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SAFETY-TECH NEWS

Smart glasses, 3D holograms among new 5G innovations being tested: IMDA

Source: <https://www.straitstimes.com/tech/tech-news/smart-glasses-3d-holograms-among-new-5g-innovations-being-tested-imda>



Structural Manager Muhammad Isa Bin Sanusi wearing his 5G Augmented and Virtual Reality Smart Glasses at the Keppel shipyard. ST PHOTO: DESMOND FOO

Engineers at Keppel Offshore & Marine's shipyards can now receive key information about the machinery they are using - its performance in real time, for instance - via 5G augmented reality (AR) enabled smart glasses.

This innovation, which is being trialled at the shipyards, aims to increase efficiency in maritime operations and address disruptions caused by the Covid-19 pandemic. It is

part of the first batch of new 5G projects under the Infocomm Media Development Authority's (IMDA) 5G Innovation Programme. The programme seeks to accelerate the adoption and commercialisation of 5G solutions in Singapore. The other new projects are an initiative involving the use of holographic displays and images to support healthcare services - known as holomedicine - at the National University Hospital (NUH), and the development of an outdoor cinematic-quality AR experience at the Marina Bay area.

The project at Keppel's shipyards involves using sensors on equipment and machinery to transmit real-time data to the smart glasses.



An engineer can use the smart glasses to capture and stream real-time data to the command centre at Keppel's headquarters. ST PHOTO: DESMOND FOO

A field engineer can use the smart glasses to view key information about a crane that his team is operating - for example, the weight of the load it is lifting and its maintenance condition. This would reduce the frequency of periodic maintenance checks, said senior programme lead for yard transformation at Keppel Offshore & Marine. "We are looking at an overall reduction of 15 per cent for maintenance times," he added.

An engineer can also use the smart glasses to capture and stream real-time data to the command centre at Keppel's headquarters, where a team can help to rectify any issues that occur during the operation. Other uses for the smart glasses include displaying checklists of tasks for inspection personnel, so that they need not carry documents containing those lists with them.



Keppel O&M's Smart Glasses leverages Augmented and Virtual Reality to increase productivity and safety in operations. PHOTO: KEPPEL CORPORATION LIMITED

The holomedicine project at NUH will enable the use of realistic 3D holograms for various medical operations, including helping surgeons to plan operations. Among other things, it will also enable holographic scanned images or guides converted from CT or MRI scans to be overlaid on a patient, providing real-time guidance for surgeons during an operation.

ENVIRO-TECH NEWS

NTU researchers develop transparent fire-resistant wood coating

Source: <https://www.straitstimes.com/singapore/ntu-researchers-develop-transparent-fire-resistant-wood-coating>



A panel of spruce wood coated with the fire-resistant resin (left) and the other without (right) after being burnt. ST PHOTO: WALLACE WOON

A coating developed by researchers at Nanyang Technological University (NTU) can prevent wood from catching fire.

Two panels of spruce wood were placed alongside in a testing chamber, the first showing its raw wood grain and the other with a slight sheen only noticeable when light reflects off it. A burner that can heat substances to more than 800 deg C is applied to the two panels. One crackled and blackened, as expected, and the other started foaming up, expanding to form a layer of insulation, protecting the wood underneath. When the burner was switched off, the researcher scraped off the residue on the coated piece of wood to reveal that it was unscathed by the extreme heat. Just a thickness of about 75 microns - the thickness of a sheet of paper - of the coating is needed to protect the surface of wood from fire. The wood needs to be cured overnight.

When heated to 300 deg C, the resin coating expands by up to 100 times in thickness, and it is this expansion that insulates and protects the wood from heat, according to Associate Professor from the NTU School of Materials Science and Engineering. "Most timber or wooden panels only have a transparent coat that protects them from moisture, weather corrosion, termites or pests, and are not designed to withstand high heat. "Thus, timber can still burn very quickly, especially if it is unprotected," he said. He added that current methods of making timber and other wood surfaces more fire-resistant typically obscure the natural appearance of the wood. These other methods, such as fire-retardant panels or paint, are costly and can release toxic gases when burnt.

The NTU coating's potential to stop fire damage would allow for more buildings to use timber as a structural element, a crucial step in the fight against climate change, said Managing Director of building design firm Venturer Timberwork.

NUS students come up with recycling method for medicine strips

Source: <https://www.straitstimes.com/singapore/environment/nus-students-come-up-with-recycling-method-for-medicine-strips>

Medicine strips - formally known as pharmaceutical blister packaging - cannot be recycled because they are made of plastic and aluminium heat-sealed together with a type of glue. It is difficult to separate the materials in this multi-layer packaging so the strips are usually discarded as general waste. To avoid having to throw them in the incinerators, a group of engineering students from the National University of Singapore (NUS) came up with a chemical recycling method to separate plastic from aluminium and salvage both components. Both materials can then be sent to recycling companies.

