

## NTU start-up gets \$10m lift to use deep tech to boost mass charging of electric vehicles



The start-up's proprietary equipment will facilitate a smarter way of converting electrical energy to and from the grid. ST PHOTO: KEVIN LIM

**Lee Li Ying**  
Correspondent

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SINGAPORE – A Singapore start-up has received a \$10 million shot in the arm to commercialise technology that could allow electric vehicles (EVs) to be charged more efficiently.

As the country gears up for the wider adoption of EVs, Amperesand's proprietary equipment will facilitate a smarter way of converting electrical energy to and from the grid.

The spin-off from Nanyang Technological University is the first start-up to benefit from a \$75 million deep-tech pilot programme first announced in September, said Deputy Prime Minister Heng Swee Keat on Wednesday at Singapore's investment company Temasek's annual RIE Industry Day, at Sands Expo and Convention Centre.

The programme is managed by Temasek, the National University of Singapore (NUS) and NTU, and was rolled out to accelerate the commercialisation of promising spin-offs from the universities.

Temasek, NUS and NTU's \$5 million funding will be matched by an equal amount from a deep-tech American-based venture capital investor. Deep tech refers to start-ups which provide high-tech innovation in engineering, or are based on significant scientific advances.

Co-founder of Amperesand, Dr Anshuman Tripathi, said that over the last century, electricity has been generated at large power stations, and then transmitted over power cables at extremely high voltages and distributed locally through a power transformer.

The transformer converts the electrical energy from high voltage, which is hazardous to humans and equipment, to lower voltages safe for use in industries, homes and offices.

Normally, power grids operate on alternating current (AC), which minimises the energy lost when it is transmitted over long power lines. However, there has been a steady increase in industrial equipment and household devices that are powered by direct current (DC), such as any battery-operated device. The power generated by solar panels is also DC.

Conventional transformers, however, cannot convert DC to AC or vice versa, and require special equipment to do so.

Amperesand's solid state transformer does away with the need for such power conversion equipment.

With solar energy increasingly being introduced into the distribution power grid, and the incoming surge of EVs that will draw from the power grid, there needs to be a smarter way to convert and control electrical energy, said Dr Tripathi, who is also the senior programme director of future mobility systems and power grids at NTU's Energy Research Institute. Different devices take and give back to the power grid at different voltages and currents, and without a smarter power interface, the stability of power networks will be compromised.

"Solid state transformers can regulate all these functions seamlessly in one unit. These devices are smaller and more efficient than the combined power conversion equipment built around conventional transformers. This is an important breakthrough in providing a balance between the distribution power grid, alternating or direct current loads and clean energy resources," he said.

The start-up aims to be the first in the world to commercialise a modular solid state transformer that can be scaled up for multi-megawatt fast charging of EVs.

“The technology will be a game changer in the electric vehicle landscape. It will not only facilitate fast charging, making the process quicker than ever, but also optimise the control of energy transfer. Its ability to significantly improve power quality of the distribution grid will help to reduce the cost of grid operators,” said Dr Tripathi.

It is slated to deliver the first systems to customers globally by 2025.

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Separately, NTU and NUS will also develop a new common intellectual property (IP) licensing framework by December 2023.

Subsequently, potential licensors will be able to go to a joint IP marketplace to identify and select IP from both institutions. Both universities will streamline the process to reduce the time taken to obtain a licence from a few months to a few weeks. Procedures involving paperwork, legal licensing agreements, and also the various options for payments will be streamlined.

“What we want to do is to make licensing IP as easy as a Google search and a one-click process... What we hope now is that companies can find out quickly what types of IP are available, rather than having to go to (different researchers and individuals),” said Associate Professor Benjamin Tee, the associate vice-president of innovation and enterprise at NUS.

For a start, the platform will have a database of about 500 IP licences in areas like climate technology and artificial intelligence.

Additionally, companies that have revenues of up to \$1 million will be offered a deferred payment plan for licence fees. This means they can license the technology first, conserve their cash and use it to develop and scale up their innovation. Conventionally, licensing a technology requires a larger upfront payment in addition to annual fees like royalties.

Mr Heng said: “In a more competitive and less benign world, Singapore can continue to create and capture value and feed the virtuous circle of innovation if we can drive collaboration to address shared global challenges such as pandemic readiness, climate change and ageing population.”