50 companies — realize the full benefits of AI.

HBR spoke with Casalaina about what goes into a successful AI project, how to communicate as a data scientist, and the one question you really need to ask before launching an AI pilot.

You've been working in AI for a long time now. You worked for Salesforce years ago, then at other companies, and now you've come back to lead. How would you describe what it is you do in this work?

I bring machine learning into the things that people use every day — and I do it in a way that aligns with their intuition. The problem with machine learning and AI — which are two sides of the same coin — is that most people don't know what either really mean. They often have an outsized idea of what AI can do, for example. And of course, AI is always changing, and it is a powerful thing, but its powers are limited. It's not omniscient.

The point you're making about how imagination can take hold explains a lot of the issues businesses run into with AI. So, when you're thinking about the kinds of problems that AI is good at solving, what do you consider?

When I talk to customers, I like to break it down into ingredients. If you think about a fast food taco, there are six main ingredients: meat, cheese, tomatoes, beans, lettuce and tortillas. AI isn't that different: there's a menu of certain things that it can do. When you have an idea of what they are, it gives you an idea of what its powers are.

I'm intrigued! So, what are AI's ingredients?

The first ingredient is "yes" and "no" questions. If I send you an email, are you going to open it or not? These give you a probability of whether something is going to happen. We get a lot of mileage out of "yes" or "no" questions. They're like the cheese for us — we kind of put that in everything.

The second ingredient is numeric prediction. How many days is going to take you to pay your bill? How long is it going to take me to fix this person's refrigerator?

Then, third, we have classifications. I can take a picture of this meeting that we're in right now and ask, "are there people in this picture?" "How many people are in this picture?" There are text classifications, too, which you see if you ever interact with a chatbot.

The fourth ingredient is conversions. That could be voice transcription, it could be translation.

But basically, you're just taking information and translating it from one format to another.

The tortilla, if we're sticking to our analogy, is the rules. Almost every functional AI system that exists in the world today works through some manner of rules that are encoded in the system. The rules — like the tortilla — hold everything together.

So how do you, personally, apply this in your work at Salesforce? Because I think people often struggle with figuring out where to start with an AI project.

The questions I ask are, "What data do we have?" And, "What concrete problems can I solve with it?"

In this job at Salesforce, I started with something every salesperson tracks as a natural part of their job: categorizing a lead by giving it a score of how likely it is to close.

Data sets like these are a key source of truth from which to develop an AI-based project. People want to do all kinds of things with AI capabilities, but if you don't have the data, then you have a problem.

Getting into the next phase of this, let's talk about the lifecycle of finding a project and deploying it. What are the questions you find yourself asking when thinking about how to get from pilot to rollout?

What problem you're trying to solve — that's the first question you need to answer. Am I trying to prioritize people's time? Am I trying to automate something new? Then, you confirm that you have the data for this project, or that you can get it.
The next question you need to ask is: Is this a reasonable goal? If you're saying, I want to automate 100% of my customer service queries, it's not going to happen. You're setting yourself up for failure. Now, if 25% of your customer service queries are requests to reset a password, and you want to automate that and take it off your agents' plates, that is a reasonable goal.

INDUSTRY 4.0 AND THE MANUFACTURING INDUSTRY IN A POST COVID-19 WORLD

Manufacturing operations globally are seeing disruption they have never experienced before as a result of the COVID-19 emergency. The focus in the early weeks of the crisis was about understanding and adapting to the dramatically changed situation while those manufacturing essential products like food, medicines, PPE, and medical devices dealt with the challenge of meeting demand.

Thoughts are now turning to the future for manufacturers in all industries as plans are being drafted for the slow march towards normality, albeit a normality that is likely to be different to the normal we were familiar with before.

What role will Industry 4.0 have in the post-COVID-19 world? Has the experience of the medical crisis and the resulting lockdown changed priorities in relation to Smart Factory technologies, digital transformation, and digitalisation? What are the solutions that will be important elements of the new paradigm for the manufacturing industry?

The Impact of COVID-19 on the Manufacturing Industry

HOW HAS THE COVID-19 CRISIS IMPACTED THE MANUFACTURING INDUSTRY? OF COURSE, THERE IS NO SINGLE ANSWER TO THAT QUESTION AS THE POSITION VARIES FROM INDUSTRY TO INDUSTRY AND COMPANY TO COMPANY.

How has the COVID-19 crisis impacted the manufacturing industry? Of course, there is no single answer to that question as the position varies from industry to industry and company to company.

Some have stopped production completely while others have seen massive increases in demand. There are others too who are still operating but at a reduced level while there are some that are operating but are producing completely different products than they were before the COVID-19 crisis began.

The only thing we can say with certainty, however, is that almost every manufacturing operation in every industry has been impacted by the COVID-19 crisis in some way.

This applies even in industries like pharmaceuticals and medical devices. While manufacturers in these industries mostly (although not always) fall into the category of businesses that have seen increased demand during the COVID-19 crises, they still face significant disruption.

In the pharmaceutical industry, for example, supply chains faced disruption as many of the active ingredients in pharmaceutical products come from China, the country first hit by COVID-19 and where the first lockdown and quarantine rules came into force.

Evaluating and Analysing the Impact

In the lockdown phase of the crisis, particularly in the early stages, our own health, as well as the health and wellbeing of our family, friends, and colleagues, were the most important considerations.

This continues, plus there is also a focus on ensuring the health system doesn't become overwhelmed while we all do what we can, individually and as a wider society, to slow the spread of the virus.

As the situation unfolds, however, the economic, business, and job security impact of the crisis is coming into increasing focus as businesses plan for the next stage, i.e. when lockdown measures begin to be lifted in the coming months.

Whatever the impact of the crisis on manufacturing businesses, the situation presents a unique opportunity to evaluate and learn lessons:

- What weaknesses can be identified?
- Has the risk matrix changed?
- Was the decision-making process efficient during the most frantic stages of the crisis and was there enough information to make good decisions?
- Was the information accurate?
- Etc

Even in manufacturing businesses that have seen consistent or even increasing demand, there are still important lessons to be learned, including those above.

Learning these lessons is crucial for business resilience and continuity planning, but for the pharmaceutical and medical device industries, it is also about public health, patient outcomes, and saving lives.

Important Lessons Learned

What are some of the lessons we have learned in the manufacturing industry during the COVID-19 crisis? Accepting the fact there are challenges and limitations when making generalisations, there is an important lesson that most manufacturers can learn.

That lesson is that once system architectures and processes were tested beyond what we used to regard as a normal operating range, they failed.

There will be exceptions and there will be success stories, but most companies struggled with a new reality that they had never planned for or anticipated. For example:

- How do you maintain capacity and quality standards while ensuring sufficient social distancing for members of staff?

- How do you respond quickly to the rapidly changing levels in demand that were experienced by many manufacturers, particularly given the lack of real-time data providing information on things like raw material stock levels, manufacturing capacity, and distribution chain efficiency?
- How can you mitigate supply chain and distribution chain unpredictability?

This brings us to another lesson learned as a result of the COVID-19 crisis – the fact that manufacturing really is a real-time process. Delays, however small and wherever they occur, can have a significant impact, i.e. assessing levels of demand, raw material availability, staffing availability, scalability, the effectiveness of the distribution chain, factory floor processes, etc.

The Role Industry 4.0 Can Play in the Post COVID-19 World

Industry 4.0 was important before the crisis, not least because of the efficiency, competitiveness, and productivity benefits it offered. In summary, the technologies and concepts that fall under the Industry 4.0 umbrella set out a blueprint for the Smart Factory of the future.

This will undoubtedly change given our individual and collective experience of Q1 and Q2 2020.
Industry 4.0 technologies and solutions, however, remain important and will play a key role in shaping the manufacturing sector in the months and years to come.

Here are some of the ways Industry 4.0 solutions will improve manufacturing operations and businesses post COVID-19:

- Providing real-time visibility of manufacturing operations across all aspects of the business, breaking down data silos and ensuring real-time information is available to decision-makers
- Improving OEE, an objective which is more important now than ever before
- Increasing use of automation, robots, cobots, and autonomous vehicles for efficiency and cost-saving purposes as well as to facilitate social distancing
- Increasing use of machine learning and artificial intelligence to assess, plan, and make decisions on everything from manufacturing output capacity to equipment maintenance schedules
- 3D printing of components and parts as a backup to, or in place of, third-party suppliers
- Augmented and virtual reality for training, technical support, and other tasks which are otherwise difficult in an era of social distancing

Adapting to the New Normal

Like all sectors, the manufacturing sector will go through a period of change in the post-COVID-19 world. Industry 4.0 technologies and solutions will help manufacturing companies protect their staff and ensure output capacity while also helping them adapt to what will become the new normal.

SUSTAINABILITY AT SIEMENS:STRONG RESULTS, CONTINUED ACCELERATION

Siemens' ecodesign standards are already implemented in all of the company's relevant products.

With this approach, aspects like ensuring that products are recyclable are taken into consideration right from the design phase. By 2030, the company wants to develop 100 percent of its relevant product families sustainably based on ecodesign requirements. In addition, Siemens intends to intensify purchasing of recycled materials – referred to as "secondary materials" – for metals and resins and wants to implement the principle of a circular economy. Furthermore, the company is seeking to come as close as possible to zero landfill waste by 2030. In fiscal 2021, 38 percent of the metals that Siemens used to manufacture its products were already purchased from recycled sources.

Siemens also made solid progress in its climate protection efforts. Over the past two years, the company reduced the CO2 emissions from its operations by another 36 percent. In early 2021, the company had set itself new reduction targets that were validated by the Science Based Targets-Initiative (SBTi).

Siemens has achieved further progress toward meeting its sustainability ambitions. At its Capital Market Day in June 2021, the company set itself ambitious environmental, social and governance (ESG) targets with its new strategic framework DEGREE. In its Sustainability Report for fiscal 2021, Siemens has published information today on its progress toward achieving these targets.

"We're on track to successfully achieve our sustainability targets, and we're driving our ambitions further ahead with our DEGREE framework," said Judith Wiese, Chief People and Sustainability Officer and member of the Managing Board of Siemens AG. "Our 360-degree approach puts Siemens' sustainability efforts to work for all our stakeholder groups: customers and investors, our people, communities and the environment. We're proud of our results, but success will need to be proven in the long run – and that's the case for our company as well as society as a whole and for the planet."

Siemens has made solid progress with respect to its 14 ESG ambitions and has already made substantial headway toward realizing about one-third of them. Advances were made, for example, in providing occupational training to its people, in the ESG requirements for its suppliers and in the share of women in top management.

For the targets of ecodesign and secondary materials – in other words, for the sustainable development of products and the reuse of raw materials in manufacturing – Siemens has now completed the baselining process and can begin from a very good starting position: Today, 26 percent of

In this way, the company wants to make its contribution toward limiting global warming to 1.5 degrees Celsius. Based on the SBTi reduction pathway, Siemens wants to become carbon neutral in its business operations by 2030. By that year, the company also wants to reduce emissions throughout its entire value chain by 15 percent compared to 2019.

In fiscal 2021, Siemens not only abated further emissions in its own operations but also helped its customers do the same in their operations: The technologies from Siemens' Environmental Portfolio enabled the company's customers to abate 88 million tons of CO2 – ten percent more than in fiscal 2020. In addition, by introducing SiGreen to the market, Siemens is launching a new solution that, for the first time, makes it possible to track products' carbon footprint throughout the entire supply chain. In this way, companies can implement targeted reduction measures with quantifiable impact.

To accelerate efforts to protect the climate and resources, Siemens is relying on strategic partnerships. For instance, in 2021, the company became a founding member of the Alliance for Clean Air. In addition, Siemens expanded its strategic partnership with The Biodiversity Consultancy to scientifically assess its biodiversity footprint and supplement its involvement in the area of sustainability.

Siemens has been a leader in international sustainability rankings for more than 20 years. In the Dow Jones Sustainability Index (DJSI) published on November 12, 2021, for instance, the company was ranked first among its industry peers. In this ranking, Siemens reached a top global position in social and environmental reporting, in innovation and cybersecurity as well as in product- and industry-related environmental protection. Siemens has been included in this ranking every year since 1999, when the index was first published.

Siemens' key sustainability figures are, effective immediately, also available digitally and in a new format to provided users and investors with better opportunities to evaluate them.

SINGAPORE WELCOMES THE CONCLUSION OF THE WTO JOINT STATEMENT INITIATIVE ON SERVICES DOMESTIC REGULATION

67 Members of the World Trade Organisation (WTO) have concluded the Joint Statement Initiative on Services Domestic Regulations. Singapore welcomes the successful conclusion of the Initiative.

2. Minister for Trade and Industry Gan Kim Yong said, "The enhanced rules in the Joint Statement Initiative on Services Domestic Regulation will improve the operating environment for Singapore businesses as they foray into overseas markets. It will provide greater clarity and certainty by streamlining regulations and making requirements transparent. This will help to reduce cost and the administrative burden for companies, especially small and medium enterprises."

3. As the first services outcome in over 24 years, the Initiative will inject momentum to other services discussions within the WTO, and support services trade recovery from the impact of the COVID-19 pandemic.

4. Negotiations on the Initiative have been ongoing since 2019 and is open to all WTO Members. Participating Members are obliged to adhere to disciplines that relate to licensing procedures, qualification requirements and technical standards that affect trade in services. These rules contribute to a facilitative trading environment for our businesses.

MINISTRY OF TRADE AND INDUSTRY
5 DECEMBER 2021

HONEYWELL SUCCESSFULLY BEGINS TESTING NEXT–GENERATION T55 ENGINE FOR U.S. ARMY CHINOOK HELICOPTERS

Honeywell has reached a significant milestone with the U.S. Army by being the first engine to test (FETT) as part of its Cooperative Research and Development Agreement (CRADA) for the next-generation engine for Chinook helicopters. The CRADA program and testing of the T55-714C engine is planned over a two-year period to validate the benefits and ease of integration of the new engine variant onto the Chinook platform. This will allow the U.S. Army to evaluate the capabilities of the newest rendition of Honeywell's battle-proven T55 engine.

Testing of the first T55-GA-714C engine was successfully initiated at Honeywell's Phoenix test facilities in November to verify the design and establish the performance benchmark in preparation for the engine installation on the flight test aircraft. This is an essential next step for the U.S. Army to test the new T55-GA-714C engine capability for its latest CH-47 Chinook helicopters. To date, the engine has tested through Maximum Continuous Power, demonstrating mechanical operation and acquiring key performance data. Additional testing is planned at significantly higher power levels.
"First engine to test is a significant achievement for the program and is the culmination of detailed design work, component manufacturing, system integration and validation. Now all the engineering is coming to life in the rigorous testing of this enhanced engine for the U.S. Army," said Dave Marinick, president, Engines and Power Systems, Honeywell Aerospace. "This engine is a natural incremental complement for the Chinook, keeping the platform relevant for the next generation of warfighters. We are confident that our 714C engine will exceed the expectations of the U.S. Army."

With 6,000 horsepower, Honeywell's upgraded engine is 23% more powerful and consumes 8% less fuel than the current T55, even in the most demanding operating conditions. New modifications also make the next-generation T55 easier to maintain with lower operating costs, delivering increased readiness for the warfighter.

Honeywell has reached a significant milestone with the U.S. Army by being the first engine to test (FETT) as part of its Cooperative Research and Development Agreement (CRADA) for the next-generation engine for Chinook helicopters. The CRADA program and testing of the T55-714C engine is planned over a two-year period to validate the benefits and ease of integration of the new engine variant onto the Chinook platform. This will allow the U.S. Army to evaluate the capabilities of the newest rendition of Honeywell's battle-proven T55 engine.

Testing of the first T55-GA-714C engine was successfully initiated at Honeywell's Phoenix test facilities in November to verify the design and establish the performance benchmark in preparation for the engine installation on the flight test aircraft. This is an essential next step for the U.S. Army to test the new T55-GA-714C engine capability for its latest CH-47 Chinook helicopters. To date, the engine has tested through Maximum Continuous Power, demonstrating mechanical operation and acquiring key performance data. Additional testing is planned at significantly higher power levels.
"First engine to test is a significant achievement for the program and is the culmination of detailed design work, component manufacturing, system integration and validation. Now all the engineering is coming to life in the rigorous testing of this enhanced engine for the U.S. Army," said Dave Marinick, president, Engines and Power Systems, Honeywell Aerospace. "This engine is a natural incremental complement for the Chinook, keeping the platform relevant for the next generation of warfighters. We are confident that our 714C engine will exceed the expectations of the U.S. Army."

the current T55, even in the most demanding operating conditions. New modifications also make the next-generation T55 easier to maintain with lower operating costs, delivering increased readiness for the warfighter.

Honeywell has reached a significant milestone with the U.S. Army by being the first engine to test (FETT) as part of its Cooperative Research and Development Agreement (CRADA) for the next-generation engine for Chinook helicopters. The CRADA program and testing of the T55-714C engine is planned over a two-year period to validate the benefits and ease of integration of the new engine variant onto the Chinook platform. This will allow the U.S. Army to evaluate the capabilities of the newest rendition of Honeywell's battle-proven T55 engine.

Testing of the first T55-GA-714C engine was successfully initiated at Honeywell's Phoenix test facilities in November to verify the design and establish the performance benchmark in preparation for the engine installation on the flight test aircraft. This is an essential next step for the U.S. Army to test the new T55-GA-714C engine capability for its latest CH-47 Chinook helicopters. To date, the engine has tested through Maximum Continuous Power, demonstrating mechanical operation and acquiring key performance data. Additional testing is planned at significantly higher power levels.

"First engine to test is a significant achievement for the program and is the culmination of detailed design work, component manufacturing, system integration and validation. Now all the engineering is coming to life in the rigorous testing of this enhanced engine for the U.S. Army," said Dave Marinick, president, Engines and Power Systems, Honeywell Aerospace. "This engine is a natural incremental complement for the Chinook, keeping the platform relevant for the next generation of warfighters. We are confident that our 714C engine will exceed the expectations of the U.S. Army."

With 6,000 horsepower, Honeywell's upgraded engine is 23% more powerful and consumes 8% less fuel than the current T55, even in the most demanding operating conditions. New modifications also make the next-generation T55 easier to maintain with lower operating costs, delivering increased readiness for the warfighter.

"We are proud to partner with the U.S. Army on the CRADA program for the next-generation T55-GA-714C engine," said Steven Williams, vice president, Defense Aftermarket, Honeywell Aerospace. "We will be able to demonstrate the power, capability and reliability of the upgraded engine to the U.S. Army. Additionally, we are on track and on schedule to deliver the new engines and meet the U.S. Army's needs."

The T55-GA-714C engine is specifically designed for next-generation military operators and will improve the Chinook helicopter's ability to lift troops and heavy cargo for the U.S. Army. Because the engine is based closely on the T55 version currently in use, minimal airframe modifications are required — the same intake, exhaust and engine airframe mounts are used. This design provides the U.S. Army with a major engine improvement without the need to retrain their maintenance and operational staff or undertake major aircraft changes.

In 2020, Honeywell won a competitive repair and overhaul contract for the T55. In addition, Honeywell completed a new, world-class engine repair and overhaul facility in Phoenix. That move allowed the repair and overhaul work on the T55-GA-714A engine to be fulfilled in the same location as new engine production. The T55 center of excellence provides for a shared workforce, facilities and engineering resources between both engine lines and delivers up to 20 engines per month to the U.S. Army, foreign military and commercial customers.

Honeywell first delivered the T55 engine to the U.S. Army in 1961 at 2,200 shaft horsepower on the CH-47A helicopter. Since that time, the engine's power has nearly tripled to 6,000 shaft horsepower. Each performance increase on the T55 is accompanied by reduced fuel burn, increased reliability and decreased maintenance hours. The T55 engine is the world leader in powering heavy lift helicopters. Over 900 CH-47 helicopters are operated today by various militaries around the world.

IIGA DIGITAL

https://orangemedia.asia
https://www.iiga.news
https://iiga.shop
https://iiga.one
https://industrialroadshow.com
https://honeybot.link

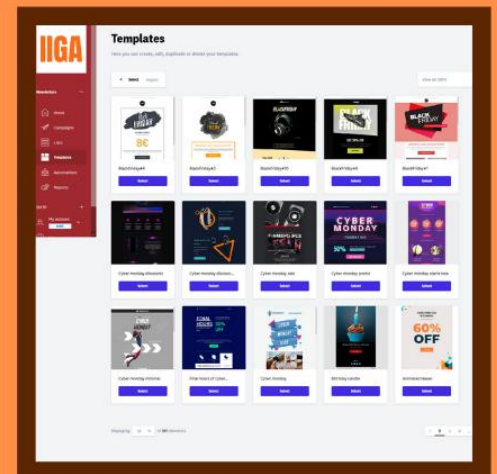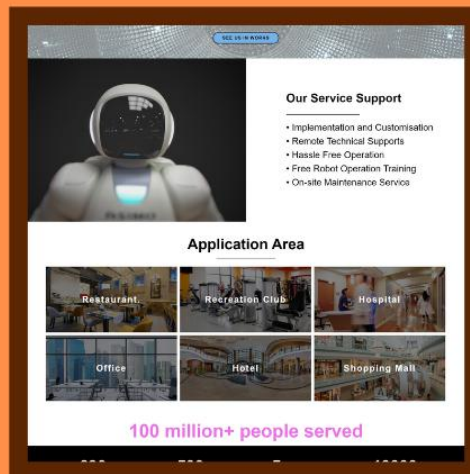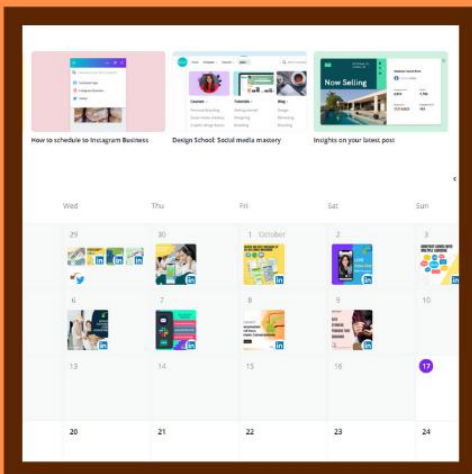**FROM MEDIA TO DIGITAL MARKETING**

- ✓ Social Media Campaign
- ✓ Email Marketing
- ✓ Email Validation
- ✓ Dynamic QR Code with mini landing page
- ✓ 1-1 Management Virtual Meeting

OUR SERVICES

- ✓ No Code Site -Webflow
- ✓ Landing Page
- ✓ SEO Content Writing
- ✓ Copywriting
- ✓ Smart Ads
- ✓ Chatbot

Another exciting division of Industrial Guide Asia

ROCKWELL AUTOMATION AND CYTIVA COLLABORATE TO ACCELERATE AUTOMATION PLATFRMS IN THE BIOPHARMACEUTICAL INDUSTRY

Rockwell Automation, the world's largest company dedicated to industrial automation and digital transformation, today announced that it has begun collaborating with Cytiva, a global life sciences leader, to accelerate the industry's digital transformation. This new collaboration deepens Cytiva's 2019 pledge to invest in China and also strengthens the relationship between Rockwell and Cytiva that has been in place since 2019. Cytiva joined the Rockwell Automation PartnerNetwork Program as an OEM Partner to help drive a best-in-class distributed control system offering.

Rockwell Automation and Cytiva will bring their combined expertise in biomanufacturing and automation to create an efficient, flexible, and scalable platform. As part of the collaboration, the companies are building an Automation and Digital Transformation Center, located inShanghai, to co-host demonstrations, trainings, and more.

Ian Shih, regional vice president, Greater China, Rockwell Automation, says: "Scalable and sustainable development is of the utmost importance to our companies and to the industry as a whole. Our combined solutions offer the flexibility to scale up for vaccine production or scale down to produce smaller batches of personalized medicines."

Lihua Yu, General Manager, Greater China, Cytiva says: "As the industry moves toward more automated manufacturing solutions, together we can bring digital-oriented R&D and streamlined production to life not only in China, but throughout the world. Our joint work will accelerate the development and delivery of transformative medicines, reduce costs, and ultimately deliver more medicines to patients in need."

