

# Future farming

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Smart farmers

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## Device communicates with plants using electric signals

Researchers envision a future where farmers can take preventive steps to protect their crops, using the plant 'communication' device they have developed.

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A team of scientists led by Nanyang Technological University, Singapore (NTU Singapore) has developed a device that can deliver electrical signals to and from plants, opening the door to new technologies that make use of plants.

The NTU team developed their plant 'communication' device by attaching a conformable electrode (a piece of conductive material) on the surface of a Venus flytrap plant using a soft and sticky adhesive known as hydrogel.

### Pick up and transmit electric signals

With the electrode attached to the surface of the flytrap, researchers can achieve two things: pick up electrical signals to monitor how the plant responds to its environment, and transmit electrical signals to the plant, to cause it to close its leaves.

According to the scientists, the ability to measure the electrical signals of plants could create opportunities for a range of useful applications, such as plant-based robots that can help to pick up fragile objects, or to help enhance food security by detecting diseases in crops early.

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NTU Singapore scientists develop device to 'comm...



## Monitor crop health

The research team envisions a future where farmers can take preventive steps to protect their crops, using the plant 'communication' device they have developed.

Lead author of the study, Chen Xiaodong, President's Chair Professor in Materials Science and Engineering at NTU Singapore said: "Climate change is threatening food security around the world. 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 progress, even before full-blown symptoms appear on the crops, such as yellowed leaves. This may provide us the opportunity to act quickly to maximise crop yield for the population."

## Smartphone

The device has a diameter of 3 mm and is harmless to the plant. The researchers say it does not affect the plant's ability to perform photosynthesis while successfully detecting electrical signals from the plant. Using a smartphone to transmit electric pulses to the device at a specific frequency, the team elicited the Venus flytrap to close its leaves on demand, in 1.3 seconds.

The researchers have also attached the Venus flytrap to a robotic arm and, through the smartphone and the 'communication' device, stimulated its leaf to close and pick up a piece of wire half a millimetre in diameter.



**Hugo Claver**

Web editor for Future Farming

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