This student initiative, called the Green Doctors Programme, was born when a pharmacist from the National University Hospital (NUH) approached the NUS department of Civil and Environmental Engineering to find a way to reduce medical waste.

Chemical recycling involves adding chemicals to the waste materials to break down their original structures. After three months of research, the Green Doctors Programme concocted a recipe to dissolve the adhesive layer between the plastic and aluminium earlier this year, so that the materials can be separated. The team, which includes about 10 chemical, environmental and mechanical engineering students, has been testing and working to optimise their solution using medicine strips provided by NUH.

The Covid-19 pandemic exacerbated the issue in 2020, due to additional infection control and biosafety measures. Since 2020, the Singapore General Hospital has been sending stainless steel disposables - such as surgical instruments and laryngoscope blades - to vendors for recycling. The soiled instruments are thoroughly washed and decontaminated in the hospital, and between 450kg and 600kg of instruments are recycled each month. By 2030, Alexandra Hospital plans to reduce its waste by 60 per cent and raise its recycling rate by the same amount. The hospital is looking to see if their

alcohol-based hand rub bottles can be cleaned so that they can be given to recyclers.

From this year, most companies with an annual turnover of \$10 million have to report the amount of packaging they use, and this includes pharmaceutical and medtech companies. Some companies have developed reusable inhaler devices - where the medicine canister for asthmatic patients can be replaced several times - to move away from disposable inhaler devices, said the Pharmaceutical Society of Singapore.

The Green Doctors Programme also plans to look into how other types of hard-to-recycle medical waste such as IV bags can be recycled. The pandemic has also made medical waste more visible, with used surgical masks disposed in public places.



It is difficult to separate the materials in this multi-layer packaging so the strips are usually discarded as general waste. ST PHOTO: LIM YAOHUI

FOOD-TECH NEWS

NTU scientists develop fungi-based protein more nutritious than plant-based meat substitutes

Source: <https://www.straitstimes.com/singapore/ntu-scientists-develop-fungi-based-protein-more-nutritious-than-plant-based-meat-substitutes>

A new type of alternative protein made from fungi, which is healthier, tastier and greener than plant-based meat substitutes, could soon become available to consumers.

Scientists from Nanyang Technological University (NTU) have been able to cultivate fungi from a base of nutrient-rich food waste, such as soya bean skin, wheat stalk and brewers'

spent grain - a by-product of the beer-making industry. The researchers hope to commercialise their solution by 2024. Director of NTU's Food Science and Technology (FST) programme and leader of the team that developed the food product, said that when grown on food waste, the edible white mushroom (*Agaricus bisporus*) can absorb all its essential nutrients such as protein, iron and amino acids.



Director of NTU's Food Science and Technology programme Prof William Chen with oyster mushrooms cultivated from a base of discarded soya bean skin. PHOTO: NTU

As a result it is more nutritious than the ingredients commonly found in plant-based meat alternatives such as peas, chickpeas, wheat, gluten and soya. He noted that a major challenge facing the plant-based proteins sector is infusing these alternative meats with the essential nutrients so they are made comparable to animal meat. Growing fungi on food waste could also help to enhance its growth and double its yield - with the mushrooms cultivated by NTU fruiting in just two weeks, compared with commercial methods, which take around a month.

The fungi-based proteins can be a lot cheaper to produce compared with plant-based meat, said the Prof. Mushrooms, for one thing, can be grown indoors in the dark, and they are a lot more energy- and water-efficient compared with crops needed for plant-based proteins, such as soya beans that would have to be grown in urban farms. "In addition, being naturally rich in protein and micronutrients like minerals and vitamins, with a texture and taste profile similar to that of real meat, a lot less processing would be needed to convert the fungi into alternative protein, which also helps bring down production costs," he added. By reusing common food waste by-products and turning them into high-value

proteins, creating these fungi-based proteins can also have mitigating impacts on the environment, said the Prof.

It is estimated that around 39 million tonnes of spent grains and 14 million tonnes of soya bean skin, also known as okara, are thrown into landfills around the world each year, where they decompose and add to greenhouse gas emissions.



A comparison of the effectiveness of growth of mushrooms in three mediums. PHOTO: NTU

To scale up the fungi cultivation method, the NTU team is collaborating with The FoodBowl, a food-processing facility supported by the New Zealand government to help food businesses and start-ups innovate, scale up and commercialise new products to international scale. One New Zealand start-up that is collaborating with NTU's FST programme to implement the fungi cultivation technology in its food products is Off-Piste Provisions, a plant-based meat company.

Commenting on NTU's innovation, acting managing director of the Good Food Institute Asia Pacific, Asia's leading alternative protein think-tank, said that with adequate investment and support, these proteins being scaled up at NTU could almost single-handedly resolve the global protein deficit. She noted that research aimed at accelerating the development of fungi-based foods can expand food choice available to consumers, spur the creation of new companies, and strengthen Singapore's global economic competitiveness while allowing the Republic to produce 30 per cent of its nutritional needs locally by 2030.