Rockwell Automation and Cytiva will promote Cytiva's Figurate automation platform in China, as well as globally. The suite of offerings by Rockwell will power Cytiva's range of solutions from idea to injection. The collaboration enables stronger integration, data collection, and analysis. This results in a standardized manufacturing platform capable of core data management.

In addition, the two companies have established multiple centers, including the Testa Center in Uppsala, Sweden, to assist customers in their drug development process. They are exploring how to apply the Industrial Internet of Things (IIOT), Augmented Reality (AR) and other advanced technologies for connectivity across the manufacturing process. With innovative solutions for factory field management in progress, Rockwell Automation and Cytiva are establishing a promising future for digital solutions for biopharmaceutical companies, helping enhance training and efficiency for operators, improving speed of batch review, streamlining equipment management, and intensifying efficiency.

GSK AND THE UNIVERSITY OF OXFORD LAUNCH NEW OXFORD-GSK INSTITUTE TO HARNESS ADVANCED TECHNOLOGY AND UNRAVEL MECHANISMS OF DISEASE

GlaxoSmithKline plc and the University of Oxford today announced a major five-year collaboration to establish the Oxford-GSK Institute of Molecular and Computational Medicine. The new Institute, which will be based at the University of Oxford, aims to improve the success and speed of research and development of new medicines, building on insights from human genetics and using advanced technologies such as functional genomics and machine learning.

Genetic evidence has already been shown to double success rates in clinical studies of new treatments, and the digitisation of human biology has the potential to improve drug discovery by more closely linking genes to patients. The new Institute aims to build on this scientific progress and improve how diseases are understood by drawing on recent advances in pathology, including how to measure

changes on a cellular, protein, or tissue level.

Backed by £30 million from GSK, the Institute is intended to pioneer further improvements in how new medicines are discovered and developed. For example, scientists from GSK and Oxford will help prioritise those early R&D programmes most likely to succeed and match them to patients most likely to respond.

The Institute will evaluate and integrate new approaches in genetics, proteomics and digital pathology to understand detailed patterns of disease which vary amongst individuals. The initial focus of research will be on neurological diseases, such as Alzheimer's and Parkinson's Disease.

Prime Minister Boris Johnson said: "We saw first-hand during the pandemic how the ingenuity and pioneering spirit of UK scientists and the R&D sector saved thousands of lives, with the rapid development and delivery of medicines and vaccines around the world.

"I am delighted to see that GSK and the University of Oxford are today taking further steps to deepen our understanding of some of the most complex diseases, such as Parkinson's. Together they will harness the power of scientific collaboration to progress cutting-edge technologies and accelerate drug discovery – helping to cement the UK's role as a life sciences superpower."

Emma Walmsley, Chief Executive Officer, GSK said: "We are delighted to be joining with the University of Oxford in this new collaboration. By combining the strengths of our two scientific organisations and harnessing advanced technologies, the Oxford-GSK Institute exemplifies the UK's track-record and continued ambition in life sciences..

Together, our aim is to improve drug discovery and development to help bring new and better medicines for patients."

Professor Louise Richardson, Vice-Chancellor of the University of Oxford, said: "On behalf of colleagues across Oxford I would like to say how delighted we are by this new initiative with GSK. The Institute will create a unique partnership with staff from the university's medical school and GSK working side-by-side to research and develop treatments for some of the most difficult to treat diseases. In addition, the Institute, in keeping with our educational mission, will provide training and build capacity in Britain's academic and bioscience sectors."

The genetic and genomic revolution of the past decade has amassed vast datasets of promising targets for medicine discovery. These datasets can be combined with functional genomics to provide deep understanding of disease at a molecular level.

"I am delighted to see that GSK and the University of Oxford are today taking further steps to deepen our understanding of some of the most complex diseases, such as Parkinson's. Together they will harness the power of scientific collaboration to progress cutting-edge technologies and accelerate drug discovery – helping to cement the UK's role as a life sciences superpower."

Emma Walmsley, Chief Executive Officer, GSK said: "We are delighted to be joining with the University of Oxford in this new collaboration. By combining the strengths of our two scientific organisations and harnessing advanced technologies, the Oxford-GSK Institute exemplifies the UK's track-record and continued ambition in life sciences. Together, our aim is to improve drug discovery and development to help bring new and better medicines for patients."

Professor Louise Richardson, Vice-Chancellor of the University of Oxford, said: "On behalf of colleagues across Oxford I would like to say how delighted we are by this new initiative with GSK. The Institute will create a unique partnership with staff from the university's medical school and GSK working side-by-side to research and develop treatments for some of the most difficult to treat diseases. In addition, the Institute, in keeping with our educational mission, will provide training and build capacity in Britain's academic and bioscience sectors."

The genetic and genomic revolution of the past decade has amassed vast datasets of promising targets for medicine discovery. These datasets can be combined with functional genomics to provide deep understanding of disease at a molecular level.

By harnessing this understanding, as well as the power of machine learning, the Institute will uncover new indicators and predictors of disease and use them to accelerate the most promising areas for drug discovery. This is particularly important for GSK as it prioritises the large number of genetically informed drug targets generated from its collaborations with organisations, such as 23andMe and UK Biobank. The Institute will also aim to provide new measurements to establish proof of concept for potential medicines earlier in the R&D process, by better identifying the most appropriate patients to enrol in clinical trials, thus accelerating drug development timelines.

GSK and Oxford bring complementary capabilities and expertise into the Institute. GSK has leading capabilities in human genetics and functional genomics, and an in-house artificial intelligence and machine learning function, including its AI hub in central London. The University of Oxford has similar expertise but together they will be using patient, molecular information and state-of-the-art platforms to pinpoint the GSK targets that are most likely to succeed and be developed into safe, effective, disease mechanism-based medicines.

Diseases driven by neuro-immunological mechanisms including Alzheimer's, Parkinson's, Multiple Sclerosis (MS), Frontal Temporal Dementia, Amyotrophic Lateral Sclerosis (ALS) and Pain will be within the initial scope of the Institute. GSK has a rich pipeline of genetically informed targets and clinical projects in these areas.
The Institute will recruit a number of new research groups, in addition to drawing upon existing expertise from both GSK and Oxford. Five GSK/Oxford fellowships will be provided for early to mid-career researchers to establish themselves as Principal Investigators researching areas aligned with the Institute's aims and objectives.

The Institute will have its base in the Nuffield Department of Medicine, and be closely associated with colleagues from across departments, including the University's Wellcome Centre for Human Genetics and Big Data Institute. GSK and Oxford are in active discussions regarding the nature of the first projects which are anticipated to start in the second half of 2022 and will use the latest laboratory and data science platforms and approaches. A completely new way of collaborating will be established where research teams will have both GSK and University members, including secondments between both institutions.

The Directors of the Institute will be Professor John Todd, Director of the Wellcome Centre for Human Genetics and Dr Tony Wood, SVP, Medicinal Science and Technology at GSK.

SHELL COMPLETES SALE OF ITS PERMIAN BUSINESS TO CONOCOPHILLIPS

As noted in the announcement of the agreement for the sale of Shell's Permian business, this deal reflects Shell's focus on value over volumes as well as disciplined stewardship of capital. This transaction was made possible by the Permian team's outstanding operational performance and provides excellent value to our shareholders through accelerated cash delivery and additional distributions. As previously announced, the cash proceeds from this transaction will be used to fund $7 billion in additional shareholder distributions with the remainder used for further strengthening of the balance sheet. The first tranche of additional shareholder distributions will be in the form of share buybacks of up to $1.5 billion and will commence on December 2, 2021. The form and timing for distributing the remaining $5.5 billion will be announced in early 2022. These distributions are in addition to our shareholder distributions in the range of 20-30% of cash flow from operations.
Notes to editors

- On September 20, 2021, Shell and ConocoPhillips announced that they had reached an agreement for ConocoPhillips to acquire Shell's Permian business.
- The transaction resulted in an after-tax gain of $2.4 to $2.6 billion after adjustments.
- Majority of Midland-based Permian employees and many Houston-based employees were offered employment by ConocoPhillips with effect upon closing in accordance with the terms and conditions of the transaction.

- Shell is one of America's leading energy companies with interests in 50 states employing more than 15,000 people. Shell's U.S. portfolio of operated companies and interests consists of oil, natural gas, petrochemicals, gasoline, lubricants, and other refined products along with renewables such as wind, solar, and mobility options like electric vehicle charging and hydrogen. In the U.S. Shell is also investing in an integrated power business that will provide electricity to millions of homes and businesses.

Cautionary note

The companies in which Royal Dutch Shell plc directly and indirectly owns investments are separate legal entities. In this announcement "Shell", "Shell Group" and "Group" are sometimes used for convenience where references are made to Royal Dutch Shell plc and its subsidiaries in general. Likewise, the words "we", "us" and "our" are also used to refer to Royal Dutch Shell plc and its subsidiaries in general or to those who work for them. These terms are also used where no useful purpose is served by identifying the particular entity or entities. "Subsidiaries", "Shell subsidiaries" and "Shell companies" as used in this announcement refer to entities over which Royal Dutch Shell plc either directly or indirectly has control. Entities and unincorporated arrangements over which Shell has joint control are generally referred to as "joint ventures" and "joint operations", respectively. Entities over which Shell has significant influence but neither control nor joint control are referred to as "associates". The term "Shell interest" is used for convenience to indicate the direct and/or indirect ownership interest held by Shell in an entity or unincorporated joint arrangement, after exclusion of all third-party interest.

This announcement contains forward-looking statements (within the meaning of the U.S. Private Securities Litigation Reform Act of 1995) concerning the financial condition, results of operations and businesses of Shell. All statements other than statements of historical fact are, or may be deemed to be, forward-looking statements. Forward-looking statements are statements of future expectations that are based on management's current expectations and assumptions and involve known and unknown risks and uncertainties that could cause actual results, performance or events to differ materially from those expressed or implied in these statements.

Forward-looking statements include, among other things, statements concerning the potential exposure of Shell to market risks and statements expressing management's expectations, beliefs, estimates, forecasts, projections and assumptions. These forward-looking statements are identified by their use of terms and phrases such as "aim", "ambition", ''anticipate'', ''believe'', ''could'', ''estimate'', ''expect'', ''goals'', ''intend'', ''may'', "milestones", ''objectives'', ''outlook'', ''plan'', ''probably'', ''project'', ''risks'', "schedule", ''seek'', ''should'', ''target'', ''will'' and similar terms and phrases.

There are a number of factors that could affect the future operations of Shell and could cause those results to differ materially from those expressed in the forward-looking statements included in this announcement, including (without limitation): (a) price fluctuations in crude oil and natural gas; (b) changes in demand for Shell's products; (c) currency fluctuations; (d) drilling and production results; (e) reserves estimates; (f) loss of market share and industry competition; (g) environmental and physical risks; (h) risks associated with the identification of suitable potential acquisition properties and targets, and successful negotiation and completion of such transactions; (i) the risk of doing business in developing countries and countries subject to international sanctions; (j) legislative, fiscal and regulatory developments including regulatory measures addressing climate change; (k) economic and financial market conditions in various countries and regions; (l) political risks, including the risks of expropriation and renegotiation of the terms of contracts with governmental entities, delays or advancements in the approval of projects and delays in the reimbursement for shared costs; (m) risks associated with the impact of pandemics, such as the COVID-19 (coronavirus) outbreak; and (n) changes in trading conditions.

No assurance is provided that future dividend payments will match or exceed previous dividend payments. All forward-looking statements contained in this announcement are expressly qualified in their entirety by the cautionary statements contained or referred to in this section. Readers should not place undue reliance on forward-looking statements. Additional risk factors that may affect future results are contained in Royal Dutch Shell plc's Form 20-F for the year ended December 31, 2020 (available at www.shell.com/investor and www.sec.gov).

These risk factors also expressly qualify all forward-looking statements contained in this announcement and should be considered by the reader. Each forward-looking statement speaks only as of the date of this announcement, December 1, 2021. Neither Royal Dutch Shell plc nor any of its subsidiaries undertake any obligation to publicly update or revise any forward-looking statement as a result of new information, future events or other information. In light of these risks, results could differ materially from those stated, implied or inferred from the forward-looking statements contained in this announcement.

The contents of websites referred to in this announcement do not form part of this announcement.

CLEARPATH ANNOUNCES PARTNERSHIP TO ACCELERATE AUTONOMOUS VEHICLE DEVELOPMENT
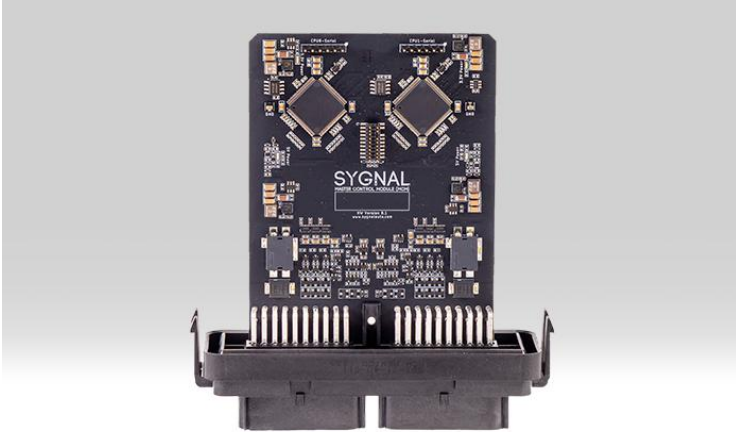
Clearpath Robotics, a manufacturer of mobile robotic platforms for research and development, and Sygnal Technologies Inc, experts in drive-by-wire (DBW) control systems, have announced a partnership to bring the Sygnal drive-by-wire conversion kit to the global autonomous vehicle developer community. Under the partnership agreement, Clearpath is authorized to sell and support the Sygnal DBW system world-wide via its component store.

The Sygnal DBW system is a drive-by-wire control system that allows for seamless electronic control over a vehicle's accelerator, brake and steering, to enable testing for autonomous vehicle applications and technologies. Designed for quick and easy integration, the Sygnal DBW system comes with comprehensive documentation and can be installed in less than 30 minutes in compatible vehicles. Its economical price point makes it ideal for developers looking to build fleets of autonomous vehicles.

"We are excited to partner with Sygnal to offer their drive-by-wire system to researchers and developers." said Bryan Webb, President of Clearpath Robotics. "We believe that the world has just gotten started with autonomous passenger vehicles. We see a bright future for the technology as developers further embrace the opportunities that driverless vehicles can offer. Our products, partnerships, services and track record uniquely position us to provide leading driverless car technology to the research and development community."

"Clearpath is one of the most respected robotics companies on the planet, so when we started discussing a partnership we knew it would be a great fit," said Syngal CEO Josh Hartung. "Between our expertise in robust by-wire control systems and their expansive expertise in automated systems, I think this offering is going to be very hard to ignore for R&D groups worldwide."

Sygnal DBW system is currently compatible with the Kia Niro and Kia Soul electric vehicles. More vehicle options will be introduced in the near future.

MATRADE PROPEL ADOPTION OF SUSTAINABILITY AMONG MICRO, SMALL AND MEDIUM ENTERPRISES THROUGH MTC–MSME BENCHMARKING PROGRAMME

MATRADE continues to propel the adoption of sustainability among Malaysian Micro, Small and Medium Enterprises (MSMEs), towards reinforcing their global competitiveness as export champions. The benchmarking element on sustainability has enriched the existing customised exporters development programme, via exclusive coaching session spearheaded by the graduates of Mid-Tier Companies Development Programme (MTCDP).

Deputy Chief Executive Officer (Exporters Development) of MATRADE, Abu Bakar Yusof said, "We received overwhelmed responses on the previous session conducted and continue in organising this interactive platform on sharing knowledge between Mid-Tier Company (MTC) with MSMEs. This programme encourages for closer relations between MSMEs and MTCs, besides being able to build working linkages and subsequently joining MTCs' global supply chain in efforts to strengthen MSMEs' global footprints."
The benchmarking programme aims to guide the MSMEs on understanding major global trends and identifying critical elements of sustainability to be adopted and implemented. This value-added feature on exporters development is a journey to groom more export champions in the near future, increase the global competitiveness among the Malaysian exporters and strengthen their global footprints to tap into the global supply chain.

The rising demand on sustainability urges the Malaysian exporters to take control and be responsive on this matter as it will increase the impact on corporate reputation. Adoption of sustainable good practises and standard will become necessity in the near future. This has been addressed through National Trade Blueprint (NTBp) on pursuing sustainability and innovation. Several strategic recommendations that include establishment of sustainable manufacturing centre to nurture sustainable practises among Malaysian exporters and stakeholders, addressing forced labour issues while encouraging sustainability certification to promote long-term social sustainability and instillation of the concept of sustainability across the Government agencies to support the exporters in embracing the adoption of sustainability elements into their businesses.
"Sustainability has been one of MATRADE's strategic focus in the development programme. As part of our efforts to future-proof Malaysian exporters, MATRADE has introduced Sustainability Action Values for Exporters (SAVE)

initiative in 2019, where we encourage the exporters to embrace sustainability policies and practises in their businesses ad operations, particularly to equip the companies or markets that have embedded the Environmental, Social and Governance (ESG) into their principles," he added. To date, MATRADE has established strategic partnerships with reputable organisations such as UN Global Compact, CIMB and Malaysia Green Technology Corporation (MGTC).

In line with the 12th Malaysia Plan, MATRADE will strive to create more export champions, supporting the ongoing efforts by the Government in regenerating Malaysian economy, driving the growth of new sectors while striking the balance to ensure the socio-economic inclusiveness and sustainability.
MATRADE has successfully groomed 275 MTCs through MTCDP since the programme started in 2014. It is one of the Government's high impact initiatives in the Malaysia's Development Plan. In 2020, companies under MTCDP reported exports' revenue of RM15.38 billion, an increase of 3.6% compared with the year before.
The MTCDP targets export-oriented MTCs with annual revenues between RM50 million to RM500 million for manufacturing companies and RM20 million to RM500 million for services companies. Interested companies are encouraged to contact midtier@matrade.gov.my for more details.

ZEBRA TECHNOLOGIES EXPANDS INDONESIAN SERVICE CENTER TO COMPLEMENT BUSINESS GROWTH

Zebra Technologies Corporation, an innovator at the edge of the enterprise with solutions and partners that enable businesses to gain a performance edge, today announced the expansion of its service center through service partners in Indonesia to support the growth in local demand for mobile printers.

The global mobile printer market is expected to grow considerably from 2021 to 2023, and according to IDC, more opportunities have emerged during the COVID-19 pandemic for the Indonesian printing business, especially those supporting label-packaging purposes.

"Given this growing demand, it is no surprise that the sales of our printers have increased by double-digits year-over-year," said Christanto Suryadarma, Sales Vice President of Southeast Asia, Zebra Technologies Asia Pacific. "To complement the growing popularity of our mobile printers, we have expanded our service center

capabilities to include all printers in addition to our other tracking, mobile computing and scanning solutions."

Zebra's authorized service partner in Indonesia – PT Sentral – is equipped with skilled technicians who are proficient in repairing Zebra's broad portfolio of innovative products and solutions. To support the expanded service center, Zebra has provided additional training to existing technicians and added new technicians as well.

The expansion of the service center reinforces Zebra's commitment to its Indonesian customers as it offers greater convenience and less business downtime, which translates into enhanced business continuity and operational efficiency.

"Our customers in Indonesia are our priority and we are fully committed to this market. We want to provide them with a complete solution that includes hardware, software, and services to achieve a performance edge. We also want them to enjoy greater convenience and a peace of mind when using our solutions without the need to worry about business downtime," added Suryadarma.

Businesses with Zebra OneCare™ maintenance plans can leverage the service center in Indonesia along with those customers using Zebra products that are under warranty. Zebra OneCare further offers users with technical and software support, security software updates, analytics reports and more. Additional flexible enhancements are also available, allowing customers to tailor their service plans to meet individual business needs today and as their operations evolve in the future.

In addition to the service center in Indonesia, Zebra has five others in Southeast Asia including Singapore, Malaysia, Thailand, Vietnam, and a newly added one in the Philippines which opened in November 2021.

KEY TAKEAWAYS
- The expansion of Zebra's service center through service partners in Indonesia is poised to support its business growth driven by the rising local demand for mobile printers.
- The expanded service center adds printers to its existing portfolio of tracking, mobile computing and scanning solutions.
- Zebra's customers in Indonesia get to enjoy greater convenience, less business downtime, and a peace of mind with the expansion of the service center.

BATTERY–POWERED MIREO PLUS B DECARBONISES EUROPE'S RAILWAYS

The Institute will evaluate and integrate new approaches in genetics, proteomics and digital pathology to understand detailed patterns of disease which vary amongst individuals. The initial focus of research will be on neurological diseases, such as Alzheimer's and Parkinson's Disease.

Prime Minister Boris Johnson said: "We saw first–hand during the pandemic how the ingenuity and pioneering spirit of UK scientists and the R&D sector saved thousands of lives, with the rapid development and delivery of medicines and vaccines around the world.

One of the reasons railways are the 'greenest' form of transport is that it is relatively easy to power trains by electricity – from overhead catenary or contact rails. However, electrification isn't always viable for regional or local routes, and Siemens has developed a new platform which allows operators to fully decarbonise these operations efficiently and economically – Mireo Plus.

In Germany, only around 50% of routes are electrified. Drawing on its many decades of experience in building electric trains (Siemens was the most important pioneer of them in the 20th century), it has designed Mireo Plus from the ground up to offer flexibility, range and efficiency.

- Niederbarnimer Eisenbahn (NEB) orders 31 battery–powered vehicles from Siemens Mobility
- The environmentally friendly Mireo Plus B trains will run on all lines of the Ostbrandenburg network

From December 2024, the Berlin–Brandenburg metropolitan region will get environmentally friendly, battery–powered regional trains for the first time, as well as improved and more condensed timetable

services. Niederbarnimer Eisenbahn (NEB) has ordered 31 two–car battery trains of the type Mireo Plus B from Siemens Mobility.

East Brandenburg rail network gets 31 battery-electric trains

- Climate-friendly contract conditions are met: Niederbarnimer Eisenbahn (NEB) orders 31 battery-operated trains from Siemens Mobility ...

In March 2020 Siemens Mobility received the first order for 20 battery–powered trains

Mireo Plus B – Multiple units with battery hybrid drive

Start of operation 12/2023

Maintenance for 29.5 years

20 Mireo Plus B two-car trains

120 seats

Client Regional Office for Rail Vehicles Baden-Württemberg

Siemens Mobility receives first order for battery-powered trains

- 20 Mireo Plus B battery-powered trains for Baden-Württemberg ...

The Landesanstalt Schienenfahrzeuge Baden–Württemberg (SFBW) ordered 20 Mireo Plus B trains. The two–car electric trainsets with 120 seats can operate on rail routes with or without overhead power lines thanks to their battery hybrid drive and are scheduled to operate in Network 8 of the Ortenau regional system.

The contract also includes maintenance of the trains by Siemens Mobility for a period of just under 30 years. State Minister for Transport Winfried Hermann said: "This marks the first time battery–powered trains will be used in the state. With this innovative technology, the electrification of rail routes without continuous overhead power lines will also be possible."

