THE ENGINEER

NTU Singapore team develops plant communication tool

18th March 2021 9:58 am

Researchers at NTU Singapore have developed a device to communicate with plants, aiming to unlock potential in robotics and agriculture.

The team at NTU (Nanyang Technological University) said that the plant communication device was developed by attaching a conformable electrode on the surface of a Venus flytrap plant using hydrogel as an adhesive.

According to the study, published in *Nature Electronics*, the electrode achieves two things when attached to the plant's surface: picking up electrical signals to monitor how the plant responds to its environment; and transmitting electrical signals to the plant, causing it to close its leaves.

The NTU researchers believe that this ability to measure electrical signals of plants could create opportunities in robotics – such as plant-based robots and more sensitive grippers

XDBOT set for Covid-19 cleaning duties in Singapore

MENA region ripe for controlled environment agriculture

"Climate change is threatening food security around the world," said lead author of the study, Professor Chen Xiaodong. "By monitoring the plants' electrical signals, we may be able to detect possible distress signals and abnormalities. When used for agriculture purpose, farmers may find out when a disease is in process, even before full-blown symptoms appear on the crops such as yellowed leaves."

The 3mm device is harmless to the plant, the team confirmed, and does not affect its ability to perform photosynthesis. Using a smartphone to transmit electric pulses to the device at a specific frequency, researchers elicited the Venus flytrap to close its leaves on demand in 1.3 seconds. They also attached the plant to a robotic arm and used the device to stimulate its leaf to pick up a piece of wire half a millimetre in diameter.

Seeking to improve the device's performance, the NTU Singapore team collaborated with researchers at the Institute of Materials Research & Engineering (IMRE), a unit of Singapore's Agency for Science, Technology and Research (A*STAR). Results from this separate study found that using a type of hydrogel called thermogel made it possible to attach their device to a greater variety of plants.

"The device can now stick to more types of plant surfaces and more securely so, marking an important step forward in the field of plant electrophysiology," said Professor Loh Xian Jun, executive director of the IMRE. "It opens up new opportunities for plant-based technologies."