Mireo Plus B trains for Hermann–Hesse–Bahn in Baden–Württemberg

The state of Baden–Württemberg has ordered three Mireo Plus B trains from Siemens Mobility. The battery–electric trains will ensure locally emission–free traffic on the new Hermann–Hesse–Bahn between Renningen and Calw from 2023. Siemens Mobility will additionally take over maintenance of the trains over their entire service life. By being equipped with the latest European Train Control System, the Mireo Plus B trains are equipped for ETCS Level 2 operation. This new standard offers more track capacity, greater


Mireo Plus B trains for Hermann-Hesse-Bahn in Baden-Württemberg

The state of Baden-Württemberg has ordered three Mireo Plus B trains from Siemens Mobility. The battery-electric trains will ensur...

punctuality as well as interoperability in cross–border rail traffic. The reorder option became possible as part of a past order for 20 Mireo Plus B for the Ortenau network in 2020.
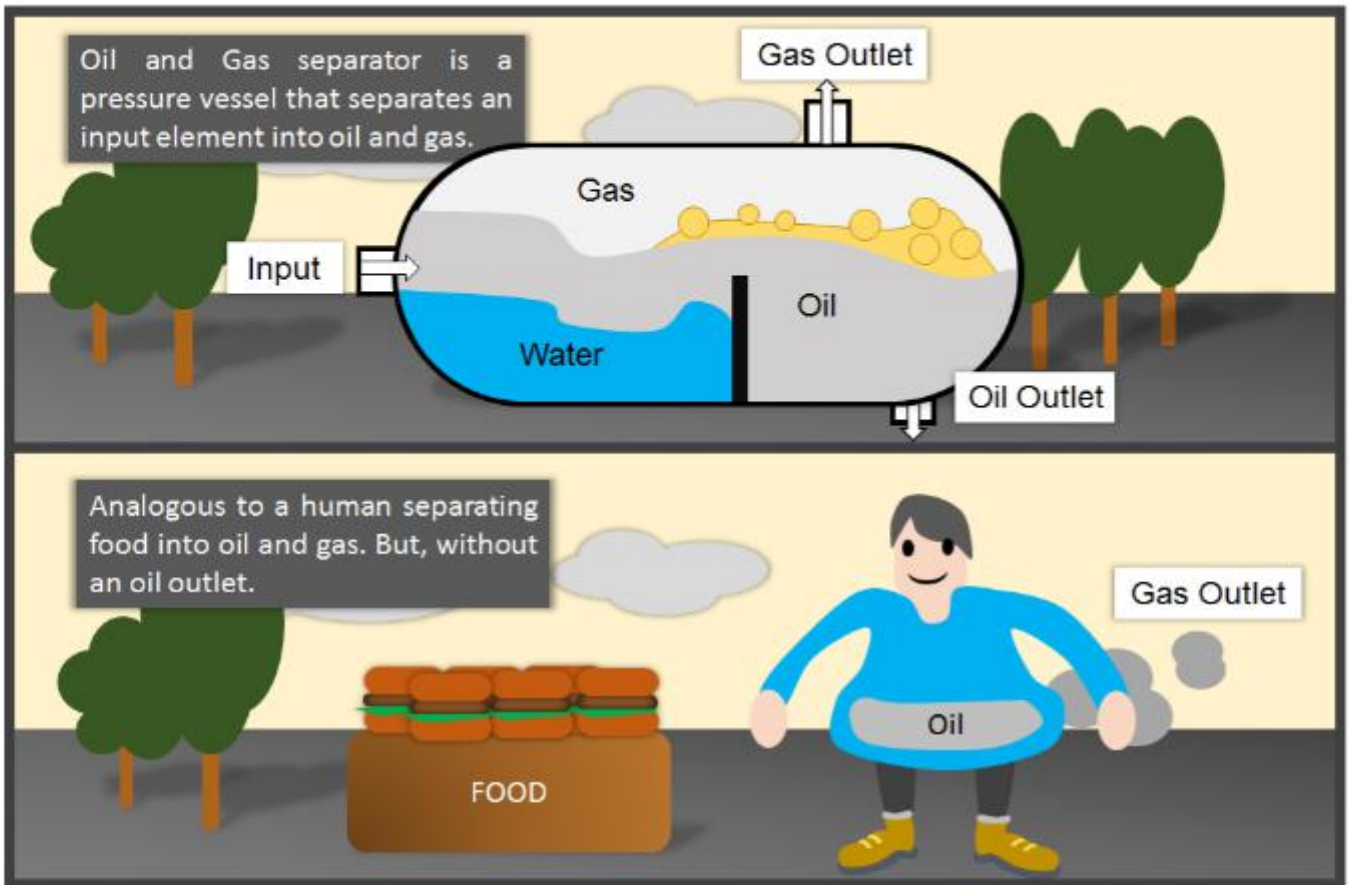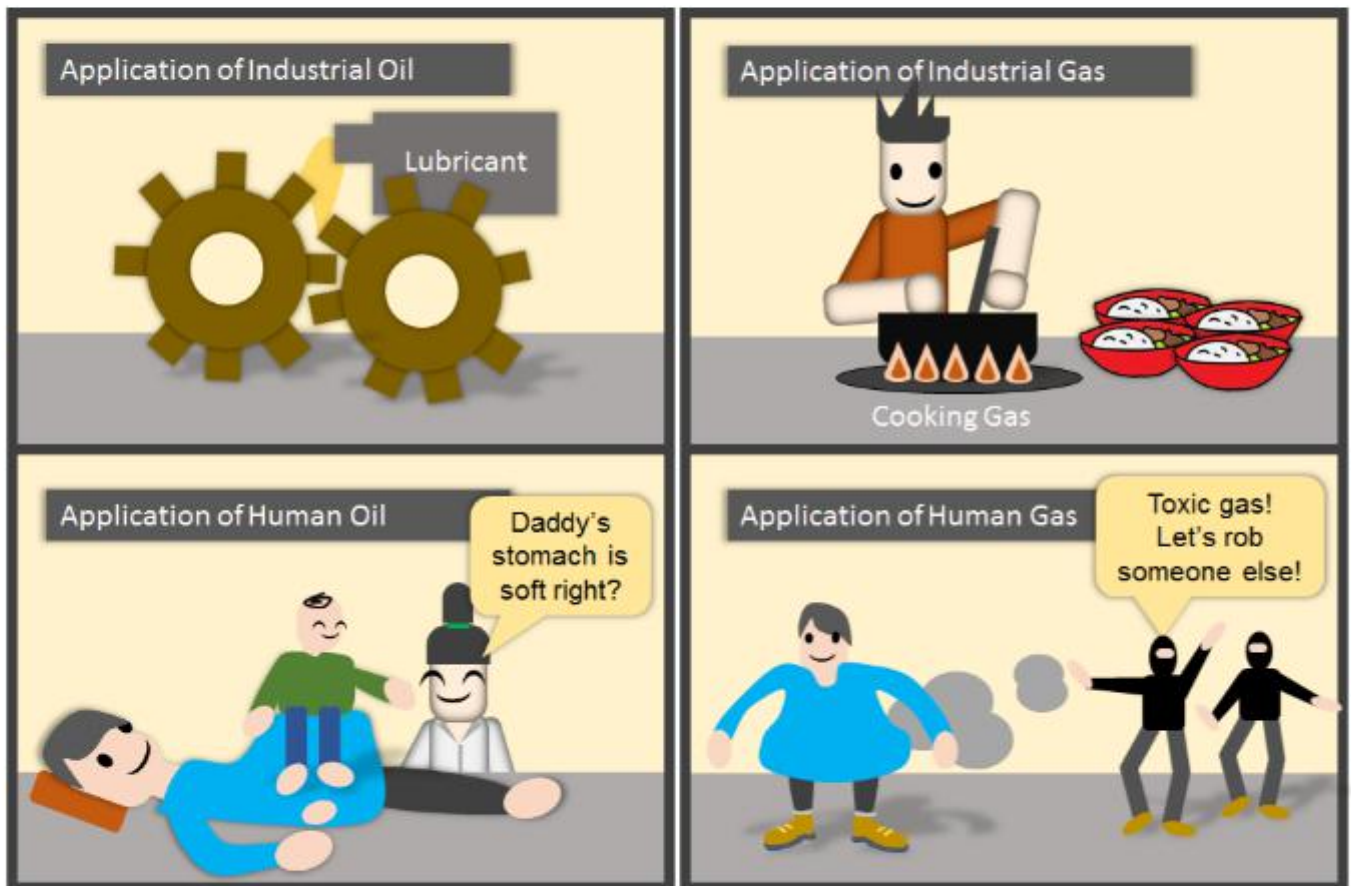
SUMITOMO ELECTRIC RELEASES CROSS-LINKED FLUORORESIN FEX™ TAPE WITH APPROXIMATELY 1,000 TIMES HIGHER WEAR RESISTANCE

In order to reduce environmental burden, tape products with more functionalities are increasingly needed. FEX™ tape can be used extensively and effectively as an alternative to conventional fluororesin tapes. While Sumitomo Electric expects annual sales of about 100 million yen in 2023, the Company anticipates that there will be increasing applications where FEX™ tape is useful since environmental consideration is increasingly required in today's society.Sumitomo Electric will continue to support manufacturing industry around the world by meeting social needs with its unique material and application development technologies.

*1
PTFE stands for polytetrafluoroethylene, which is a linear polymer of fluorine (F) and carbon (C). Since the bonding force between C and F is extremely strong and stable, it has excellent properties, such as extremely high slipperiness (the lowest level of friction in solids), non-adhesiveness, heat resistance, chemical

Sumitomo Electric Industries, Ltd. has developed "cross-linked fluororesin FEX™ tape" (FEX™ tape), which is about 1,000 times more resistant to wear than conventional fluororesin (PTFE*¹) tape. After sample shipment scheduled to start in December 2021, it will be on sale from April 2022.

Cross-linked fluororesin FEX™*² (Fluoro Ethylene Crosslinking) was developed by Sumitomo Electric in 2012 by making full use of two key technologies, fluorine processing technology and electron beam irradiation technology.*³ Taking advantage of its characteristics, such as about 1,000 times more resistance to wear than conventional PTFE, strengthened adhesion to base materials, and improved durability, FEX™ has been used for coating a wide variety of products that go beyond the range of conventional fluororesin applications, such as automobiles, office equipment,
semiconductors, and medical products, since its release.

As a new product form of FEX™, the Company has developed FEX™ tape, which allows users to easily utilize the high wear resistance of FEX™ just by attaching it to an object, and has made the product ready for mass production.
The use of FEX™ tape for equipment eliminates the need for frequent replacement of parts and tape due to wear and peeling, thus the product is expected to bring various advantages over conventional fluororesin tapes, such as extended service life and less frequent maintenance of equipment, improved workability, and the prevention of scratches on equipment. In addition, the product is environmentally friendly because its excellent slipperiness and wear resistance contribute to the reduction of load on equipment and wear debris, respectively.

resistance, and weather resistance. In addition, due to its lowest electronegativity and polarity among macromolecules, it is difficult for foreign molecules to adhere to it, and the fluorine molecules are weakly bonded to each other, making them prone to wear.

*2
The wear resistance of cross-linked fluororesin FEX™ has been improved up to approximately 1,000 times by applying a cross-linking reaction (see *3)to PTFE in order to overcome the weaknesses described in *1 while maintaining the original excellent properties.

*3
A technology to irradiate polymer materials with electron beams. Sumitomo Electric introduced Japan's first commercial electron beam accelerator in 1964, starting the production and sales of the heat shrink tubing "SUMITUBE™," the heat-resistant tubing "IRRAX™ TUBE," and the modified engineering plastic "TERALINK™." This time, very strong covalent bonds were formed by irradiating PTFE with an electron beam under special conditions to generate a cross-linking reaction, which forms "bridges" between molecular chains. Therefore, various properties, such as heat resistance, chemical resistance, and wear resistance, have been improved.

ifm electronic

A passion for Quality

ifm electronic stands for an incredibly wide range of industrial quality sensors & systems, for facory automation & process control applications.
Launched in 1969, as man set foot on the moon, the company has continued to research, develop & manufacture innovative products to optimise advanced technical processes. With incredible industry & application know-how, ifm provide successful solutions that are innovative, yet economical. We have the product range & flexibility required to meet our customer's expectations. From an individual sensor, through to a complete system.
Present in more than 70 countries, 5,000 direct employees service & support installations with over 100,000 customers, in every industry.
Your satisfaction is our goal!

ifm – close to you!

sales.my@ifm.com
Tel: +603 8063 9522

HONEYWELL'S NEW AIR MONITOR ALERTS WHEN INDOOR CONDITIONS MAY PRESENT INCREASED RISK FACTORS FOR EXPOSURE TO AIRBORNE VIRUSES

Honeywell today announced a new, user-friendly monitor that alerts users when indoor air conditions may present an increased risk of potentially transmitting airborne viruses in schools, restaurants and other spaces.

The Honeywell Transmission Risk Air Monitor is an easy-to-deploy, portable device that measures carbon dioxide and features a proprietary risk alerting system based on user-selected activity levels within a room. This helps customers be aware of when to proactively improve indoor air quality, which according to the U.S. Centers for Disease Control and Prevention, can help reduce the spread of certain diseases and decrease the risk of exposure among building occupants.

The new monitor incorporates a proprietary algorithm developed by Honeywell based on research conducted at the University of Colorado on the influence of aerosols on the transmission risks of airborne viruses. Users are alerted when conditions are present that indicate a certain air risk factor level is reached so they can increase ventilation with outdoor air and/or improve air filtration, which the U.S. Environmental Protection Agency recommends as important components of a larger strategy for indoor air quality.

"The importance of indoor air quality isn't going to go away once we have the pandemic behind us. People are more aware of and cognizant to the potential impact that indoor air quality can have on well-being and productivity," said Mary Furto, Chief Marketing Officer of Honeywell's Gas Analysis and Safety business. "Our monitor provides an efficient and simple way for users to be alerted if their indoor spaces present increased risk factors by analyzing breathable air. This can enable users to understand when to take appropriate actions such as increasing ventilation in a room."

Honeywell's monitor uses CO_2, temperature and humidity sensors and offers three pre-programmed activity level settings. It features a green, yellow or red light to alert users about the potential for increased indoor air risk factors. It incorporates an easy-to-read digital display, a rechargeable battery and is Bluetooth®*- and WiFi-enabled to allow for connectivity between the device and its mobile application and online dashboard.

Depending on the number of devices an individual or organization uses, Honeywell created unique user experiences to easily monitor certain indoor air risk factors. For schoolteachers or small business owners who use one or a few monitors, they are encouraged to use the Transmission Risk Air Monitor application from a mobile device.

For organizations with several monitors, such as schools or school districts, they can access an online dashboard to monitor certain indoor air risk factors across devices from one centralized location.

Scientific evidence suggests using air monitors[1] to measure indoor environmental air can be an efficient method[2] to assess the potential risk and exposure to airborne viruses, which can fluctuate based on CO_2 concentration levels and how active people are in a space.

"Our research has shown a close correlation between the likelihood of transmitting airborne viruses and increased carbon dioxide levels. Effective monitoring solutions can indicate that fresh air is sufficient and circulating properly in an enclosed space," said Jose-Luis Jimenez, Professor of Chemistry and CIRES Fellow, University of Colorado-Boulder. "Our recommendation is to display a real-time carbon dioxide monitor in all public indoor spaces so people can learn quickly what environments are safer or less safe for a given activity. Going forward these monitors can be useful as a metric of indoor air quality to indicate when conditions could present an increased risk of exposure to airborne viruses."

In addition to potentially reducing risk of exposure to airborne viruses, indoor air quality adjustments can be beneficial for student health and academic performance. While adverse effects have been reported for elevated levels of CO_2 in classrooms, studies have shown that increasing ventilation can help students with decision-making, attention, concentration and memory.[3]

For more than 50 years, Honeywell has developed innovative gas detection solutions and analytics software to protect workers in challenging conditions across a wide range of industries. The company's portable BW SOLO CO_2 detectors are being used by workers handling large amounts of dry ice to package and ship certain COVID-19 vaccines.

The Honeywell Transmission Risk Air Monitor complements Honeywell's Healthy Buildings solutions, which integrate air quality, safety and security technologies along with advanced analytics to help building owners improve the health of their building environments, operate more cleanly and safely, comply with new guidelines, and help reassure occupants as they return to the workplace. Honeywell has an advanced indoor air quality portfolio that can help improve occupant well-being, meet energy efficiency goals, and importantly, change the way that occupants experience a building.

The Honeywell Transmission Risk Air Monitor (HTRAM) analyzes specific air quality conditions and alerts the user when conditions are present that may increase the risk of exposure to airborne viral transmission. It does not prevent or reduce virus transmission nor mitigate viruses that may be present, nor does it detect or warn against the presence of any virus, including but not limited to COVID-19. The HTRAM does not repel or destroy any microorganism, viruses, bacteria, or germs.

Honeywell Safety and Productivity Solutions (SPS) provides products, software and connected solutions that improve productivity, workplace safety and asset performance for our customers across the globe. We deliver on this promise through industry-leading mobile devices, software, cloud technology and automation solutions, the broadest range of personal protective equipment and gas detection technology, and custom-engineered sensors, switches and controls.

FUJITSU LAUNCHES 'GLOBAL FUJITSU DISTINGUISHED ENGINEER' PROGRAM TO ACCELERATE GLOBAL BUSINESS, TECHNOLOGY, AND HUMAN RESOURCES STRATEGIES WITH LEADING ENGINEERS

Fujitsu announced the launch of the Global Fujitsu Distinguished Engineer (Global FDE) program, which recognizes the contributions of top-tier engineers that not only possess exceptional world class technical capabilities but have also proven to create value to strategies and customers in Fujitsu's growth technology areas critical to its future of the business.   The program, which is based on a common global standard, awards titles and boosts the visibility of leading engineers in the Fujitsu Group, rewarding engineers in a way that is linked to the job-based personnel system and clarifies their career paths. Global FDE employees contribute to the growth of Fujitsu by continuously advancing technology to make an impact on society.

As a technology company, Fujitsu will continue accelerating innovation in line with its Key Focus Areas (1) and commitment to contribute to society through the power of technological innovation.

Leading the Way in Leveraging Technology to Solve Customers' Business Problems, Drive Innovation Strategy As the face of Fujitsu's technological capabilities and expertise, Global FDE employees will serve as role models that lead through example, leveraging their

exceptional skills to solve some of the most challenging business problems confronting the company and customers alike. These engineers, selected from a diverse pool of talent representing the top-tier of Fujitsu's ranks, will participate in the formulation of business and technological strategies for the Group. They will also play an important role in accelerating the HR strategy for the group as role models for other engineers under the Job-based HR system.

Certification Process

This program assesses and certifies Fujitsu's engineers, regardless of nationality, age, or gender, according to their present as well as potential future technical expertise, capabilities, and business contributions in areas critical to the business based on a common global standard. In fiscal 2021, Fujitsu established seven certification domains for the program: Hybrid IT, Network, Cybersecurity, AI, Data, Computing, and Project Management. Fujitsu plans to review the scope of certification according to business conditions on an ongoing basis.

Future Plans

In fiscal 2021, Fujitsu conferred the title of Global FDE upon 32 employees worldwide (2). In addition, it will continue to certify employees on an annual basis and aims to award the title to approximately 100 employees by fiscal 2023.
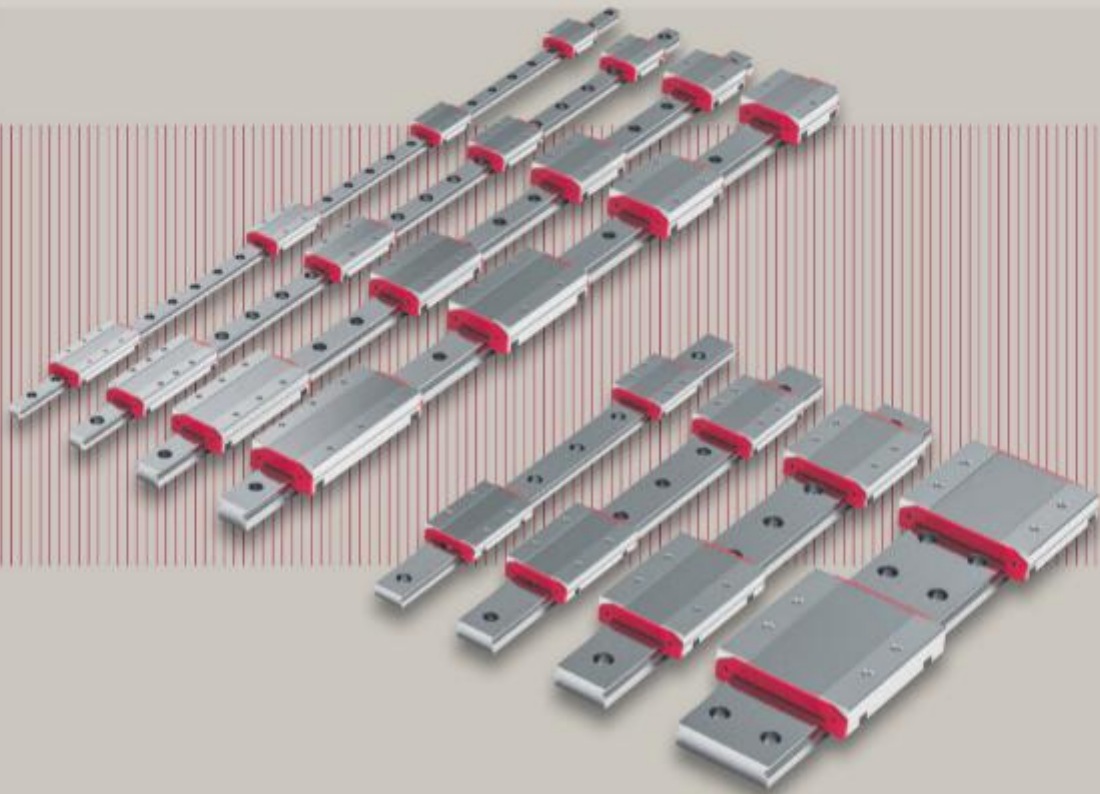
Going forward, the program will play in important role in advancing Fujitsu Uvance, its business brand launched in October 2021, contributing to the achievement of its ultimate purpose "to make the world more sustainable by building trust in society through innovation." In alignment with its vision for Fujitsu Uvance, Fujitsu will accelerate initiatives like the GFDE program that contribute to innovation in accordance with its technology strategies (3), particularly those that support the growth of its business in its Key Focus Areas.

ROLLS-ROYCE WELCOMES ITALIA TRASPORTO AEREO'S SELECTION OF 10 AIRBUS A330NEO AIRCRAFT, POWERED BY TRENT 7000 ENGINES
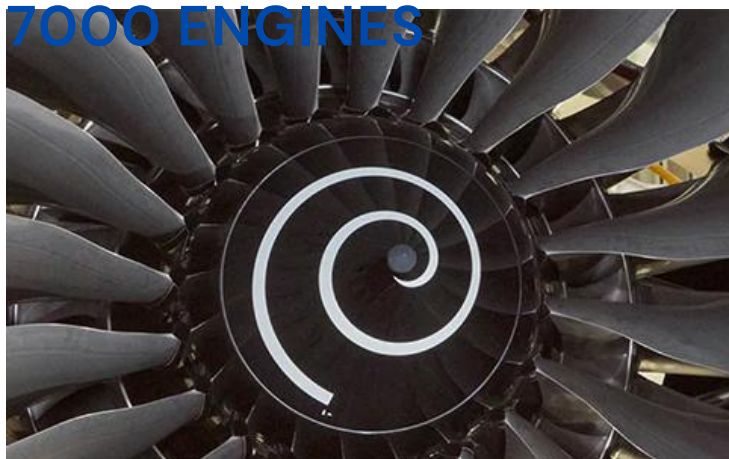
Italian airline Italia Trasporto Aereo (ITA) has selected 10 Airbus A330neo aircraft, powered by Rolls-Royce Trent 7000 engines. ITA Airways is the latest customer to take the Trent 7000.

The Trent 7000, which first entered service in November 2018, is the latest engine in the Trent family, which has clocked up more than 150 million engine flying hours across 26 years of operating. The Trent 7000 builds on the unsurpassed performance of the Trent 700 combined with the engine technology of the Trent XWB.

Supporting ITA Airways's mission to become an efficient, innovative, and competitive carrier, the Trent 7000 is quieter and contributes to a 25 per cent lower fuel burn per seat at aircraft level compared to previous generation competitors. It is also ready to operate on Sustainable Aviation Fuels as they become more available to airlines in the future. As well as offering improved efficiency, the Trent 7000 also provides 99.9% dispatch reliability.

Ewen McDonald, Rolls-Royce Civil Aerospace, Chief Customer Officer, said: "We are delighted that ITA Airways has selected the Trent 7000 and this agreement represents the start of a great partnership. With an excellent fuel burn performance, the Trent 7000 is the perfect choice to support the airline's aspirations. We look forward to working with them in the future.

Francesco Presicce, ITA Airways, Chief Technology Officer, said: "We are looking forward to welcoming the A330neo, powered by the Trent 7000, to our fleet. The engine forms an important part of our business plan and our goal of operating a new environmentally-friendly fleet."

YOKOGAWA DEVELOPS SINGLE CELLOME SYSTEM SS2000 FOR SUBCELLULAR SAMPLING

Yokogawa Electric Corporation (TOKYO: 6841) announces that it has developed the Single Cellome™ System SS2000, a single-cell analysis solution that utilizes high-resolution images captured with a confocal microscope to automatically and accurately collect samples of specific cells and intracellular components. The SS2000 will be released in Japan, the US, and China in February 2022, with release in other markets such as Europe to follow at a later date.

Development Background

As the smallest unit of all living organisms, cells can greatly differ from one another; hence, there is a growing focus on single-cell analysis involving the isolation and handling of individual cells, as opposed to studying a population. In recent years, with improved analytical technology, it has become possible to analyze not only single cells but also specific molecules within them.

Understanding the characteristics and functions of cells and mechanisms for cell development is a very effective means for clarifying the causes of diseases, preventing them, and verifying the efficacy of new drugs. This is essential for drug discovery research and the development of precision medicine and regenerative medicine.

Conventional techniques for the analysis of intracellular components have typically involved the disruption and collection of heterogeneous cell populations, which does not allow for sampling at the individual cell level, so many components cannot be collected and essential information on cell location and morphology is lost. In addition, as this sampling is done manually, throughput is low, and it is quite difficult for even experienced researchers.

Utilizing Yokogawa's core imaging technologies that enable the real-time analysis of minute phenomena in live cells, the Single Cellome System SS2000 incorporates new technologies that automatically and accurately control sampling operations in order to support the performance of cutting-edge life science research.

Feature

Yokogawa confocal microscopy technology enables the rapid, minimally invasive imaging of living cells. Based on the high-sensitivity analysis of the high-resolution 3D images, the cells are automatically and precisely sampled using precise positioning technology.

1. **Optimal selection of cells or regions within cells according to set criteria.** The SS2000 analyzes images of a large number of cells within a target range and classifies them by using provided criteria such as cytoplasm area and nucleus size. It then identifies which cells are suitable for analysis and determines their sampling location. Utilizing criteria such as distance from the nucleus, image analysis can even identify optimal regions within individual cells.

2. **Reliable sampling of target cells and components within individual cells.** The SS2000 directly samples only target cells without detachment, retaining all positional and morphology information in the culture plate. Furthermore, the utilization of high-resolution 3D images and precise positioning technology enables the selective sampling of target organelles and cytoplasm.

3. **Samples can be used for a broad range of analyses.** The collected cells and intracellular components can be used for a broad range of analyses, including genetic analysis and mass spectrometry. The optimum and efficient collection of target samples improves analytical sensitivity. In addition, single living cells that have been sampled can be grown in secondary cell cultures.

Hiroshi Nakao, a Yokogawa Electric vice president and head of the Life Business Headquarters, comments, "The newly developed Single Cellome System SS2000 is a solution that will play a key role in future cell research. It provides the potential to understand not only the characteristics of single cells, but also the networks and communication between cells, allowing us to ascertain pathological mechanisms. In an era where more and more people are living to the age of 100, Yokogawa will accelerate the development and provision of solutions to protect lives, health, and safety."

Single Cellome™ System SS2000 for Subcellular Sampling
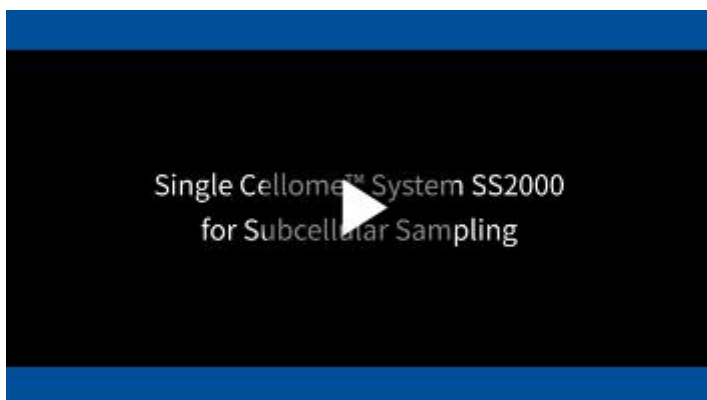
CONTINENTAL RECEIVES FIRST SERIES ORDER FOR VEHICLE HIGH-PERFORMANCE COMPUTER IN CHINA

Technology company Continental continues to pioneer on the road towards software-defined vehicles and has received its first series order for an in-vehicle high-performance computer (HPC) from a major Chinese vehicle manufacturer.

The solution will first launch in the manufacturer's electric vehicle platform in 2023 and is planned to be subsequently rolled-out in five electric, hybrid and combustion engine carlines in China. Besides being Continental's first HPC for a Chinese vehicle manufacturer, this project also marks an important step towards cross-domain high-performance computers in server-based architectures. Integrating functions and features from the body and vehicle control domain, the HPC will, for example, manage data communication and over-the-air updates, as well as torque and thermal management.

For this, Continental is not only providing the HPC hardware, but also the basic software, integration services and architecture design to its customer.

With our first Chinese high-performance computer we are building on our know-how as a pioneer in this field and continue to drive the revolution towards software-defined vehicles globally. Integrating a wide range of different functions, this project marks an important step towards central cross-domain computing solutions for future mobility," says Jean-Francois Tarabbia, head of the business unit Connected Car Networking at Continental.

"As we will be developing the solution with our team, supported by the newly founded Continental China Software & System Development Center in Chongqing, we are also demonstrating how we transfer global expertise to best serve our customers in our core markets.

The solution for the Chinese vehicle manufacturer is based on the second-generation platform of Continental's Body HPC platform, but additionally integrates a vehicle control unit. With this, the HPC comprises a set of features and functions spanning over traditionally separated domains. It carries out body functions such as access, door and window control along with the tasks of a gateway with data and over-the-air update management and diagnosis.

Additionally, the HPC also integrates vehicle control functions such as thermal and torque management for electric vehicles and a fuel consumption algorithm based on machine learning and edge computing for the combustion engine models.

By bringing these different domains together, a core element for the solution is a safety application framework which complies with high-functional safety standards in a real-time computing environment, as well as the adherence to strict cyber security requirements. With the server-based architecture and a separation of hardware and software, Continental also enables the vehicle manufacturer to provide new functions, updates and upgrades of the software via over-the-air services to the owners once the vehicles are in the field.

HUAWEI SMART RAILWAY SOLUTION AND 5G NETWORK SUPPORT GRAND LAUNCH OF LAOS-CHINA RAILWAY

General Secretary of the CPC Central Committee and President Xi Jinping, together with Secretary General of the Central Committee of the Lao People's Revolutionary Party, President Thongloun Sisoulith, on December 3 jointly witnessed the grand opening of the Laos-China Railway through an online meeting.

Departing from the north in Kunming, China, to Vientiane station in the south, the Laos-China Railway is 1,035 kilometres long.
The railway is of great significance to bilateral economic, social and cultural exchanges as well as regional connectivity, and also contributes to regional development and prosperity.

Travel time from the China-Laos border to Vientiane has now been shortened from 2 days to just 3 hours. Departure from Kunming and arrival in Vientiane can now be achieved in the same day. This is the first railway in Laos and has changed Laos from being a "land-locked country" to a "land-linked country", boosting regional connectivity and supply chain resilience.

This means that business activities and travel between China and South-East Asia have become more convenient and easier.
The railway brings Laos into a new era of transportation networks in the region. The 1,035 kilometre long railway will boost the various sectors of the region and help Laos to recover its economy after being hit by the Covid epidemic.

Huawei Smart Railway Solution has supported the Laos-China Railway in digitalisation efforts, enabling advances in safety and security across all aspects of the railway, including construction, operations and maintenance.

At the same time, Huawei is working closely with Laos' telecom operators to build a high-speed network and ensure stable connectivity, with advanced technology benefitting the Lao people and passengers.

"The launch of the Laos-China Railway is a great vision of the leaders of both countries, and the significant efforts of all workers has made this come true in a space of five years. Huawei has worked together with Laos' telecom operators to build a wireless network along the railway. 5G coverage will be available in the near future so that people can enjoy more stable, high-speed and smart connectivity.

"Working while on the train and staying in touch with friends and families anytime anywhere has become possible. Thanks to their big contribution! After we open the railway, we should open the digital-way, digital-one-belt-one-road," said Minister of Technology and Communications, Prof. Dr Boviengkham Vongdara.

Project director of Huawei Laos, Mr Somlith Nammanininh, said "It is my great honour to participate in this grand opening and support the ceremony. As a Lao citizen, I am very excited that finally there is a railway in my motherland, which was beyond my imagination a few years ago. I believe the Laos-China Railway will spur the economy, help Laos to integrate into the global market, and create more opportunities for local businesses and people."

"Like all Huawei people that participate in the network construction of the whole railway, I am very proud of the HUAWEI CLOUD meeting, 5G technology and FTTX solution that has ensured the online meeting of this historical moment. I look forward to seeing the merger of digital technology and modern transportation to bring a good future to the country."

"Huawei has been operating in Laos for 23 years. "In Laos, for Laos" is our mission, and we have witnessed and participated in this great historic moment. Huawei Laos will continue to make contributions to the digital economy and industry transformation in Laos."

MITSUBISHI POWER UPGRADES GAS TURBINES AT SENOKO ENERGY TO REDUCE 15,000 TONS OF CARBON EMISSIONS ANNUALLY

Mitsubishi Power, a power solutions brand of Mitsubishi Heavy Industries, Ltd. (MHI) has completed upgrade works for two GTCC power plants with M701F gas turbines at Senoko Energy in Singapore. This has helped to improve energy efficiency and reduce approximately 15,000 tons of carbon emissions annually, equivalent to removing over 4,500 cars from the road a year.

The upgrade is part of a long-term service agreement (LTSA) concluded under a consortium with Mitsubishi Corporation. Mitsubishi Power applied its latest gas turbine technologies to the M701F gas turbine, achieving a heat rate improvement by reducing the volume of cooling air, which results in reduced carbon emissions.

The successful upgrade led to Senoko Energy receiving Honorable Mention in the Best Practices category for the National Environment

Agency's EENP Awards(Note1) Mr. Tan Cheng Teck, Executive Vice President, Operations & Maintenance, Senoko Energy said, "This project validates the hard work of our engineers, technicians and workers, particularly as the upgrade occurred during a challenging time of the pandemic.

"We are grateful to the project team for their meticulous planning and execution, the close collaboration with Mitsubishi Power and other contractors, as well as tremendous support from EMA in facilitating the entry of technical advisers from Japan to Singapore through the Green Lane arrangement. This was truly a team effort."

Congratulating Senoko Energy on the award, Mr. Osamu Ono, Managing Director and Chief Executive Officer of Mitsubishi Power Asia Pacific said: "Upgrading works, together with operations & maintenance (O&M), are not only essential for maximizing the asset value of existing power plant infrastructure but can also help improve energy efficiency and reduce carbon emissions in the path towards decarbonization. Mitsubishi Power commends Senoko Energy for the EENP Award they received in recognition of this successful upgrade. We are honored to build upon our long-standing relationship with Senoko Energy to provide critical gas turbine upgrading that supports their push for cleaner power generation in Singapore."

Work on the upgrade and LTSA began on June 21, 2019, as part of Senoko Energy's efforts to improve energy efficiency and decarbonize in line with Singapore's Carbon Pricing Act(Note2), which saw subsidies for company efforts that led to reductions in carbon emissions. Close collaboration between Senoko Energy, Mitsubishi Power and other contractors allowed upgrade works to be completed on schedule while ensuring workplace safety despite challenges faced during the COVID-19 pandemic.


NARROWING DOWN THE POTENTIAL IN THIS INDUSTRY
industrialguide ASIA
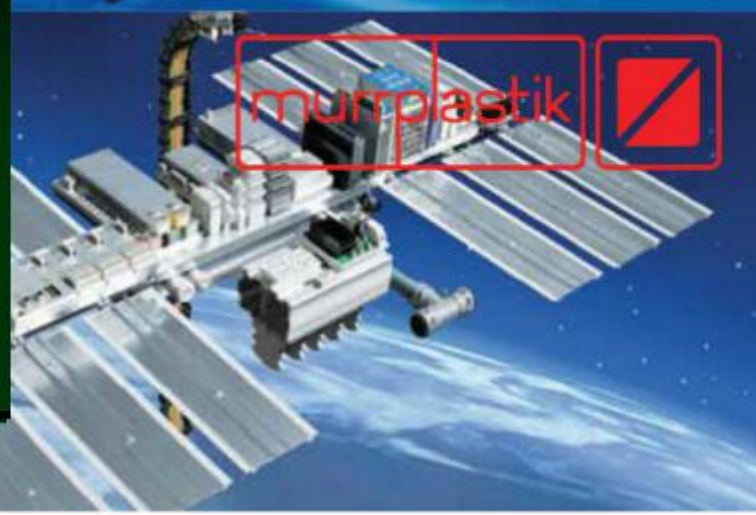
AP & C INKS NEW AGREEMENT WITH AIRBUS TO PROVIDE TITANIUM POWDERS

AP&C – a GE Additive company has announced it has signed a new agreement with Airbus to provide Titanium powders (Ti-6Al-4V) for use in metal additive manufacturing applications. The new multiyear agreement to provide Ti-6Al-4V powders deepens AP&C's working relationship with Airbus, which dates back several years.

"The adoption of metal additive technology in aerospace continues to gather momentum. And one of the challenges of matching that pace in a highly-regulated industry like aerospace, is building a robust supply chain that can meet both the industry standard for conventionally and additively manufactured parts, but also add value," said Alain Dupont, CEO at AP&C.
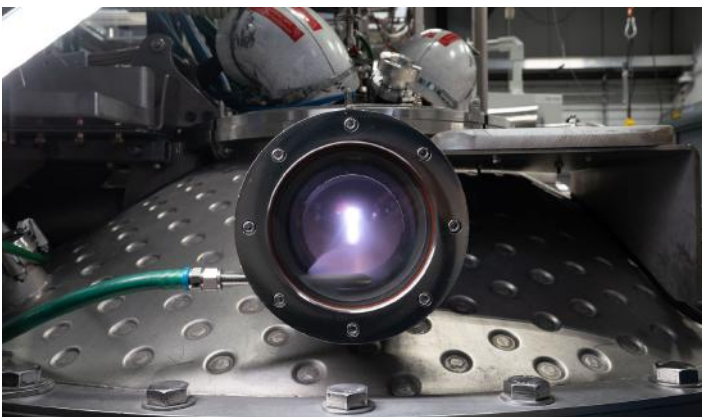
"Our approach is to be more than just a supplier of metal powders to our customers. To scale metal additive manufacturing, acceleration can only be achieved by sharing knowledge and best practice to lower risk and increase stability. One way we have supported Airbus in recent years, for example, has been to help its in-house additive manufacturing team establish its own methods and processes to qualify Ti-6Al-4V powders," added Dupont.

AP&C is a world-leader in the large-scale production of plasma atomized titanium, aluminum and nickel powders. The company continues to invest in its plasma atomization technology that allows new materials to be produced and ultimately reduce the cost of plasma atomized powders, while maintaining the high quality required by metal additive manufacturing users in the aerospace industry.

AP&C has grown its capacity to more than 1,000 tons of titanium powder per year. This large-scale production is performed in more than a dozen powder production lines at two manufacturing sites.

NEW CANON CR-X300 4K WEATHERPROOF PTZ CAMERA PROVIDES IMPRESSIVE IMAGE QUALITY, CONNECTIVITY, FLEXIBILITY AND PROTECTION FROM THE ELEMENTS

Canon U.S.A., Inc., a leader in digital imaging solutions, today announced the launch of the CR-X300 4K Outdoor PTZ(pan-tilt-zoom) camera. The CR-X300 supports a full IP1 workflow, including a single cable solution with PoE++ for power that includes IP streaming of signal and control. Even better, the CR-X300 shares core imaging technologies, including image quality and autofocus capabilities Canon's popular lineup of professional camcorders, as well as the CR-N300 indoor PTZ camera.

The CR-X300 supports a wide range of communications standards and provides an outstanding level of protection from environmental factors, making it an ideal remote PTZ camera system for video capture in such outdoor scenarios as sports broadcasts, live events, wild animal observation, and theme parks. In addition, the CR-X300 offers built-in ND filters to help with shooting outdoors in the sun. In recent years, the demand for video content has grown, including large amounts of content

created and streamed on-location. By expanding its lineup of remote camera systems, Canon is providing users a more flexible, efficient, and less labor-intensive solution for video production workflows.

The new camera system delivers 4K 30P and 1080 60P / 4:2:2 / 10-bit video by leveraging video processing technologies cultivated through Canon's history of developing professional video cameras—including a 1/2.3-inch sensor and a DIGIC DV6 image processing platform. In addition, the CR-X300 features a 20x optical zoom lens with a 29.3 – 601mm equivalent2 focal length for video recording of various scenarios from wide-angle to the super-telephoto range.

The CR-X300 supports the same control and streaming protocols as Canon's CR-N500 and CR-N300 PTZ cameras. Canon's XC protocol allows for IP control of visual production equipment, including Canon's PTZ cameras, enabling them to work smoothly alongside the company's Cinema EOS system3 via the Canon RC-IP100 controller. The CR-X300, along with CR-N300 and CR-N500, can be controlled via XC Protocol with Canon's free Remote Camera Control Application software, as well as with industry controller leaders, such as RCT (Remote Camera Technology). In addition, these cameras can be controlled by multiple industry partners via VISCA over IP and VISCA Serial control, such as from Skaarhoj and others. This outdoor PTZ camera exhibits smooth and responsive pan and tilt movement, making it suitable for on-air and live streaming productions. The CR-X300 is also compatible with RTMP4 for live streaming and NDI® | HX protocol5, which supports live visual production, thus enabling users to build their own production environments, as well as RTP/RTSP.

The CR-X300 camera is resistant to dust and moisture, adhering to international IP65 standards for protection against water and other foreign substances. In addition, it is equipped with a lens wiper and an aluminum die-cast housing, helping reduce maintenance and allowing it to stand up to use in outdoor environments exposed to strong wind and rain. The CR-X300 is lightweight, weighing in under 16 lbs. and features a carrying handle and a

1/4 20 insert allowing it to be mounted to a tripod making it a good fit for temporary or permanent productions. The CR-X300 is compatible with the POE++6 standard, enabling the camera to be powered and controlled by a single LAN cable and thereby helping to reduce the cost and labor required for installation. The CR-X300 also offers multiple video IO's, including, Genlock, 6G-SDI, and HDMI.

AMECA ROBOT SHOWS OFF NEW LEVEL OF HUMAN-LIKE FACIAL EXPRESSIONS

Engineered Arts, a robot maker based in the U.K., is showing off its latest creation at this year's CES 2022. Called Ameca, the robot is able to display what appears to be the most human-like facial expressions by a robot to date. On its webpage, the company calls Ameca "The Future Face of Robotics." Engineered Arts is in the business of making robots that look as much like humans as is possible. To that end, they have been creating a series of robots with ever more life-like expressions. Its previous models were called Mesmer and RoboThespian—robots that were able to demonstrate a wide range of emotions. They were also painted with colors meant to mimic human skin and hair.

None of the robots at Engineered Arts has been designed to do anything, other than impress an audience. Mesmer was programmed in a way that allowed it to give a speech using the voice of a person behind the scenes. But they cannot walk or move around—they move only their arms, hands wrists, fingers, neck, head, eyes and mouth. But they do so in ways that look very human.

Ameca has been designed as a robot platform—customers who buy it can add AI and other software to give the robot desired abilities. The software it comes with is geared toward

protection. The housing components can be produced in a single-stage Direct Long Fiber Thermoplastic (D-LFT) molding process. LANXESS has optimized Durethan B24CMH2.0 as the material for the D-LFT molding compound. Kautex Textron compounds the PA6 for the process with glass fiber rovings

LANXESS has optimized Durethan B24CMH2.0 as the material for the D-LFT molding compound. Kautex Textron compounds the PA6 for the process with glass fiber rovings. The local reinforcement of the housing structure is carried out using continuous fiber-reinforced thermoplastic composites of the Tepex dynalite brand from LANXESS. "The process enables shorter and thus more economical cycle times than the processes in which steel or aluminium are processed," Haas explains.

creating life-like expressions. It can smile, frown, wink and open and close its mouth. It can also show surprise or frustration or amusement. In a video released by the company, the robot appears to wake, as if from a nap. As it does so, it appears to be surprised by its existence. And it behaves as if startled when suddenly looking at the camera—as if suddenly spotting the viewer looking at it.

Will Jackson, founder of Engineered Arts, spoke to the press recently, telling them that the abilities of Ameca and the company's prior robots are the result of over 15 years' worth of research and development. He also said that the goal of the company has remained the same—to develop robots that are able to interact in human-like ways, with humans.
Ameca is currently available for sale through the Engineered Arts website—certain models are also available for renting for events.

THINK BIG – LARGE – FORMAT PLASTIC HOUSINGS FOR HIGH–VOLTAGES OF ELECTRIC VEHICLES

Speciality chemicals company LANXESS and Kautex Textron GmbH & Co. KG, a Textron Inc. company, have been collaborating for several years to research whether battery housings for electric vehicles can be designed and manufactured from technical thermoplastics. Together, they have developed a near-series technology demonstrator in a feasibility study. With a length and width of around 1,400 millimeters each, the system is a technically sophisticated, large-format all-plastic housing part with a weight in the mid-double-digit kilogram range.

Going forward, Kautex and LANXESS want to use the results of the cooperation to enter into development projects for series production with automotive manufacturers," adds Dr Christopher Hoefs, Project Manager

e-Powertrain at LANXESS.

Single-stage manufacturing process with short cycle times

The demonstrator was developed based on the battery housing of a C-segment electric vehicle. It consists of a housing tray with crash structure, a housing cover and an underrun (underbody)

No complex metal forming, fewer production steps

Today, housings for high-voltage batteries are primarily made of extruded steel or aluminium profiles. Depending on the vehicle class, the housing length and widths can be well over 2,000 or 1,500 millimeters, respectively. The size, the number of components and the numerous manufacturing and assembly steps make metal housings very cost-intensive. For example, complex structures made from strand press profiles require many secondary work steps such as welding, punching and riveting. In addition, the metallic components must be protected against corrosion in an additional process step by cathodic dip coating.

"Plastics, on the other hand, can fully exploit their design freedom. By integrating functions such as fasteners and thermal management components, the number of individual components of a battery housing can be greatly reduced. This simplifies assembly and logistical effort, which reduces production costs," says Hoefs. Plastics are also corrosion-resistant and electrically insulating. The latter ensures, for example, that there is a reduced risk of the system short-circuiting. The low density of plastics and their potential for lightweight construction lead to significantly lighter housings, which benefits, among other things, the range of electric vehicles.

Complex mix of high requirements

High-voltage battery housings must meet a variety of highly demanding technical requirements. For example, they must

be stiff and strong and yet be able to absorb a significant amount of energy in the event of a crash. This is tested via mechanical shock- and crush tests. The housings must also be flame-retardant in the event of a vehicle fire or thermal run-away of the electrical cells. Finally, the housings must be integrated into the vehicle structure.
"We continue to work together on optimizing the production and structural design of the components. The aim is to carry out the majority of the development work virtually, in order to save costs in prototype design and to shorten the time to market of future series components," Hoefs says.
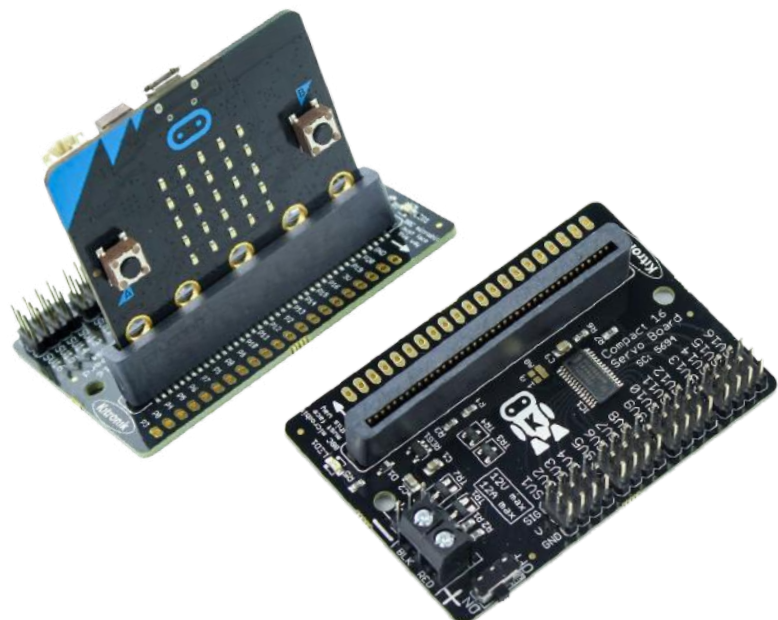
KITRONIK COMPACT 16 SERVO DRIVER BOARD FOR THE BBC MICRO:BIT

TAKE YOUR ROBOTICS PROJECT TO THE NEXT LEVEL WITH THE KITRONIK COMPACT 16 SERVO DRIVER BOARD FOR THE BBC MICRO:BIT.

This board allows up to 16 Remote Control (RC) servos to be driven simultaneously. It is based on the PCA9685 driver IC.

The board includes an integrated Edge Connector for the BBC micro:bit . Expansion Pads allow the connection of this board with other compatible micro:bit accessory boards using the "Link" pluggable pin header.

Power is provided via either a terminal block or servo style connector. The supply is then controlled by an on/off power switch to the board. There is also a green LED to indicate when the board is turned on. The board then produces a regulated 3.3V supply which is fed into the 3V and GND connections to power the connected BBC micro:bit. This removes the need to power the BBC micro:bit separately. The 3V and GND pins are also broken out on the Link header, which means external devices can also be powered.

Kitronik has produced a set of custom blocks for the MakeCode editor to simplify using the Compact 16 servo control board for BBC micro:bit. To add them to the editor, select the cog icon in the top right of the editor. Then, select Extensions from the drop-down menu and in the search bar type and enter Kitronik. Pick the **Kitronik I2C-16-servo** tile from the list and the new blocks will be added to the menu in the editor.
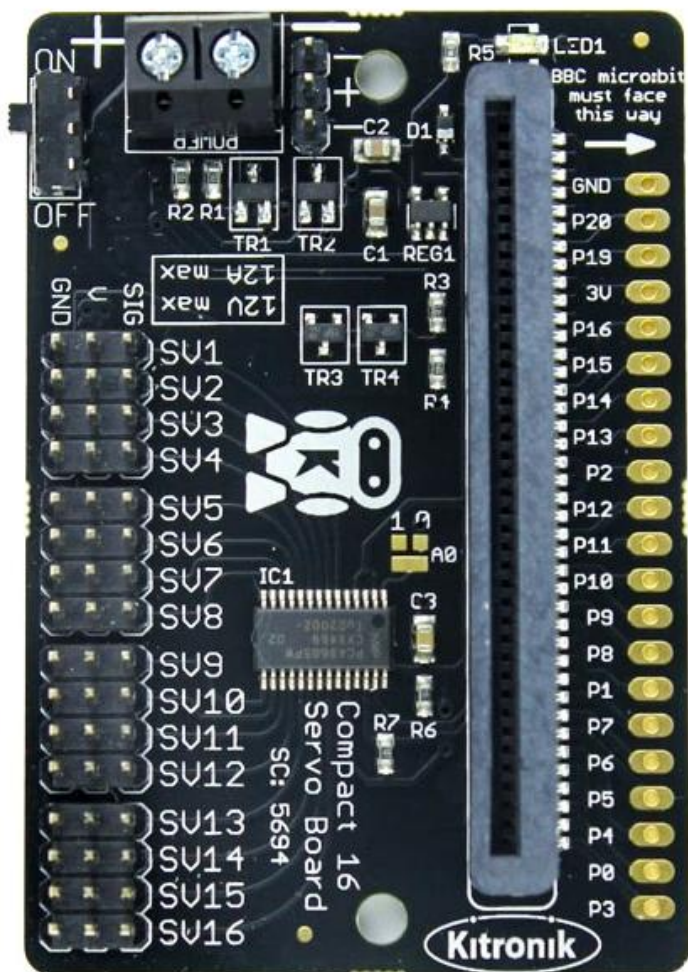
Features

- Drive up to 16 servo motors.
- Servos take power directly from the board power supply.
- Standard 0.1" pitch servo connectors.
- Link Standard compatible.
- This board also features an on/off switch and power status LED.
- Includes fitted Edge Connector for the BBC micro:bit to slot into.
- Power the board via either a terminal block or servo style connector.
- The 3V and GND pins are also broken out on the Link header, allowing external devices to be powered.
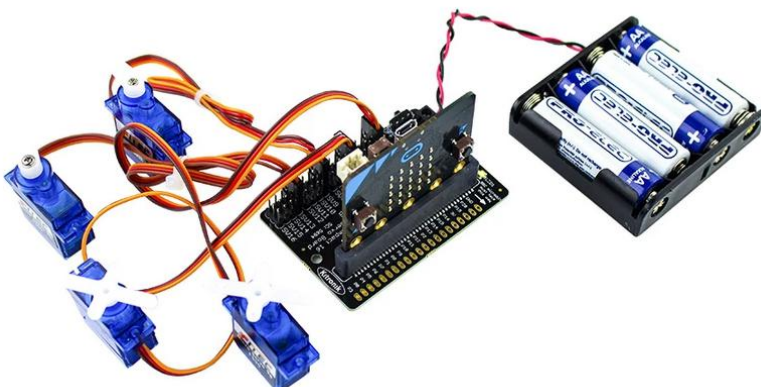- Code with the Microsoft MakeCode editor with custom blocks by Kitronik or with Python.

Contents

- 1 x Compact 16 Servo Driver Board for the BBC micro:bit.

Dimensions

- Length: 68mm.
- Width: 46.5mm.
- Height: 10.6mm.
- PCB Thickness: 1.6mm.

Requires

- A micro:bit.
- USB Cable.
- Power Supply.
- The following part is also required;
  - Servos

MCULITE-2

BASIC LOW COST JOYSTICK FOR 3-AXIS CMM WITHOUT AN LCD.

- Compatible with the range of Renishaw CMM controllers and incorporates all the functionality of the HCU1 hand controller for motorised head
- Controls motion of CMM axes
- Indexes the motorised head and rotary table
- Operates as a computer mouse
- Has a system menu for navigating the operating software
- Handheld or table mounted operation

UCC Retrofit

Renishaw has formed a technical partnership with some of the industry's leading software companies and retrofitters to provide powerful CMM retrofit solutions using Renishaw's UCC controllers.

Technical specification

MCU comparison
■ Standard specification
– Not available

	MCUlite-2	MCU5	MCU W	MCU5-2	MCU W-2
Display window	-	■	■	■	■
Fast / slow button	■	On paddle	On paddle	On paddle	On paddle
Programmable function keys	2	4	4	4	4
Axis locks	■	■	■	■	■
Engage / re-engage	■	■	■	■	■
Disable probe	■	■	■	■	■
Take point / delete point	■	■	■	■	■
Speed override	■	■	■	■	■
Operate rotary table	-	■	■	■	■
Run / stop program	-	■	■	-	-
Move in part CS	-	■	■	■	■
Soft stop facility	-	■	■	■	■
Wireless operation	-	-	■	-	■
Battery life	-	-	8 hours	-	10 hours
Move in stylus CS	-	Via menu	Via menu	■	■
Macro cycles	-	-	-	■	■
Orbital mode	-	UCCsuite 4.8 Via menu	UCCsuite 4.8 Via menu	■	■

Retrofits
Learn about retrofitting options for your CMM.

Extended Warranty
For peace of mind a 3-year warranty is available for your new CMM products during the first 3 months from purchase. Contact your vendor.

arduino.cc/pro
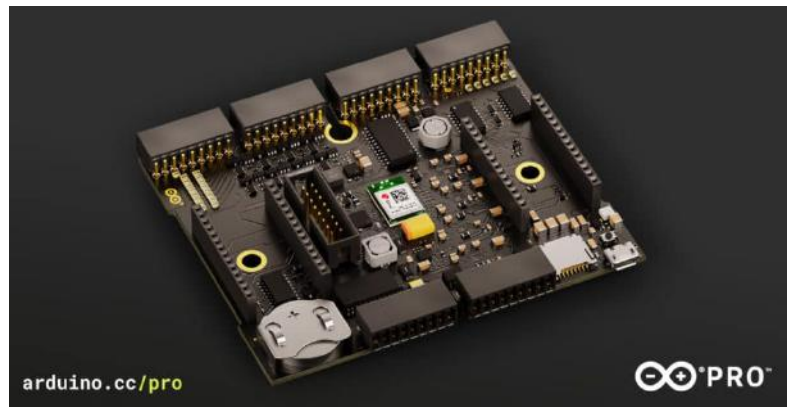
SENSE THE FUTURE OF SMART AGRICULTURE

CONTROL AND MONITOR OUTDOOR ENVIRONMENTS FROM EVERYWHERE WHILE LEVERAGING AI ON THE EDGE

Edge Control, a remote monitoring and control solution, optimized for outdoor environments.

The Arduino Edge Control can be positioned anywhere and is suitable for precision farming, smart agriculture, and other applications requiring intelligent control in remote locations. Power can be either supplied via solar panel or DC input.

Remotely control your application through the Arduino Cloud (or third-party services) using a choice of connectivity options suitable to the location. The Arduino Edge Control features built-in Bluetooth and its connectivity can be expanded with 2G/3G/CatM1/NB-IoT modems, LoRa®, Sigfox, and WiFi by adding any one of the MKR boards.

The Arduino Edge Control is capable of connecting sensors and drive actuators like latching valves (common in agriculture). Moreover, it has the capability to provide real-time monitoring over the entire process, thereby reducing production-related risks.

Particularly suited to smart agriculture, the sensors can collect real-time data such as weather conditions, soil quality, crop growth, amongst others. Once sent to the Arduino Cloud, the data value chain becomes valuable analytics that supports business processes at various levels (e.g. crop yield, equipment efficiency, staff performance, etc.). The Arduino Edge Control has the capability to improve crop quality and reduce human effort/error by automating processes like irrigation, fertilization, or pest control.

Read more about Edge Control's features, application examples, schematics, connectors and other technical aspects in its datasheet.

ROHM ADDS NEW FUNCTION TO ROHM SOLUTION SIMULATOR

ROHM SOLUTION SIMULATOR ENABLES FULL CIRCUIT VERIFICATION OF POWER SEMICONDUCTOR AND ANALOG ICS.

ROHM has added a new thermal analysis function to the ROHM Solution Simulator that allows designers of electronic circuits and systems in the automotive and industrial markets to collectively verify power devices and driver IC's thermal issues on different solution circuits.

ROHM Solution Simulator, which runs on ROHM's website, makes it possible to carry out a variety of simulations for free – from component selection to individual device and even system-level verification.

This enables easy and accurate verification of ROHM products such as SiC devices in power semiconductors, driver/power supply ICs, and passive components (i.e. shunt resistors) in solution circuits under close to actual application conditions.

ROHM released its ROHM Solution Simulator in 2020 – in line with the company's overall focus: developing and supporting application circuits that maximize the characteristics of driver ICs and power devices designed to supply high power in the automotive and industrial equipment markets.

In this context, the ROHM Solution Simulator enables full circuit verification of power semiconductor and analog ICs. The tool is free of charge, and the software has been well received for its applicability and high accuracy.

The newly added thermal analysis function can be implemented in solution circuits for devices and applications where heat is likely to become an issue in electronic circuit design.

This is the only simulator in the industry that enables web-based electrically and thermally coupled analysis of not only of the semiconductor chip (junction) temperature during operation, but also pin temperatures as well as thermal interference of board components on solutions circuits that include both power semiconductors and ICs along with passive components.

As a result, thermal analysis that used to take as much as a day can now be performed in about ten minutes (100x faster than conventional methods). This allows users to quickly and easily check the temperature of various parts of the device before prototyping (instead of after as is currently the case), reducing the need for rework.

ROHM Solution Simulator can be used free of charge by simply registering on ROHM's website. In addition to the simulator, the dedicated web page provides access to videos and documents required for use.

Going forward, ROHM will continue to implement thermal analysis functions in solutions circuits compatible with ROHM Solution Simulator, focusing on the latest SiC devices, to further reduce the number of resources required for application development and prevent issues.
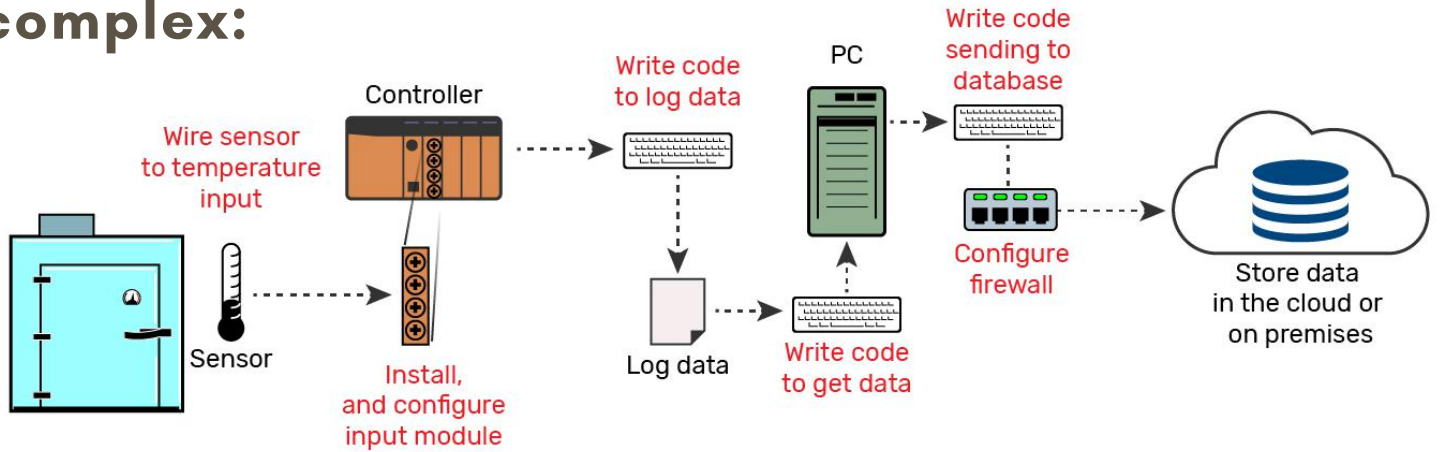
GROOV RIO

WHAT IS GROOV RIO?

groov RIO is an independent, intelligent Ethernet-based edge I/O module designed for IIoT and automation applications. It solves two main problems with most remote I/O today:

- First, specifying all the required components (rack, power supply, bus coupler, module types, and more) is time-consuming, difficult, and requires special skills.
- Second, communicating data among field devices, control systems, business applications, and cloud services is complex and costly, requiring PLCs, custom programming, and other expensive middleware.

Logging temperature to a database is too complex:

groov RIO revolutionizes remote I/O by solving both problems:

- One part number. A single device provides sensing and control for 12 different signal types via built-in multifunction, multi-signal I/O channels, and packages it together with an intelligent I/O processor, power over Ethernet, two mounting options with no rack or chassis, and software—in a compact industrial housing.
- Built-in processing and communication. Embedded web-based configuration, flow logic software, efficient data communication methods like MQTT, and multiple operations technology (OT) and information technology (IT) protocols simplify any application.

Logging temperature to a database is simplified with groov RIO:
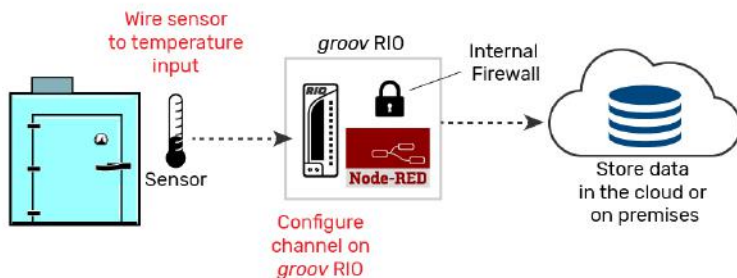
groov RIO is Edge I/O

These features make groov RIO a new kind of I/O product—edge I/O—that reduces IIoT complexity. Edge I/O and edge computing both offer traditional industrial

Edge computing products like Opto 22's groov EPIC edge programmable industrial controller are proving to be a scalable, efficient model for adding IoT connectivity to industrial applications. Now groov RIO brings that same kind of connectivity to the I/O level, without a controller, and simplifies the current complexity of IIoT applications.

IIoT projects are too complex

With today's connectivity and technical capabilities, it seems like simple IIoT applications should be simple to achieve.

We can do IIoT projects now, but without edge I/O, it's too hard:

- First, you—or someone you hire—needs to specify and procure all the components of an I/O or PLC system that will work with the field signals you have.
- Then you install an enclosure for the PLC and I/O, assemble them, and supply power.
- Next, you install the sensors and actuators and connect them to channels on I/O modules mounted on the PLC rack.
- Then you use the vendor's proprietary software to program the PLC, configure the channels for the correct signal types, and acquire and log the I/O data.
- Next, you need a PC with software that can read the PLC's memory and translate the logged data into a format understood by the destination software, service, or system you're sending the data to.
- Finally, some software needs to log into the destination and post the data. And if the destination isn't on premises, or in the cloud somewhere that's accessible, good luck!

groov RIO gets the data now. No PLC, no PC, no middleware

Edge I/O avoids complexity and the time and money costs that go with it. With groov RIO, you can:

- Place the unit almost anywhere for remote I/O and data communications. It's UL Hazardous Locations approved and ATEX compliant, DIN-rail or panel mounted, and may not even need an enclosure.
- Connect to proprietary machines or processes without disturbing them, paralleling machine I/O to gain the data you need to use elsewhere.

- Connect your own Wi-Fi adapter, USB memory stick for local data storage (up to 32 GB), or USB-to-serial adapter.
- Configure the flexible multi-signal, multifunction I/O channels (see Thousands of Field I/O Combinations?) from any device with a web browser.
- Create and run up to four PID control loops locally and independently. No PLC, PAC, or PC needed. (Requires groov RIO firmware 3.0 or higher.)
- Enable MQTT on RIO to securely and efficiently send data—as Sparkplug-B or string payloads—to MQTT brokers on premises or in the cloud. Other devices and software can subscribe to the data as needed.
- Create simple data flows with built-in Node-RED to send data to cloud services, databases, other I/O channels, and APIs through pre-built nodes.
- Manage security, including device firewall, security certificates, and user authentication and permissions via LDAP centralized user account management (LDAP requires groov RIO firmware 3.0 or higher).

GOOD IMAGES, GREAT PRICE – GPIXEL: THE ACE 2 FAMILY CONTINUES TO GROW!

As much performance as needed, as little cost as possible: True to this principle, the 16 new ace models with Gpixel's GMAX2505 and GMAX2509 CMOS sensors fit seamlessly into the wide range of ace 2 Basic and ace 2 Pro models. You get exactly the right mix of performance and price you need for your application.

Small sensors with high resolution thanks to small pixels: an unstoppable trend that Basler is happy to implement for you. Combined with the matching Basler Lenses, accessories and software, the Basler ace 2 Basic Gpixel models form a compact, affordable package for price-sensitive applications in factory automation, robotics or AOI.

With their unique Beyond features, the ace 2 Pro models get the most out of this camera-sensor combination for you.

Great performance packed small: the new ace 2 models

- Resolutions of 5 and 9 MP
- USB 3.0, GigE
- Frame rates of up to 64 fps
- Global shutter
- Matching Basler Lenses, accessories and pylon Camera Software Suite for your vision system from a single source
- Reduced total system cost with prices starting at €429

Go to the ace 2 models

Sensors from Gpixel

Sensor	GMAX2505	GMAX2509
Shutter Technology	Global	Global
Sensor Type	CMOS	CMOS
Sensor Format	1/2"	2/3"
Sensor Size	6.5 mm x 5.4 mm	10.5 mm x 5.4 mm
Pixel Size (H x V)	2.5 µm x 2.5 µm	2.5 µm x 2.5 µm

Discover the sensor world of Gpixel

MAXIMUM FLEXIBILITY AND MORE OPERATING CONVENIENCE: THE NEW GENERATION OF KRAUSSMAFFEI LRX LINEAR ROBOTS

- CONQUER CHALLENGING INJECTION MOLDING PROCESSES IN RECORD TIME
- ENERGY SAVINGS OF UP TO 20 PERCENT WITH ECOMOD
- NEW HANDHELD PENDANT PROVIDES MORE INFORMATION AND USER-FRIENDLINESS

The new generation of KraussMaffei LRX linear robots grows with your requirements. Three key benefits for plastics processors are the wide selection of axis lengths and wrist axes, optimal integration of peripherals and great flexibility in complex, challenging injection molding processes. The EcoMode function enables energy savings of up to 20 percent. The new, larger handheld pendant provides more information and easier control and operation. Like its predecessor, the new generation features outstanding precision and cost-effectiveness.

How? The super-fast acceleration means shorter cycle times—to give just one example.

Customized system solutions

"In developing the LRX linear robot, we made it a point to incorporate our customers' requirements. This includes, for example, a wide range of options and the ability to switch production from one application to the other quickly and efficiently. Thanks to the modular system, we provide our customers custom-tailored system solutions with this approach in mind. Later upgrades and retrofits are possible as well," explains Dr. Volker Nilles, Executive Vice President New Machines at KraussMaffei.

The new linear robot product line also includes customized gripper solutions tailored optimally to the mold and the component. All components are integrated centrally into the MC6 control system and are easy and intuitive to operate. This is a boost for operating convenience.

Saving resources – Energy savings of up to 20 percent

Resource-efficient – the EcoMode function provides energy savings of up to 20 percent

Energy efficiency and resource-conserving production are becoming more important all the time. As a result, KraussMaffei is now offering the EcoMode function as a standard feature for all linear robots in the LRX series. Eco-Mode ensures that the operating speed of the robot is adapted to the cycle of the injection molding machine. This reduces waiting times but has no influence on the cycle time. This, in turn, relieves the load on the mechanical system and the drive train and provides energy savings of up to 20 percent.

More potential for conserving resources is offered by the optional air-saving valves for generating a vacuum with integrated air-saving control. This interrupts vacuum generation as soon as the component is gripped securely and the configured vacuum value is reached. When the threshold value is undershot, vacuum generation is activated again. Compared to conventional vacuum valves, this function uses far less compressed air. This, in turn, saves energy and money.

More information and operating convenience

The development of the new handheld pendant was focused on providing the operator with more information and greater convenience during operation. The new capacitive multitouch panel has a diagonal screen size of 10.1". Thanks to the high resolution of 800 x 1280 pixels and the pressure-sensitive touchscreen, the operator now has a clearly arranged view of information that he or she can respond to quickly.
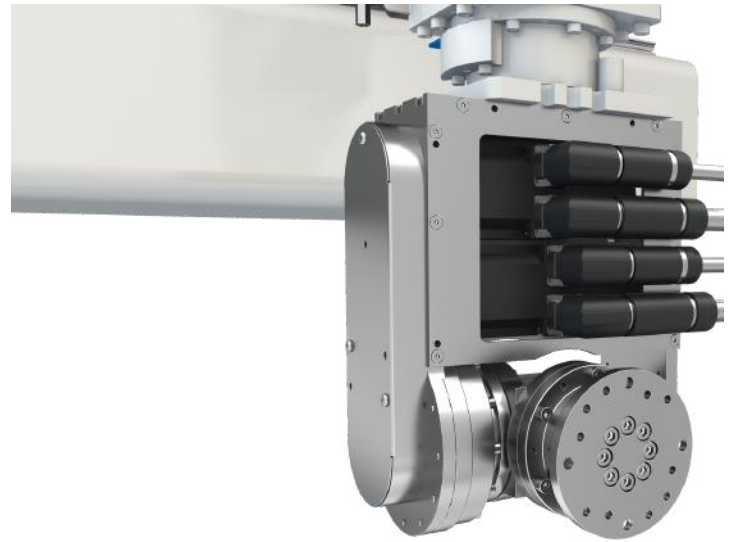
Agile and lightweight – the wide selection of pneumatic and servo wrist axes ensures high robot precision in parts handling.

Boosted pneumatics and vacuum for greater flexibility

The number of configurable circuits offered in standard models has been increased from the current 4/4 to 8/8. All the latest-generation LRX linear robots now offer the ability to implement up to 8 vacuum and 8 pneumatic circuits. In addition, the media portal on the Y-axis has been optimized to make gripper changes even faster and easier. The bottom line: greater flexibility for plastics processors, particularly for complex and challenging injection molding processes.

Shorter cycle times and greater process reliability

The outstanding features of the linear robots in the LRX/LRX-S series from KraussMaffei include particularly fast acceleration, which enables short cycle times and high productivity.

Our in-house measurements have obtained yielded values of 1.8 mm from other manufacturers. We are thus offering our customers significant added value," says Nilles. These values shorten the mold opening time for component insertion and demolding and enable faster production in a safe process. The bottom line here as well: shorter cycle times and thus greater productivity in injection molding production.

Fast, precise, and modular – the new generation of KraussMaffei LRX linear robots provide plastics processors

even greater flexibility in complex, challenging injection molding processes with the usual high precision, speed and repeatability. The new generation is offered in combination with injection molding machines from KraussMaffei or other manufacturers as well as a standalone unit.

Fast, precise and modular – the new generation of KraussMaffei LRX linear robots offers plastics processors even greater flexibility in complex, challenging injection molding processes.

Create Ready-Made Engaging Illustrations in PowerPoint starting from USD2.99 per month, copyright-free! For Sales, Marketers, and Trainers!

MARY WASHINGTON HOSPITAL WELCOMES MOXI THE ROBOT

Mary Washington Hospital (MWH) leaders and staff welcome Moxi, a robotic hospital assistant, as the newest member of staff. Moxi, created by Diligent Robotics, is a point-to-point delivery robot, meaning it can retrieve items in one department and deliver them to another. This will allow the nurses, certified nursing assistants and techs to remain on the unit and spend more time with their patients.

Eileen Dohmann, Senior Vice President and Chief Nursing Officer at Mary Washington Healthcare, sees potential for Moxi to positively impact the staff. "If Moxi can take away some of those tasks that don't require an RN or a CNA or a tech to do, then Moxi is going to help us." Hospital associates were excited to meet their new team member as Dohmann escorted Moxi throughout the hospital.

Diligent co-founder Dr. Vivian Chu was onsite for Moxi's first tour of the hospital. "We're incredibly excited to work with Mary Washington Hospital. Partnering with such an innovative hospital means we can push out the technology of Moxi to really improve the lives of nurses," Chu said.

"What we have seen is that nurses, especially during the pandemic, are working long hours and can spend an astonishing 30% of their time fetching and gathering supplies. We are excited to see this project begin and to watch the immediate impact Moxi will have on these teams. Nurses and clinical care teams get pulled in so many directions and I love that we can integrate Moxi robots into the team to help relieve some of this stress," added Chu.

Diligent Robotics staff will remain onsite at MWHC as they map and program-

Moxi's operating system so the robot can find its way around the facility. Moxi will be fully functioning in early January 2022.

Moxi's operating system so the robot can find its way around the facility. Moxi will be fully functioning in early January 2022.

Mary Washington Healthcare is a fully integrated, regional medical system that provides inpatient and outpatient care through over 50 facilities and services including Mary Washington Hospital, a 471-bed regional medical center, and Stafford Hospital, a 100-bed community hospital. Mary Washington Healthcare is a nonprofit health system and has a long-standing commitment to provide care regardless of ability to pay. For more information about our services and facilities, please visit mwhc.com.

Diligent Robotics is an Austin-based A.I. company that created Moxi, a hospital robot assistant that helps clinical staff with routine, non-patient-facing tasks so they have more time for patient care, and hospitals save money on staff burnout and turnover costs.

Moxi has been successfully deployed in several US hospitals and focuses on fetch and deliver tasks for frontline clinicians. As a company founded by social robotics experts, Diligent is proud to be at the forefront of creating robots that incorporate mobile manipulation, social intelligence and human-guided learning capabilities.

STARSHIP: CONTACTLESS FOOD DELIVERY ROBOTS

THE UNIVERSITY OF ILLINOIS AT CHICAGO IS THE 17TH COLLEGE TO IMPLEMENT THIS INNOVATIVE TECHNOLOGY

As colleges began to reopen after months of shutdowns and social restrictions, the University of Illinois at Chicago, UIC, reinvited students and staff back onto campus for the Fall 2021 semester.

Now in the growing era of contactless service, Starship autonomous delivery robots are being implemented on campuses, with hopes of future growth. These insulated two-foot tall white robots deliver food and drinks from the restaurant to the customer, conveniently dropping off an order at any chosen location.
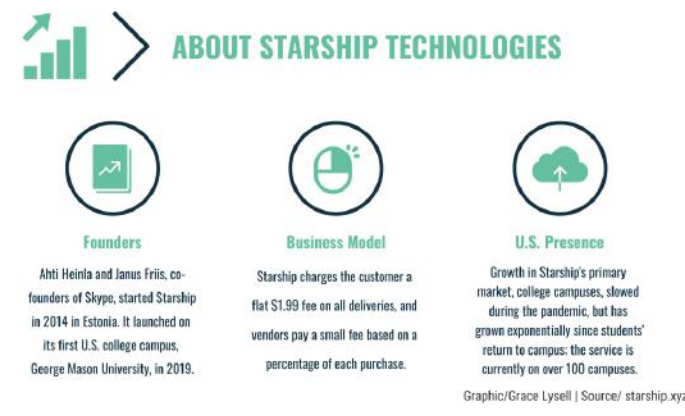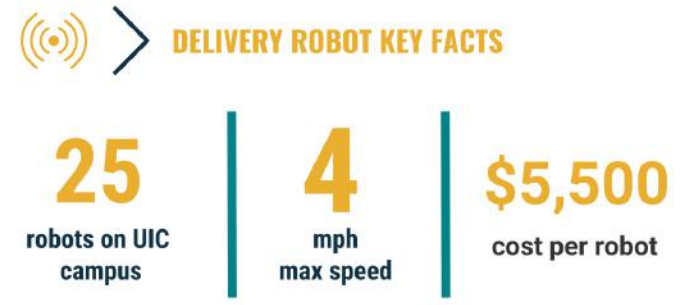
With customizable notifications, the Starship robots are marketed as a user-friendly alternative to leaving study hall for a snack.

Charles F. Farrell, the Executive Director for Business Development at UIC, and William Harvey, Resident District Manager at UIC Dining Services, an employee of Chartwells- Compass Group, worked together with Starship to bring these robots to Campus East for the 2021–2022 school year.

"I had been to a couple of conferences and Bill's company has a relationship with Starship, and we started talking about, 'should we think about this,'" said Farrell. "Then one thing led to another, just before the pandemic sort of broke out, if you will, in January of 2020, we flew down to the University of Houston, which is a school very, very similar to this one."

After learning about the Starship network from the staff and students at the University of Houston, Farrell and Harvey decided that the delivery robots would be a great addition to UIC, as they would allow food to be delivered to students from dawn till dusk.

The next step was choosing when to bring the Starship to campus. The pandemic halted their implementation but, after the calamity settled, a contactless food delivery service fit the new social environment that emerged.

STARSHIP ROBOTS
Autonomous Delivery Devices

DELIVERY ROBOT KEY FACTS

| **25** robots on UIC campus | **4** mph max speed | **$5,500** cost per robot |

ABOUT STARSHIP TECHNOLOGIES

Founders
Ahti Heinla and Janus Friis, co-founders of Skype, started Starship in 2014 in Estonia. It launched on its first U.S. college campus, George Mason University, in 2019.

Business Model
Starship charges the customer a flat $1.99 fee on all deliveries, and vendors pay a small fee based on a percentage of each purchase.

U.S. Presence
Growth in Starship's primary market, college campuses, slowed during the pandemic, but has grown exponentially since students' return to campus; the service is currently on over 100 campuses.

Graphic/Grace Lysell | Source/ starship.xyz

As colleges began to reopen after months of shutdowns and social restrictions, the University of Illinois at Chicago, UIC, reinvited students and staff back onto campus for the Fall 2021 semester.

"Once we kind of had a sense last summer, about what was gonna be the reality for this year, then we started talking again about whether this was the right time to do it," said Farrell. "We also talked about playing up the fact that this is a person-less delivery, and decided this was the right time to do it. Now the University is the 17th campus with these robots."

Karina Nevarez, manager at Dunkin UIC, witnessed the early implementation of Starship around Campus East during the 2021 Summer Semester.

"Around August, they would do little trials," said Nevarez. "When school was starting, that's when the process to use

the robots really began. We figured out it's just like filling any other order. We're used to using stickers, so it's the same thing. On the monitor the order sticker would pop up, then, since the order isn't on the big screen, we know that someone has to take it downstairs to the robot."

Most restaurants and markets have had great success adding Starship to their order fulfillment models.

Dunkin has had the easiest experience as they previously had a robust ordering system, but other smaller markets quickly learned how to adjust. The addition of the handheld notification devices that connect to the Starship App and robot activation are now standard at all participating locations on campus.

"It's pretty easy when it's slow," said

Nevarez "But when we get rushes, like crazy rushes, then it gets hard, especially when we're short staffed. Then we lose a team member because someone has to take the order downstairs. So sometimes, it's a good and a bad thing, but usually, so far, so good. We've never had any problems with the robot orders either, so that's a good thing."

Alaa Mohamed, a sophomore at UIC majoring in Biomedical Engineering, enjoyed the addition of Starship to Campus East, as it made receiving food effortless.

"It was so easy and simple," said Mohamed. "I was able to get my coffee from Dunkin by ordering from the Starship app. I ordered the robot to meet me in front of the library. It was so convenient to have, I avoided wasting time walking in the cold to get my coffee."

Personal safety on college campuses is highly stressed, especially for students with late classes or those spending late nights studying at the library. Starship not only provides a contactless delivery, but also adds another layer of security to the benefits the program provides.

Starship Campus Delivery Service with Robots

Watch later   Share

Watch on ▶ YouTube
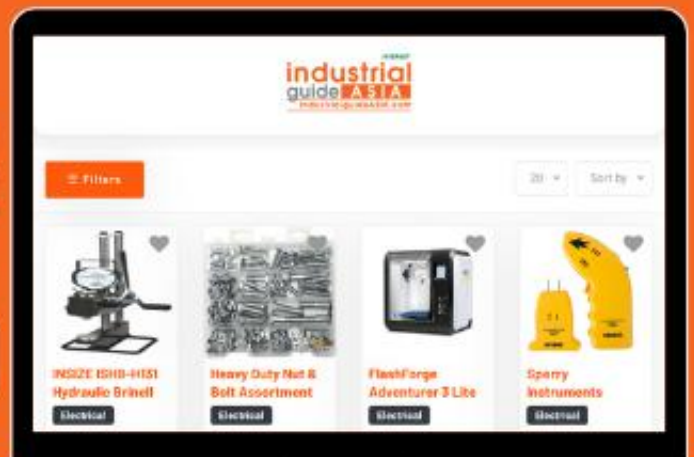
"Pretty much all campus food and snack options are available, besides Chick-Fil-A, so I think that the choices are good," said Mohamed. "Most places close early which is inconvenient for studying later in the evening, but Dunkin and the market in Student Center East are almost always available, which is nice."

With the student body growing accustomed to Starship, an increase in the number of orders is expected within the following semesters. Farrell and Harvey expect to expand the fleet available on Campus East in order to meet demands, as well as expand their range to include more food options.

As of recently, UIC has not held any campus wide surveys to gauge the popularity and use of the Starship network, but there is hope to expand to Campus South, West, and beyond within the following years.

If Chicago chooses to define Starship as pedestrians, the robots will have full access to the city's sidewalks and the

ability to cross residential streets. This expansion of their territory would not only help serve students, by providing a larger list of restaurants to order from, but it would also expand the service to community members off campus.

With ambitions to expand across the city, Farrell and Harvey first must juggle the politics and complications of operating Starship autonomous robots within the heart of metropolitan Chicago, the nation's third largest city.

"We want to take a real careful approach, we also don't want to bite off no, pun intended, more than we can chew, and not have good service all across the board," said Farrell. "So we want to figure it out, where we can control things first, and then think about branching out."

Safety has been a concern for many cities hosting the Starship program. These autonomous robots have been using sidewalks and crossing intersections across the country, as most cities have classified Starship robots as pedestrians.

Sergeant Kevin Flanigan, a member of the Chicago Police department since 1994, gave advice to drivers encountering Starship on roadways.

"If these robots are considered pedestrians, the driver of the vehicle is at fault no matter what," said Flanigan. "If the pedestrian walked across where it wasn't a crosswalk, none of that really matters because, as the driver of the vehicle, you have to be aware that pedestrians have the right of way. The person driving the car could be at least liable for at least a ticket."

Causing any damage to the robot could also be considered causing damage to private property. All drivers would need to inform the authorities immediately after the accident occurred to clarify the situation.

If plans to expand UIC's Starship autonomous delivery network succeed, the University will be gaining a portion of the profit from the services provided.

"Our relationship with Chartwells involves a commission based structure," said Farrell. "So we get a percent, it's a different percent on what kind of sale it is. So revenue from Starship, it's just gonna get slid in with all the other things, like when you buy a sandwich from Chick-fil-A, a piece of

that comes back to the university in the form of commission. The same thing will be true here."

When ordering from Starship, there is a $1.99 delivery fee included with every order. This along with the standard charge of purchase will be distributed between all parties involved in the Starship network at UIC.

According to Starship, the autonomous robots have made over 2 million deliveries worldwide. In the United States, the service is spreading quickly to new college campuses, including the University of Kentucky, Purdue University, and most recently South Dakota State University.

Though the future of these robots is still uncertain, autonomous robots are forecasted to grow in popularity as they replace humans in menial jobs. As UIC plans to expand their fleet, sooner, rather than later, Starship robots might be seen delivering food across Chicago, as they learn how to better navigate urban sidewalks.

"Bill and I have joked that when we're old, or in a nursing home, robots will take care of us," said Farrell. "That might be a nice benefit, right, the robot can come to you. I think we're a ways away from having bots on all the streets but, this is the beginning of it. We're excited that we're able to bring something that's very new, and it's not very many places to UIC."

Global online B2B business platform 24 hours , 365 days

K-ELECTRIC
ONLINE EXHIBITION

Company and porduct video,
Realistic Products with
3D modeling, 360-degree

1:1 Online video
consultations

Company & products
registration 24hours,
Network expansion

SEO marketing platform,
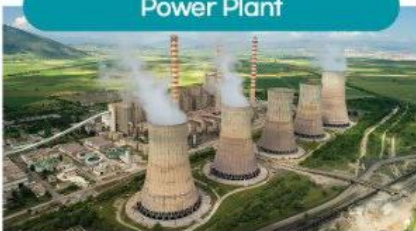check reservations for
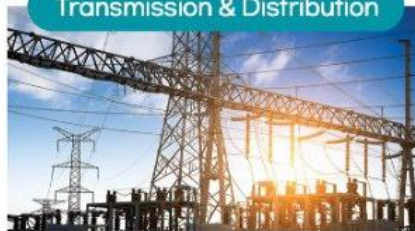visits / quiry consultations

Go to 360-degree live-action exhibition

EXHIBIT ITEMS

Eco-frendly and high-efficiency energy products, mart girds,
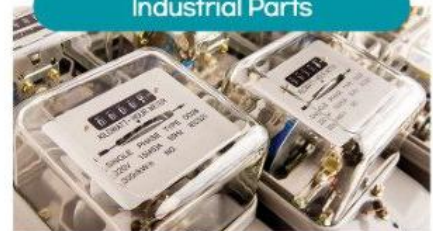ESS, microgids, HVDC, DC power distribution, new fusion products, etc.

Power Plant

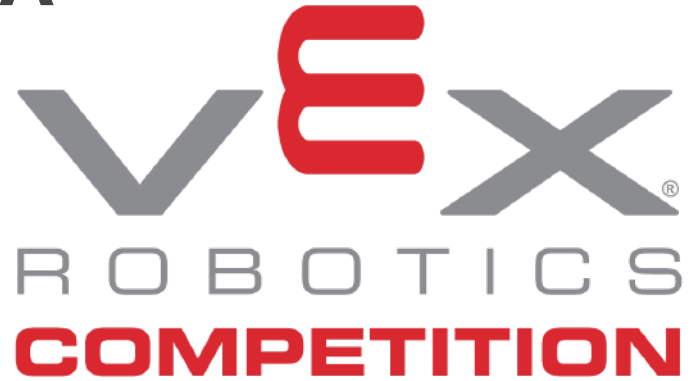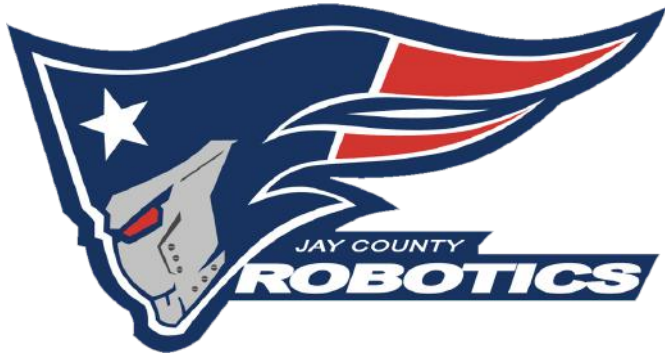Transmission & Distribution

Industrial Parts

Department : Future Growth Division
Contact : +82-2-6952-2743, ethan.choi@koema.or.kr

JAY COUNTY INVITATIONAL VRC TIPPING POINT BLENDED LEAGUE PORTLAND, INDIANA

General information

Our VRC League is on Thursdays and our VIQC league is on Tuesdays.

Register into the Waitling list to be considered for this League:
Skills will be offered before the start of matches (this will stop 10 minutes prior to match #1) and on an independent field when space is available. Teams will be guaranteed at least 3 attempts of each during the duration of the league. This is not required, but will be available. There will NOT be dedicated practice fields.

Capacity: 24
Max Registrations/Organization: 4
Price: $80.00

Championship Event
1/18/2022

COVID-19 RESTRICTIONS:
At this time, there are no mask mandates or distancing guidelines on Jay Schools Property. We will update if that changes. We will support individuals decisions on what precautions they choose to take. We will also not tolerate intolerance.

Grade Level: All
Robot Skills Challenge Offered: Yes

Event Dates and Locations

- Date: 12/09/2021
Venue/Location:
Jay County Jr-Sr High School
2072 Indiana 67
Portland, Indiana 47371
United States

- Date: 12/16/2021
Venue/Location:
Jay County Jr-Sr High School
2072 Indiana 67
Portland, Indiana 47371
United States

- Date: 01/13/2022
Venue/Location:
Jay County Jr-Sr High School
2072 Indiana 67
Portland, Indiana 47371
United States

- Date: 01/20/2022
Venue/Location:
Jay County Jr-Sr High School
2072 Indiana 67
Portland, Indiana 47371
United States

WHAT IS BOTBALL ®?

The **Botball®** Educational Robotics Program engages middle and high school aged students in a team-oriented robotics competition, and serves as a perfect way to meet today's new common core standards.

By exposing students to an inquiry-based, learn-by-doing activity that appeals to their hearts as well as their minds, Botball® addresses our nation's need for a well-prepared, creative, yet disciplined workforce with leadership and teamwork experience.

In January, February, and March, the Botball® Educator Workshops provide team leaders and mentors with technology training and introduce the details of that year's game. Then, after a build period of about 7 weeks, students bring their robots to their regional tournament to compete against other students in the current season's game challenge.

Students use science, engineering, technology, math, and writing skills to design, build, program, and document robots in a hands-on project that reinforces their learning.

- **Autonomous Robots**

The robots are always autonomous! Botball® gives students the tools to develop sophisticated strategies using artificial intelligence with embedded systems. Students will learn to program their robots in advance using C, C++, and Java.

- **Engineering**

No need for power tools or a machine shop. Competitors are at a level playing field with access to all resources. The Botball® game kit provides various parts and pieces that get you going toward building a working robot.

- **Reusable Components**

In a recent survey (2011), 86% of Botball® team leaders reported using the building materials, robot controllers, sensors, and motors, for educational activities outside of Botball® throughout the academic year.

- **Training and Support**

Botball® prepares teachers and mentors on how to use robotics in their classrooms, curriculum, and community. It will help prepare teachers and mentors to build a foundation that will impact their students for years to come.
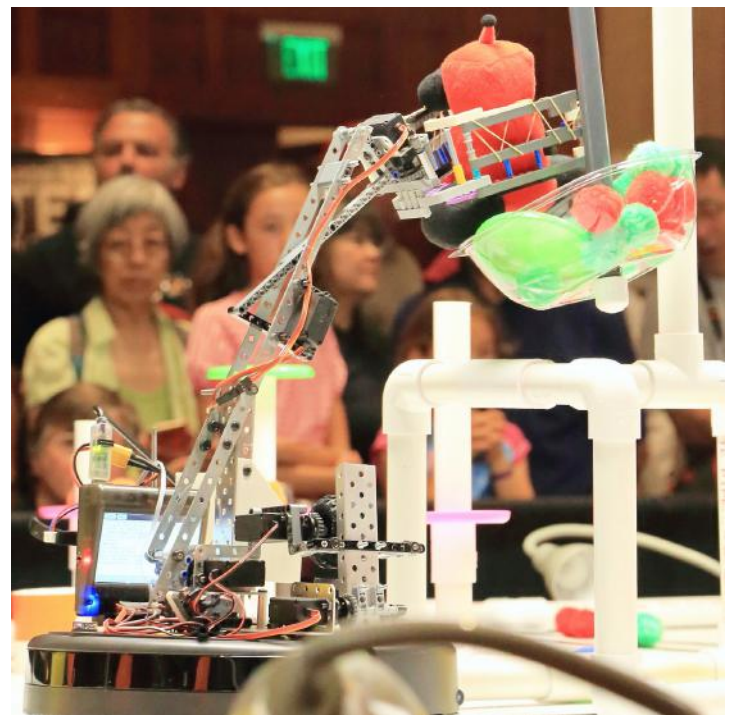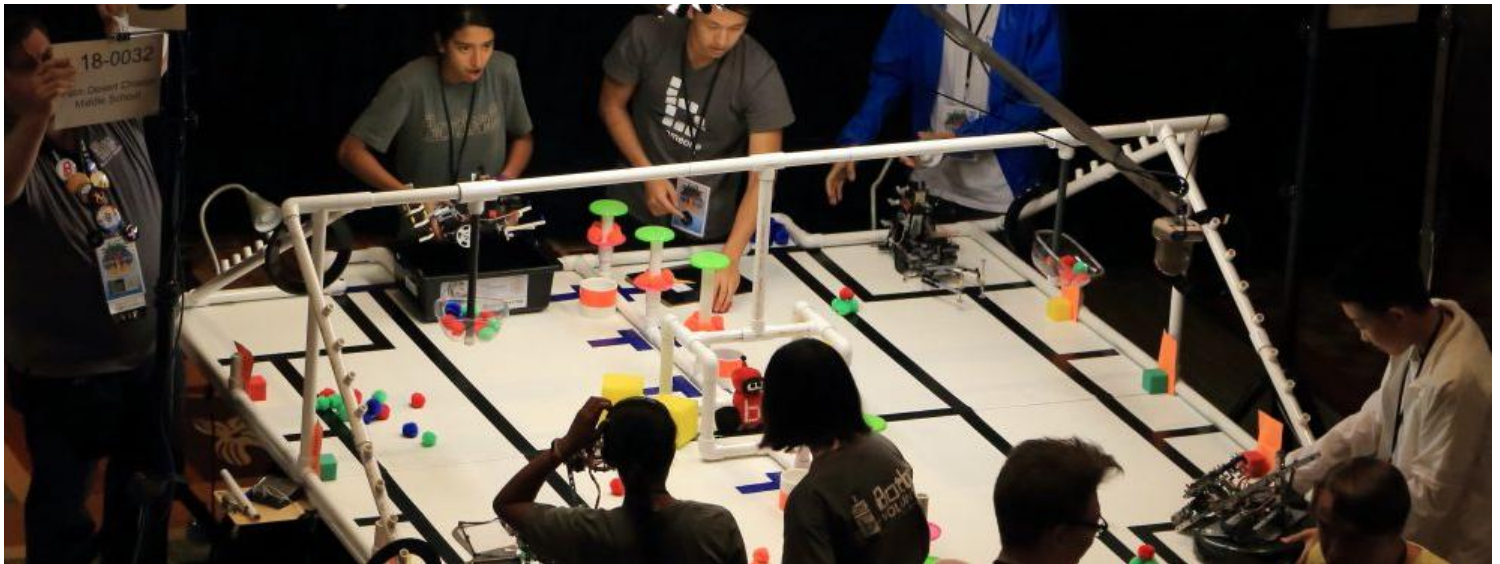
Autonomous No Remote Controlled Robots!

There is no driver! The robot's actions are based on information from the sensors, combined with the computer program written by the students in advance. Botball® robots are completely autonomous and rely on this computer programming to start, stop, and maneuver on the game board. Each robot uses sensors to detect changes in light, distance, color, and parameters.

Why Robots?
In order for students to transfer and apply the information and skills they learn in school, they must be able to use that knowledge in a way that is meaningful to them. By designing, building, programming, and documenting robots, students use science, engineering, technology, math, and language arts skills in a collaborative hands-on project that reinforces their learning.

Engineering With Minimum Tools

The kit includes an iRobot® Create robot base (similar to the Roomba robot vacuum cleaner), LEGO® pieces, a camera for use with the built in computer vision system, and all the tools required so that students can complete the mechanical construction of their robots without the need for power tools or a machine shop. This helps level the playing field amongst competitors with different access to these resources.

Teams receive their reusable robotics kit at the workshop along with software and documentation. They also receive detailed information regarding the current year's game. Participants will actually use their robotics kit to build and program a demonstration robot at the workshop. Following the workshop, students are given 7-9 weeks to:

- Design, create and program 2 autonomous robots using components from the Botball® kit
- Document their innovation and creativity online through the Team Home Base
- Connect with various students, teachers, roboticists, and hobbyists in the Botball® community

Reusable Components

In a recent survey, 86% of Botball® team leaders reported using these components for educational activities outside of Botball® throughout the academic year.

Uses for a Botball® kit outside the Botball® season:

- Incorporate the kit components into other courses such as physics, technology, or computer classes
- Use individual elements to enhance activities within a class such as a simple machines lesson or data collection around the school
- Prepare a fall challenge to get students excited about the new season
- Allow students to check out the kit to do independent projects, science fairs or engineering fairs
- Encourage students to build showcase robots for the Autonomous Robot Showcase at the Global Conference on Educational Robotics

Training and Support

Teachers who know how to use robotics to teach STEM and have appropriate educational materials can impact students for years. That's why every Botball® region hosts a hands-on professional development workshop for educators, developed and taught by professional roboticists.

The hands-on workshop is designed to empower teachers enabling them to teach their students how to apply the engineering design process and improve their computational thinking skills as they design, construct and write code to control their robots. Curriculum is aligned to Next Generation Science and Common Core math standards and provides a framework within which teams can be successful.

After the workshop, the KISS Institute for Practical Robotics provides technical support and advice throughout the Botball® season.

ROIBOT AWARD FOR CLEVER RETURN-OF-INVESTMENT IDEAS WITH ROBOTS

COMPETITION FOR CLEVER AUTOMATION SOLUTIONS –SPONSORED BY IGUS®

Conditions of participation

We are looking for an existing automation application within your company which uses igus® Low Cost Automation components or drylin® single axes. An independent jury, composed of experts from research, specialist press and manufacturers, will evaluate all submissions. Breakthrough innovation, technical refinement, and process enhancement will all lead to a higher score in the competition.

Therefore, ensure you emphasise why your automation solution optimises your process, saves costs and increases efficiency/p>

The deadline for submission is 30th. April 2022. Good luck from the Low Cost Automation team!

REGISTER NOW!

HONEYBOT
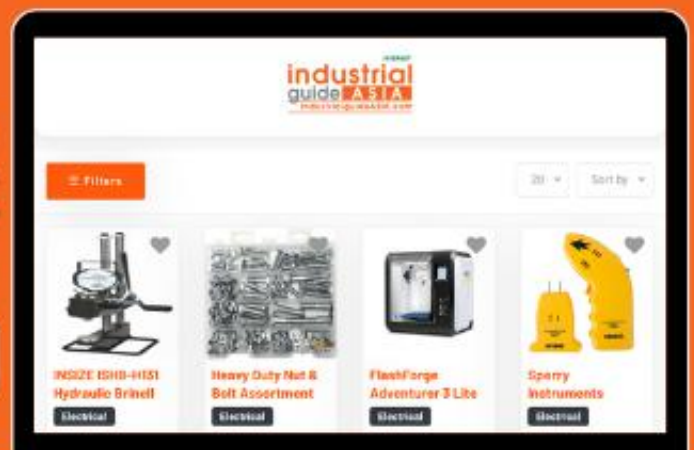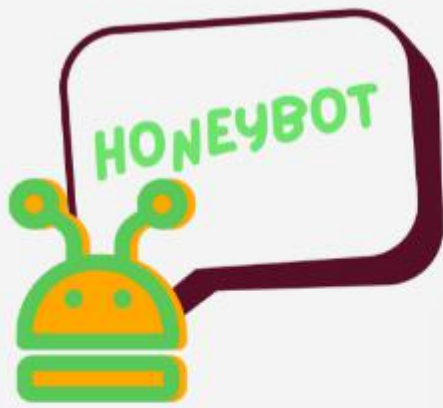
Cuts down operational cost

Offers personalized experience

Enhances engagement and sales

Automates repetitive tasks

Increase conversion rates

Generate and qualify leads automatically

Helps businesses to stay in the trend

Monitors customer data and gives better insights
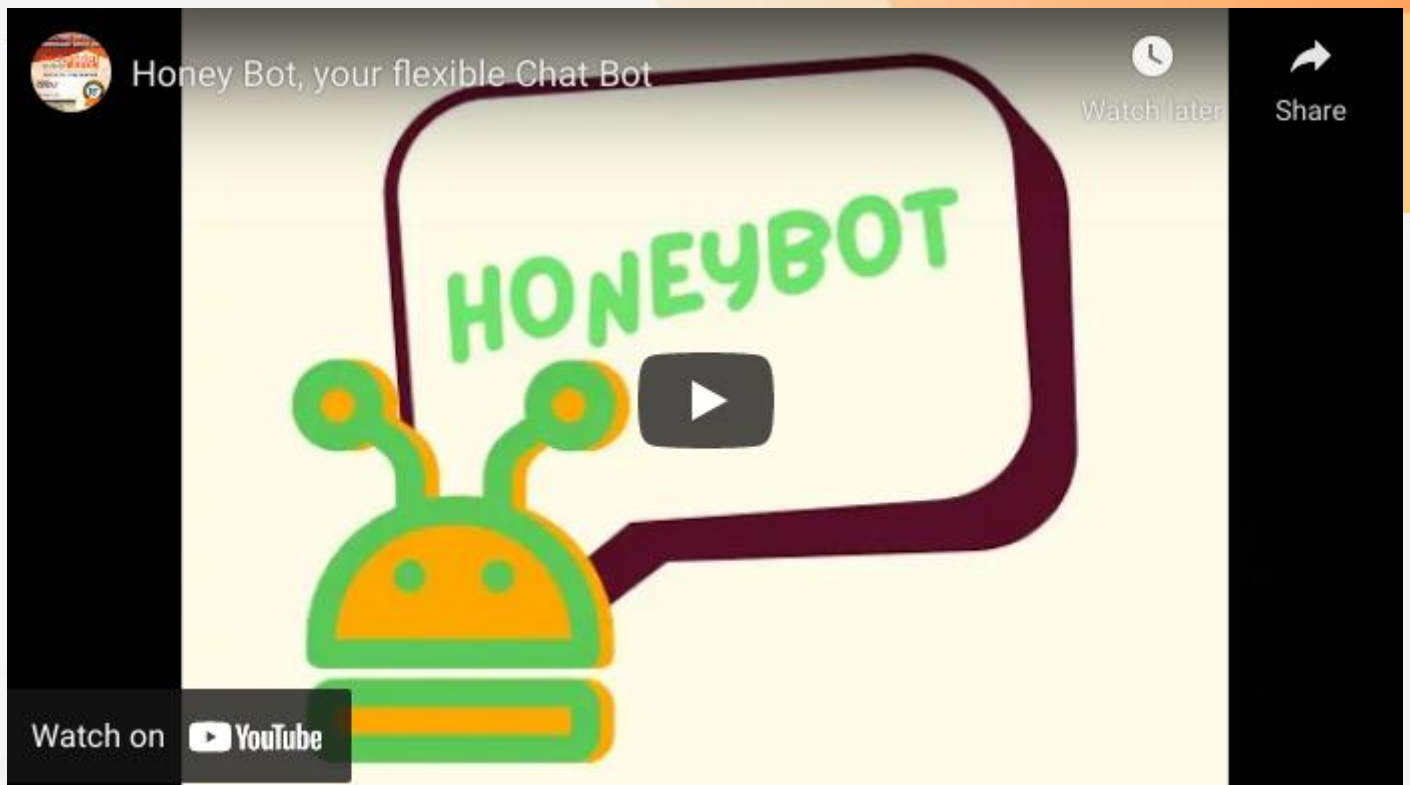
HONEYBOT.LINK

24/7

Bespoke Chatbot

TO ENGAGE YOUR SITE USERS

MR. DAVID NEVIN PRESIDENT INDUSTRIAL SEA AND AEROSPACE ASIA PACIFIC

INTERVIEW BY KAORI KITAMURA

Mr. David Nevin has joined team at Schaffler since 1999 until now. In 199 he started his career as Sales Development of Schaeffler (FAG and INA brands) in New Zealand. And now, after 22 years in the Schaeffler team, he is taking up the duties of President – Industrial SEA and Aerospace AP. He experienced in all kind of operations and high performing teams as Quality, Service, Sales and Business development.

1. Tell us how the pandemic has changed the operation and marketing strategies for Schaeffler?

The pandemic has made Schaeffler turn to digital solutions.

In terms of marketing, we have moved online and now approach things from a digital perspective. Our events are now conducted either virtually or in a hybrid format, while our campaigns are now more focused on digital marketing.

Operations-wise, sales visits were done mainly over the phone and via online seminars in the Southeast Asian region, and internal meetings and workshops were mainly done in a virtual or hybrid format as well. In order to ease this transition, Schaeffler's employees have also been given access to the latest IT solutions, including digital collaboration and communication technologies for agile and efficient cooperation combined in a sustainable, digital workplace.

Aside from new marketing and operations strategies, we now offer our customers intuitive, eCommerce channels and innovative software as a basis for using our digital services. **Upgraded online product catalogues**, including product consulting tools and calculators, were also released Q4 2020.

We have also seen increased interest in connected condition monitoring solutions such as OPTIME, which was recently also launched Q4 2020 in Asia Pacific.

2. How have Schaeffler been able to overcome these challenges so far?

We believe in taking all these challenges in our stride!
With the pandemic causing more people to move online and adapt to digital solutions, this was a good opportunity for Schaeffler

SCHAEFFLER

to fast track to digital transformation. Based on these new digital concepts, we can thus ensure the added value of our existing business models and create a basis for accessing new markets.

Our company-wide digital agenda also serves as a strategy and structural guideline for all activities in the digitalisation area, to ensure a synchronised processor all digitalisation activities.

3. How does Schaeffler's Industrial IoT Product help manufacturers to avoid unplanned downtime and save unnecessary costs in their operations?

OPTIME is Schaeffler's application solution for automated, sensor-controlled condition monitoring of industrial plants and equipment. Our condition monitoring products are also equipped with sensors and intelligent electronics and can supply information seamlessly into our customers' overall applications.

These condition monitoring products (e.g. SmartCheck, OPTIME and Prolink) allow a predictive strategy to be applied to maintenance by continuously analysing machine condition. Furthermore, we utilise cloud-based analytics to allow holistic monitoring of entire plant machinery. Machine problems can now be identified at an early stage and addressed conveniently, providing our customers with the best possible support in optimising their own processes, products, and services.

Schaeffler is also continually extending our range of scalable digital services.

4. What are the major challenges that you've experienced with implementing IoT in your industry?

Basic internet connectivity is still a challenge in some cases, including allowing external communication to the devices (ie overcoming firewall issues etc).

5. How do you see Industry 4.0 revolutionising the manufacturing industry in the APAC region?

As technology is becoming more affordable and intelligent, we will see higher levels of adoption in the manufacturing industry. As a result of this, I believe that the following technologies will become commonplace:
- Remote condition monitoring to enable predictive maintenance
- Leveraging cloud-based analytics
- Machine learning - SmartCheck/ OPTIME –self-healing/ learning mode
- AI – Autonomous production

6. How would you recommend accelerating smart manufacturing transformation and modernising the manufacturing industry?

Taking Schaeffler's own production facilities as an example, the digital connection of our production facilities along the entire value-added chain is one of the most important goals of Industry 4.0. Driven by our vision of a digital, autonomous, and sustainable factory, we are pushing ahead with systematic digitalisation and are using our digital services in our own volume production processes at an early stage.

The goal of being able to respond more quickly and flexibly to current developments in a rapidly changing world is a key motivation for Schaeffler to digitise the processes in all of its business divisions. From the first idea to the new product, and from digital production planning through to sales management,

Schaeffler ensures that the entire product lifecycle will be digitally mapped in the future.

7. Sustainability is central to Schaeffler's supply chain and procurement operations, how do you assess the current state of Schaeffler's sustainability efforts?

We hold a holistic approach to Sustainability around topics such as:
o   Environment and energy – CO2 neutral production and resource efficiency
o   Suppliers and materials – Sustainable resources and responsible supply chain
o   Customers and products – Sustainable solutions and circular economy
o   Employees and society – Health and safety, as well as diversity and development

We also continuously improve sustainability performance at all production sites in the areas of climate protection, environment and resource efficiency, occupational health and safety, sustainable supply chain, off-campus mobility, and certifications and LCA.

Furthermore, Schaeffler offers sustainable components and systems in all three of its company divisions:
o   Industrial –bearings for renewable energy production

o   Automotive Technology – mobility solutions, eg., CO2 efficient drives/ Hydrogen technology
o   Automotive Aftermarket – Resource-efficient repair solutions and services, eg., REPXPERT

8. What do you think will be the next big thing in the aviation industry and what customers can expect from Schaeffler?

The optimisation of the aircraft engine design to reduce CO2 output will definitely be the next big thing in the aviation industry given the increasing traction for neutral carbon footprint. Customers can expect that Schaeffler will continue to work on the electrification of aircraft propulsion – both manned and unmanned.

For more information please visit **https://www.schaeffler.com**

DR. SZE TIAM LIN

INTERVIEW BY KAORI KITAMURA

With more than 18 years of experience in commercialisation of new technologies and IP management, Dr Sze leads the IPI team in addressing technology and innovation needs of enterprises from the industry in areas spanning across Infocomm Technology & Electronics, Energy & Environment, Materials & Chemicals, Health & Personal Care, Manufacturing, amongst others.

Prior to IPI, Dr Sze was the Senior Vice President at ETPL (now A*ccelerate), the commercialisation arm of Agency for Science, Technology and Research (A*STAR). He worked on commercialising new technologies and, being a pioneer, contributed to several best practices in industry-research collaboration, licensing, technology and market intelligence, IP management and strategy, and licensing professional skills and training.

Dr Sze is a Certified Licensing Professional (CLP) and a council member of the Executive Committee of the Licensing Executive Society (LES), Singapore. He holds a PhD and a Bachelor of Engineering in Automatic Control & Systems Engineering from the University of Sheffield, UK and received an executive education in Strategic R&D Management at INSEAD, Fontainebleau.

1) What are the most current innovations that had been use in the organisation?

a. For IPI, we are developing an intelligent matching system that leverages Artificial Intelligence and Machine Learning to improve our search for technologies and partners to accelerate the innovation process of our clients.
b. In our interaction with enterprises across various industry sectors, we are in tune with the emerging technology trends. These days, we see companies looking into current innovations that focus on sustainability (clean and renewable energy, zero carbon and waste); food & nutrition (sustainable alternative sources) and healthcare (self-diagnostic for diseases prevention).These are also the same conference themes that we recently highlighted in our flagship technology brokerage event, Tech Innovation.

2) How IPI can accelerate the innovation process of enterprises through access to its global innovation ecosystem and advisory services during this Pandemic?

a. The pandemic reveals the issue of food security and the need to develop sustainable food sources through urban and intensive farming, alternate proteins, and nutritional crops.
b. IPI works with its global partners which include Israel, Norway and Japan to introduce new solutions and technologies for enterprises to accelerate their innovation development.
c. The Innovation Advisors, are industry veterans from various industry sectors and technology domains who possess strong technology expertise,

connections and business acumen. They provide enterprises with technology and business insights to assist them in developing differentiated competencies and their go-to-market strategy to achieve accelerated growth.

3) Walk me through the major changes and improvement in regards of new technologies and IP management that being made so far during Covid-19 pandemic in the organisation.

a. The Covid-19 pandemic has brought unprecedented disruption in the global supply chain and the healthcare system. In IPI's Innovation Marketplace, we see demand for new technologies to build resilience in the global supply chain in particular the need for digitalisation to optimise or strengthen logistics flow, manage the imbalance of supply and demand, and addressing new consumer behaviors in the new norm. New technologies are also needed in the healthcare sector to ensure safe management, diagnostics, vaccines and drugs to curb the spread of the variants.

b. As a result of Covid-19, technology adoption and research collaboration has hastened amongst companies in the spirit of open innovation. In order to accelerate new products or services to address the disruption, it has led to greater collaboration and a more flexible approach towards IP management.

4) Tell me about what is the critical component of your work that makes the work challenging?

a. We work with companies across various sectors that are seeking new technologies to accelerate their business growth. As such it is important that we have a keen understanding of the latest technology trends and USP

of the technologies that comes into our marketplace.

b. In addition, having the knowledge and experience to explore industries that are of the right fit for potential applications, as well aslook for relevant industry partners that can adopt or co-develop the technology for commercialisation.

5) IPI is an innovation catalyst that creates opportunities for enterprises to grow beyond boundaries, how has the digital manufacturing transformed this sector?

The emergence of technologies like IoT, AI, analytics and digital twin and its applications has the potential to transform the manufacturing sector. These technologies enable the setup of new manufacturing facilities, drive operational efficiency and provide resiliency in the manufacturing value chain.

6) Through IPI multidisciplinary expertise and global network, what are the new trends that we can look forward soon?

a.   Powering a sustainable future – electric transportation, clean energy, zero carbon and zero waste.
b.   Sustainable food and nutrition – alternative proteins, intensification of farming, waste upcycling.
c.   Healthcare in the new norm – More self-test diagnostics and ownership of healthcare condition.

7) How does IPI facilitate and support enterprises' innovation processes, including commercialisation and go-to-market strategies?

To translate a technology into marketor commercialisation, there are many considerations that company should be aware of or to address, e.g., IP protection and rights, regulatory compliance, prototyping, scaling up among others. IPI has a multidisciplinary team with the knowledge and network to accelerate this go-to-market strategies.

a.   IPI assists companies to find the relevant technology provider(s) to support their product or service development. This match could lead to collaborations in the form of technology transfer/licensing or R&D partnership.

An example of such a collaboration is the match between market leader in health and wellness products OSIM International and US biometric company NeuroSky toco-develop a stress-sensing feature in the world's five-senses well-being massage chair.
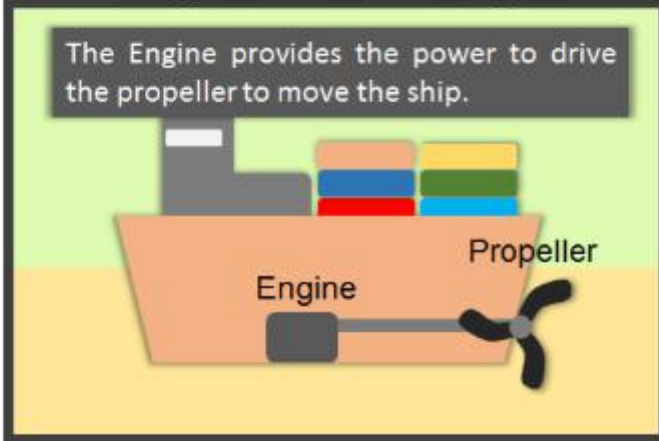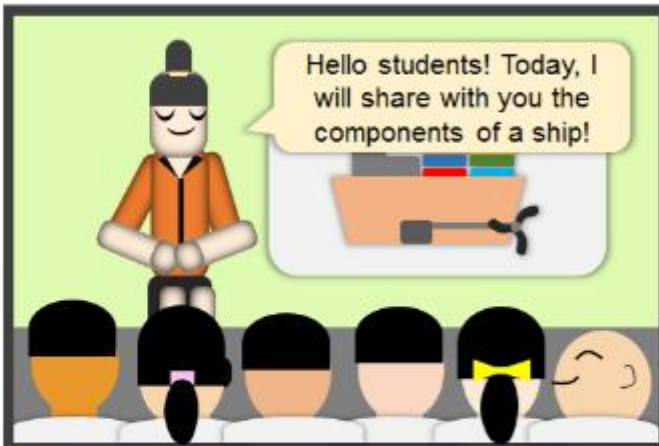
b.   In another example from IPI's Innovation Advisors who are able to guide companies in achieving growth. Dr Rebecca Lian lent her expertise in food science to convert the First Gourmet's frozen sauces into shelf-stable products—paving the way for the company's international expansion.

8) What are some challenges that you foresee when it comes to sustainability for new technologies and innovation in the future?

As the world drives towards a sustainable future, consumers must play their part to support the introduction of new technologies to address sustainability and be willing to pay more in the short-run so as to invest forward until these innovations are more widely accepted. By doing so, we can encourage the creation of sustainable products and services for the better of our planet instead of expecting to pay the same amount as the existing solutions which are not sustainable.

9) In the modern business world, staying a head of the curve means making sure your technology is efficient and up-to-date, what one litmus test should all business owners perform before investing in a new technology?

A company should ensure there is a paying customer for the new or enhanced product that uses the new technology and not a perceived one. It has to critically review and ensure that the technology that it is adopting supports its overall strategy to create a defensible product. It is important that the technology is not easily replicable and protected by patents.

MARCELO TARKIELTAUB REGIONAL DIRECTOR(SEA) ROCKWELL AUTOMATION

INTERVIEW BY KAORI KITAMURA

Marcelo Tarkieltaub has been appointed as Regional Director, Southeast Asia. Based in Singapore, Tarkieltaub will be responsible for sales and business operations across Singapore, Malaysia, Indonesia, Philippines, Thailand, Pakistan and Vietnam, as well as driving strategic growth for Rockwell Automation in Asia Pacific.

With over 20 years of experience at Rockwell Automation, Tarkieltaub was most recently Regional Director Southern Cone, a portfolio within the Latin America region covering the markets of Argentina, Chile, Peru, Paraguay, Uruguay and Bolivia. Tarkieltaub has built and developed several high-performing teams, leading the execution of key regional growth strategies for the business.

1. In your opinion, what is the role of augmented reality in remote workforce solutions?

Augmented reality (AR) is going to redefine the future of the workplace. The pandemic resulted in mass, and seemingly overnight, transition to remote work amid travel bans and social distancing measures.

In mid-2020, Rockwell Automation saw rising customer demand for AR solutions to reduce their reliance on workers' on-site presence, while allowing employees to work seamlessly across different geographies. At the same time, demand cycles for both consumer and industrial products have shortened, meaning that businesses need flexible manufacturing environments that allow them to retool and produce alternate products at short notice.

AR solutions can solve two significant challenges:
First, manufacturers can swiftly and easily gain access to colleagues and technical experts in different markets to help them pivot production outputs as well as troubleshoot machinery and process issues without restriction.

AR solutions can solve two significant challenges:
First, manufacturers can swiftly and easily gain access to colleagues and technical experts in different markets to help them pivot production outputs as well as troubleshoot machinery and process issues without restriction.

2. How can augmented reality transform cyber security by enabling more immersive training for employees?

AR-based remote services and communications tools are transforming the way we work in an encrypted and secure way. For starters, AR allows for more immersive training for remote workers, removing the need for them to be physically present in the same room.

Its use cases extend far beyond cybersecurity – AR is really more about ensuring the safety of our plant workers instead of enhancing security although that certainly is part of the curriculum for all reputable manufacturers.

One example of AR's benefits is that it enables remote experts to help on-site personnel perform the critical tasks and maintenance required to recover from downtime. For example, equipment-manufacturer intelligence can be streamed directly to an engineer's device, even as maintenance staff at other plants help with the diagnosis.

Mixed-reality devices also help frontline employees to safely assemble complex products, by equipping them with real-time production data and instructions required while performing the task.

Simulation tools enable engineers to map equipment layouts and study any impact changes on productivity and throughput.

Another use case is how machine builders can monitor installed bases of equipment from anywhere in the world by viewing a digital twin of the entire production process via virtual reality (VR). By analyzing real-time data from machinery, they can alert customers to maintenance requirements and warranty renewals.

3. How will the use of augmented reality impact the ways in which cyberattacks are carried out?

AR is less of an issue for cybersecurity than the hyper connectivity specific to the increasing convergence of information technology (IT) and operational technology (OT). The latter is the technology directly monitoring and controlling industrial equipment, assets, and processes, and is often under-protected in comparison to its IT counterpart.

Companies need to understand that there is no "airgap" between the two, and ransomware attackers have taken advantage of this by penetrating a "chink in the armor" to infiltrate an entire manufacturing network.

However, the increased level of connectedness also allows companies to capture opportunities that more traditional models and operating practices are not able to offer.

To allow for growth without compromising security, organizations should start with a holistic enterprise-wide assessment that includes:

- An inventory of authorized and unauthorized devices and software
- Detailed observation and documentation of system performance
- Identification of tolerance thresholds and risk and vulnerability indications
- Prioritization of each vulnerability based on impact and exploitation potential
- Mitigation techniques required to bring an operation to an acceptable risk state

Increased IT/OT connectivity also means that software, networks, control systems, site-infrastructure nuances, policies, procedures, and even employee behaviors, must all be accounted for.

At Rockwell Automation, we have defined five core security principals when developing a control system:

1. Secure network infrastructure
2. Authentication and policy management
3. Content protection
4. Tamper detection
5. Robust, centralized monitoring and reporting

4. What are your thoughts on new technologies that could help boost safety in the industry, such as blockchain?

Again, not just limited to safety but more generally, the evolution of cloud, edge, and software is going to transform the future of manufacturing, especially as we move towards Industry 5.0. The great cloud migration is going to transform the way automation runs, allowing for more agility and bandwidth to accommodate expansion plans.

Building on cloud allows organizations to break into the next frontier of innovation, opening up new possibilities including artificial intelligence (AI) native operation management. Instead of relying solely on physical infrastructure, which is costly to build and maintain, digital twin solutions allow manufacturers to virtually simulate the plant in an offline environment before construction begins. As production commences, engineers can run what-if scenarios to test agility, identify inefficiencies, and optimize output as production progresses.

5. What are the biggest challenges that you fore see in the coming years in regard of technological industry?

Upstream availability and downstream demand are more volatile than ever. Globally, the shortage of semiconductor components has extended lead time for manufacturers across every sector. Organizations need greater accuracy in planning project cycles because projects that were previously completed within a couple of months will likely take significantly longer, owing to material delays.

Amid a labor crunch across developed markets access to engineering talent remains highly coveted. A company might have access to technological solutions but lacks the expertise to deploy these tools to

6. What are some of the main developments that we need to be looking out for in the next 5 years in Southeast Asia?

The first and most important thing for manufacturers in Southeast Asia to note is that they are no longer competing on a local or regional level, but at a global scale. Businesses that want to survive in today's market must be willing to adapt to this change as quickly a sit happens. This is where Rockwell Automation comes in, helping our customers leapfrog to Industry 5.0 where AI, data analytics, and virtual reality are more than just buzzwords.

From a downstream perspective, customers are demanding more tailored and personalized products. Take the food and beverage(F&B) industry for example; during the pandemic, F&B players accustomed to catering in bulk for hospitality enterprises had to reconfigure their packing solutions into individual portions to sell directly to consumers working from home. Also increasingly popular is food that caters to specific dietary preferences, such as halal, nut-free, meat-free, or vegan.

Instead of having months to develop, test, and manufacture products, factories now need to accommodate several changes in weeks. In short, it's important to not just scale and expedite the process but in corporate the agility to switch the type of products manufactured.

More than just purchasing expensive software, manufacturers need to incorporate agility in the processes from a control level.

Rockwell Automation

Rockwell Automation supports customers by helping them build flexibility across every level of their organization – from plant floors to supply-chain logistics – creating additional capacity to move quickly when raw materials are available, as well as the ability to pivot fast to fulfill consumer demands.

MR. RUSSELL CHAN
DEPUTY PRINCIPAL, NGEE ANN POLYTECHNIC

INTERVIEW BY KAORI KITAMURA

Mr. Russell Chan is the Senior Director (Schools & SkillsFuture) at Ngee Ann Polytechnic based in Singapore. He interests in corporate strategic planning, organisation development and culture, industry collaborations for education and skills training, innovation and technology solutioning, SkillsFuture and Continuing Education & Training (CET), and operations and business process improvements.

1. How do you think that the future will impact robotics development in Singapore?

As Singapore realises its vision of a Smart Nation and with an increased focus on sustainability, there will be a greater reliance on robotics solutions to increase productivity, improve energy efficiency and enhance quality of life.

The COVID-19 pandemic has accelerated the demand for robotics applications in many industry sectors in Singapore. For example, more companies are leveraging robotics to enforce safe distancing measures or carry out disinfection and cleaning work. In areas such as healthcare, robotics can come into free up manpower from laborious tasks such

as fetching supplies and enable staff to spend more time on areas that require the human touch. In the construction sector, automation is identified as a key enabler to improve safety and resiliency.

Robotics development will continue to grow and will increasingly play a part in solving national challenges.

2. With the increasing automation trend, what are some of the skills that will be most in demand in the future?

With the advancement of core technologies such as sensors, communication systems, displays and cloud computing in recent years, engineers with skills in developing robot operating systems, cognitive vision/machine vision and cloud computing will be in high demand.

3. Share an example of a successful product launch that you led at one of your previous startups.

This year, Ngee Ann Polytechnic (NP) and Sing Health Polyclinics collaborated to develop a disinfection robot called HIRO, which stands for Healthcare Assistive Robot for Frontline Infection Control.

Jointly developed by NP's School of Engineering, School of Health Sciences, School of Life Sciences & Chemical Technology and Sing Health Polyclinics, HIRO uses UV-C light – which can eliminate more than 99.9% of bacteria and viruses – to disinfect high-touch and hard-to-reach places remotely and independently.

In addition, the smart robot also doubles up as a safe management ambassador to safeguard public health, boosting productivity in a polyclinic setting. HIRO serves as the first point of contact for patients when they enter the polyclinic for their temperature to be taken. It can detect visitors and patients who are not wearing masks or following safe distancing rules, and display location information. It also acts as a mobile directory to show patients and visitors the way to the different service points in the polyclinic. These automated functions allow the polyclinic to deploy its manpower more efficiently and safely. The robot is currently on trial at Tampines Polyclinic.

4. What are the most common challenges in the robotics industry and how doyou think will be the future of robotics?

Some challenges in the robotics industry include:
1) Developing reliable AI technologies
There is always room for improvement in robotics technologies, especially in the enhancement of their cognitive functions. A huge data set is typically needed to train robots to perform their designated tasks, and this is usually done under controlled environments. So there is still some way to go before robots are sufficiently empowered to function as intended in truly unknown and unstructured real-world environments.

Nevertheless, with continuous progress in robotics hardware and AI algorithms, we are confident that robots with even more advanced abilities will be developed to complement the human touch required in various sectors.

2) Implementing a flexible manipulation gripping system
There is a need for new research on materials, integrated sensors and planning/control methods to further enhance the dexterity of a robot. With advancements in manipulators, robots will be able to go beyond performing simple "pick and place" tasks and gain the ability to grasp and manipulate objects.

3) Building multi-functional robots
To cut operating costs and improve productivity, businesses need to deploy robots that can multi-task. Increasingly, the focus will be on developing robots that can perform multiple functions with the same efficiency as robots designed to fulfil a single function. This will require advanced versions of artificial intelligence and

machine learning technologies so that such multi-functional robots can carry out multiple tasks with ease.

5. What do you believe are the qualities of a great robotics programme?

A good robotics programme is one that starts with the outcome in mind, to fulfill specific key areas in a business, such as reducing manpower costs or increasing efficiency. Companies that are looking to implement good robotics solutions must assess their long-term business goals to reap the advantages of implementing the programme.

When adopting new robotic technologies, we must also not forget the humans. It is important to ensure that staff are aligned on the purpose, and have the skills and aptitude to implement the programme. These may include dedicated change management, with workplace learning and consultancy projects to help onboard staff.

6. How do you intend to build an ecosystem that supports robotics innovation and technology development?

NP launched our Robotics Research and Innovation Centre (RRIC) in October 2021 to drive robotics innovation and technology development. The RRIC brings together the expertise of our faculty members from various fields across NP to co-create robotics solutions. As part of our "for industry, with industry" approach, the RRIC serves as a platform for NP to address problem statements from industry partners, with whom

we collaborate to develop and trial new robotics solutions. With the focus on Future Mobility, Future Health, Future Construction and Future Sustainability, we seek to grow such partnerships with industry and support the larger ecosystem sin Singapore.

RRIC also welcomes collaborations with other robotics players to develop deep tech applications, such as the Robot Operating System (ROS) for robot localisation and navigation, Machine Learning and Artificial Intelligence for cognitive vision, and the Internet of Robotic Things (IoRT) for chatbots and more.

Apart from developing customised and multidisciplinary robotics solutions, the RRIC is also embarking on deep tech projects. As the robotics engineering field is rapidly advancing, these collaborations will provide rich learning opportunities for our teaching faculty to remain current, as well as for our learners to be industry-ready through hands-on experiential training.
All of these endeavours underscore our commitment to support industry needs through robotics solutions, and to nurture a strong pipeline of robotics talent.

7. What has been the most exciting advancement in robotics engineering recently?

Advancements in robotics technology are making human–machine collaborations more effortless. Developments in improved sensory technology have enabled robots to better interpret and respond to their environment.

Robots are becoming more adaptive and flexible, and can deal with a wide variety of temperature changes and hostile environments. In addition, robots are also becoming more connected, thanks to the cloud-computing revolution and increased connectivity all around.

Robots are now increasingly involved in tasks and operations in a wide variety of applications. In Japan, for example, robots are being trial led in nursing roles. Robots can help patients out of bed and support stroke victims in regaining control of their limbs. Smaller robots, such as the Dexter Bot, are easy to program and can handle manufacturing tasks that are often too laborious.

8. What are the challenges of implementing robotics technology in our society, and how do you plan to address these challenges?

One main challenge is the shortage of skilled robotics talents who are equipped to implement robotics solutions. Recognising this need, NP has launched a Specialist Diploma in Robotics Engineering with SG Innovate. Learners can look forward to acquiring essential skills and knowledge in machine learning, computer vision 3 and coding, and have the unique opportunity to participate in a traineeship programme called Power XRobotics. This comprehensive programme includes a 3-month intensive robotics course conducted by the RRIC followed by a 6-month attachment to a robotics company. This part-time full-qualification course will start in April 2022.

Another challenge is the high cost of implementing robotics solutions, as significant investments are required at the prototyping and deployment stages. To help reduce costs, we intend to develop more multifunctional robots so as to ensure that each robot's capabilities are maximised to its full potential.

9. What are the benefits of robotics technology in our society, and how do you plan to address these benefits?

We firmly believe that robotics technology must bring about improved safety, increased productivity or improved quality. We envisage robots being called upon to perform high-risk tasks, unconstrained by time, fatigue or stress, and delivering outcomes at the desired quality and consistency.

To this end, NP's RRIC will focus on developing service robots (SRs), autonomous vehicles (AVs), autonomous underwater & marine vessels (ROVs) and unmanned aerial vehicles (UAVs) for industry and national needs, covering applications on land, sea and in the air.

NGEE ANN POLYTECHNIC

10. What are some of your visions for robotics in the future?

The robotics industry is expected to grow significantly in the next few years. With an ageing population and ever-increasing need to improve productivity, there will be an increased demand for robots to assist in the provision of healthcare and to complement the workforce as part of the constant drive for automation. Even on the leisure front, changing consumer preferences and social trends will accelerate the growth of advanced robotics and autonomous solutions. Robots will also find their place in helping with the global sustainability agenda. It is with this in mind that NP and RRIC has chosen to focus on Future Mobility, Future Health, Future Construction and Future Sustainability in our technology development efforts.

While robots will increasingly populate our world, the growth of artificial intelligence would also mean that they will become increasingly autonomous and self-sufficient in their decision-making, performing a much more diverse range of tasks with better results and greater speed. We can expect future robots to adapt to their surroundings, master new processes, and alter their behaviour dynamically to perform more complex tasks.

Ultimately, humans will stand to benefit as robots shoulder the physically demanding, repetitive, or dangerous tasks. As robots increasingly complement humans at work, we can look forward to increased safety, productivity, and quality. Human manpower can then be focused on those aspects that require high-touch or innate creativity.

December

PROGRESSIVE TECHNOLOGIES IN AUTOMATION. PTA-EKATERINBURG 2021
NOVOTEL EKATERINBURG CENTER ENGLES STREET,7
01 DECEMBER 2021

MACHINE TOOL INDONESIA 2021
JAKARTA INTERNATIONAL EXPO, KEMAYORAN, INDONESIA
01-04 DECEMBER 2021

PLAST EURASIA 2021
TOYAP FAIR CONVENTION AND CONGRESS CENTER, ISTANBUL
01-04 DECEMBER 2021

INDUSTRIAL AUTOMATION SHOW (IAS)2021
NATIONAL EXHIBITION AND CONVENTION CENTER, SHANGHAI
01-05 DECEMBER 2021

AGRI LIVESTOCK MYANMAR 2021
MYANMAR EXPO HALL, YANGON MYANMAR
02-04 DECEMBER 2021

VIETNAM INTERNATIONAL ELECTRICAL APPLIANCES EXPO
VIETNAM
4-7 DECEMBER 2021

AUTOMECHANIKA DUBAI
DUBAI WORLD TRADE CENTRE
04-16 DECEMBER 2021

HIGH SECURITY PRINTING ASIA COLOMBO
SRI LANKA
05-07 DECEMBER 2021

DAC(DESIGN AUTOMATION CONFRENCE) 2021
MOSCONE WEST, SANFRANCISCO, CA
05-09 DECEMBER 2021

WORLD PETROLEUM CONGRESS 2021
HOUSTON, USA
05-09 DECEMBER 2021

MIDDLE EAST ORGANIC AND NATURAL PRODUCT EXPO
DUBAI
06-08 DECEMBER 2021

ASIAN OIL, GAS AND PETROCHEMICAL ENGINEERING EXHIBITION
BANGKOK (THAILAND)
07-09 DECEMBER 2021

CHINA MAXHINEX INDIA 2021
BOMBAY EXHIBITION CENTRE, NESCO COPLEX, W.E. HIGHWAY, GOREGAON EAST, MUMBAI
09-11 DECEMBER 2021

SHANGHAI INTERNATIONAL FURNITURE MACHINERY & WOODWORKING MACHINERY FAIR
SHANGHAI, CHINA
11-14 DECEMBER 2021

January 2022

STEELFAB 2022
EXPO CENTRE SHARJAH- SHARJAH, UAE
10-13 JANUARY 2022

WORLD FUTURE ENERGY SUMMIT 2022
ADNEC, ABU DHABI
17-19 JANUARY 2022

CAR-ELE JAPAN 2022
TOKYO BIG SIGHT, JAPAN
19-21 JANUARY 2022

NANO TECH 2022
EAST HALLS & CONFERENCE TOWER, TOKYO BIG SIGHT, JAPAN
26-28 JANUARY 2022

AGROTICA 2022
THESSALONIKI INTERNATIONAL EXHIBITION & CONGRESS CENTRE
27-30 JANUARY 2022

February

AFA 2022
AUGSBURG (GERMANY)
2 - 6 FEBRUARY 2022

SEPEM INDUSTRIES AUVERGNE RH-ALPES 2022
MONFLANQUIN (FRANCE)
8 FEBRUARY 2022

THAILAND INDUSTRIAL FAIR 2022
BANGKOK (THAILAND)
09 - 12 FEBRUARY 2022

KZN INDUSTRIAL TECHNOLOGY EXHIBITION
DURBAN (SOUTH AFRICA)
16 - 18 FEBRUARY 2022

TANZANIA TRADE SHOW 2022 DAR ES SALAAM (TANZANIA)
25 - 27 FEBRUARY 2022

INTERNATIONAL SIGNS & LED EXHIBITION
SHENZHEN WORLD EXHIBITION & CONVENTION CENTER, SHENZHEN, CHINA
22 - 24 FEBRUARY 2022

AHR EXPO
LAS VEGAS, USA
31 JAN - 02 FEB 2022

YORKSHIRE AGRICULTURAL MACHINERY SHOW
YORK AUCTION CENTRE, YORK, UK
02 FEBRUARY 2022

INBOUND MARKET EXPO
TOKYO BIG SIGHT, KOTO, JAPAN
15 - 18 FEBRUARY 2022

T-PLAS
BITEC | BANGKOK INTERNATIONAL TRADE & EXHIBITION CENTRE, BANGKOK, THAILAND
09 - 12 FEBRUARY 2022

THAILAND INDUSTRIAL FAIR
BITEC | BANGKOK INTERNATIONAL TRADE & EXHIBITION CENTRE, BANGKOK, THAILAND
10 - 12 FEBRUARY 2022

March

NATIONAL MANUFACTURING WEEK 2022
MELBOURNE, AUSTRALIA
08 - 11 MARCH 2022

CAIRO INTERNATIONAL FAIR - GENERAL GOODS & INDUSTRIALS PRODUCTS
CAIRO, EGYPT
09 - 18 MARCH 2022

CENTRAL CHINA INTERNATIONAL EQUIPMENT MANUFACTURING EXHIBITIONS
ZHENGZHOU, CHINA
10 - 13 MARCH 2022

WENZHOU INTERNATIONAL INDUSTRY FAIR
WENZHOU, CHINA
11 - 13 MARCH 2022

INTERNATIONAL EXHIBITION OF INDUSTRIAL SUBCONTRACTING, EQUIPMENT AND AGRO-FOOD PROCESSES, DIGITAL SOLUTIONS
VALENCE, FRANCE
22 - 24 MARCH 2022

(EXPOCOMER) INTERNATIONAL COMMERCIAL EXHIBITION
PANAMA CITY, PANAMA
23 - 26 MARCH 2022

CENTRAL CHINA INTERNATIONAL EQUIPMENT MANUFACTURING EXHIBITIONS
ZHENGZHOU, CHINA
24 - 26 MARCH 2022

MARVEX - AIR-CONDITIONING, REFRIGERATION & VENTILATION EXPO, MALAYSIA
KUALA LUMPUR CONVENTION CENTRE, KUALA LUMPUR, MALAYSIA
16 - 19 MARCH 2022

INTERNATIONAL BUILDING & CONSTRUCTION INDUSTRY TRADE SHOW(ARCHITECTURE + CONSTRUCTION MATERIALS)
TOKYO BIG SIGHT, KOTO, JAPAN
1 - 4 MARCH 2022

FINE AND PRECISION MACHINING TECHNOLOGY EXHIBITION
OTA CITY INDUSTRIAL PLAZA PIO RESERVATION CENTER, OTA, JAPAN
3 - 4 MARCH 2022

CONCRETETECH CHINA
CHINA INTERNATIONAL EXHIBITION CENTER, BEIJING, CHINA
26 - 28 MARCH 2022

MECHANICAL COMPONENTS & MATERIALS TECHNOLOGY EXPO
TOKYO BIG SIGHT, KOTO, JAPAN
16 - 18 MARCH 2022

FINE AND PRECISION MACHINING TECHNOLOGY EXHIBITION
OTA CITY INDUSTRIAL PLAZA PIO RESERVATION CENTER, OTA, JAPAN
3 - 4 MARCH 2022

INDUSTRIAL AI/IOT EXPO
TOKYO BIG SIGHT, KOTO, JAPAN
16 - 18 MARCH 2022

AEROSPACE TECHNOLOGY & COMPONENTS EXPO
TOKYO BIG SIGHT, KOTO, JAPAN
17 - 18 MARCH 2022

FACTORY FACILITIES & EQUIPMENT EXPO
TOKYO BIG SIGHT, KOTO, JAPAN 16 - 18 MARCH 2022

FACTORY FACILITIES & EQUIPMENT EXPO
TOKYO BIG SIGHT, KOTO, JAPAN 16 - 18 MARCH 2022

GLOBAL RUBBER, LATEX & TYRE EXPO
BITEC | BANGKOK INTERNATIONAL TRADE & EXHIBITION CENTRE, BANGKOK, THAILAND
2 - 4 MARCH 2022

April

(CANTON FAIR GUANGZHOU) INTERNATIONAL CONSUMER GOODS FAIR
GUANGZHOU, CHINA
APRIL

KYIV TECHNICAL FAIR
KIEV, UKRAINE
05 - 07 APRIL 2022

INDUSTRIAL AUTOMATION - HANNOVER 2022
DEUTSCHE MESSE HANNOVER, HANNOVER (GERMANY) 25 - 29 APRIL 2022

HANOVER FAIR - INDUSTRIAL TECHNIQUES SECTION
HANNOVER, GERMANY
25 - 29 APRIL 2022

EMWA - EQUIPMENT & MANUFACTURING WEST AFRICA 2022
THE LANDMARK EVENTS CENTRE, LAGOS, NIGERIA
26 - 28 APRIL 2022

MACHEXPO 2022
"KORME WORLD TRADE CENTER ASTANA, ASTANA, KAZAKHSTAN
27 - 29 APRIL 2022

IIGA DIGITAL

industrial guide ASIA
industrialguideASIA.com

MARKETING AUTOMATION TOOLKIT

GET AN ALL-IN-ONE SOLUTION FOR YOUR MARKETING AUTOMATION NEEDS
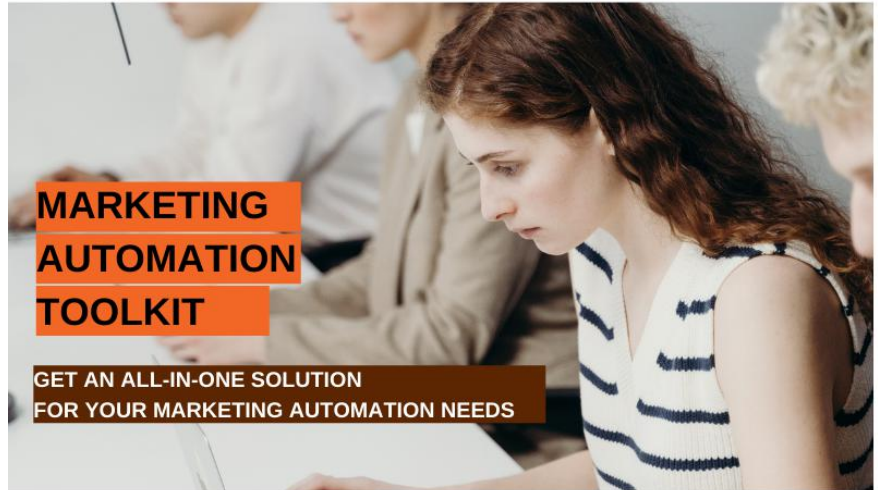
OUR FEATURES

SOCIAL MEDIA
Manage all your Social Media activities from one place

EMAIL MARKETING
Send personalized email campaign to engage with your leads.

LANDING PAGES
Create stunning landing pages that convert. No code required.

AUTOMATION
Run powerful automation with a super easy builder.

LEAD MAGNET
Profile your leads, segment your audience and manage your lists.

ANALYTICS
Control and analyze all your marketing activities

Email and Social Media Automation   **https://smart.iiga.one**