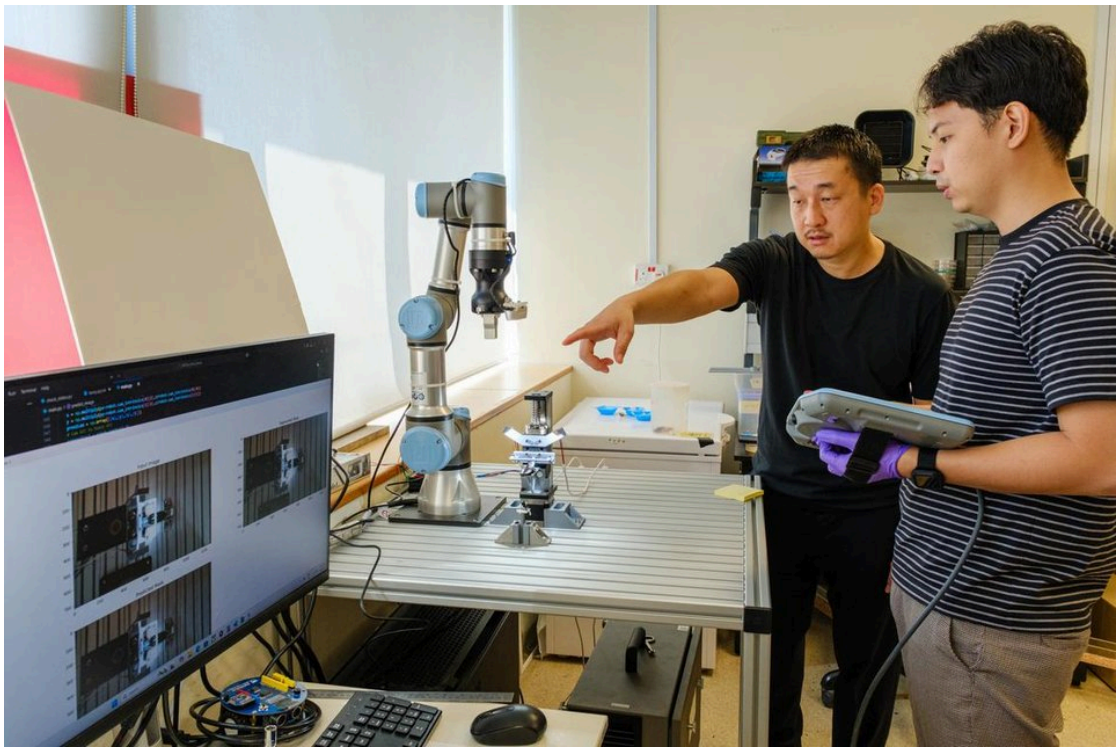
Cyborg roach ready for search and rescue efforts in 1 minute



Professor Hirotaka Sato (left) working with NTU project officer Greg Angelo Gonzales Nonato on a robotic system that automates the assembly process of cyborg cockroaches.
PHOTO: NTU SINGAPORE

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SINGAPORE - Getting a cyborg cockroach ready for deployment in disaster relief efforts now takes only around a minute, allowing for more of these hybrid insects to be created and sent in urgent situations.

Previously, it took more than an hour to do this, such as in March, when 10 cyborg cockroaches assisted in the Singapore Civil Defence Force's rescue efforts following a 7.7-magnitude earthquake that killed thousands in Myanmar.

Nanyang Technological University (NTU) said on July 28 that its scientists have built a new prototype robotic system that automates the process for trained operators to manually strap electronic “backpacks” onto the back of Madagascar hissing cockroaches to look for survivors. These devices contain infrared cameras, sensors and electrodes that can stimulate and control their movements.

The new artificial intelligence system, developed with support from the Japan Science and Technology Agency, uses computer vision and a proprietary algorithm to identify optimal spots on a cockroach’s back to implant electrodes, in one minute and eight seconds per insect.

Automating this process allows these cyborg cockroaches to be produced quickly and reduces the chance of human error, said Professor Hirotaka Sato from NTU’s School of Mechanical and Aerospace Engineering.

“Manual preparation is time-consuming and very dependent on skilled operators. Our innovation makes the dream of deploying large numbers of cyborg insects in real-life scenarios far more practical,” said Prof Sato.

The deployment of the roaches in Myanmar was the first time in the world such cyborgs were used in a humanitarian operation, and the first time insect-hybrid robots have been deployed in the field. They did not manage to find any survivors then.

The cyborg roaches were developed by the Home Team Science and Technology Agency, together with NTU and Klass Engineering and Solutions.

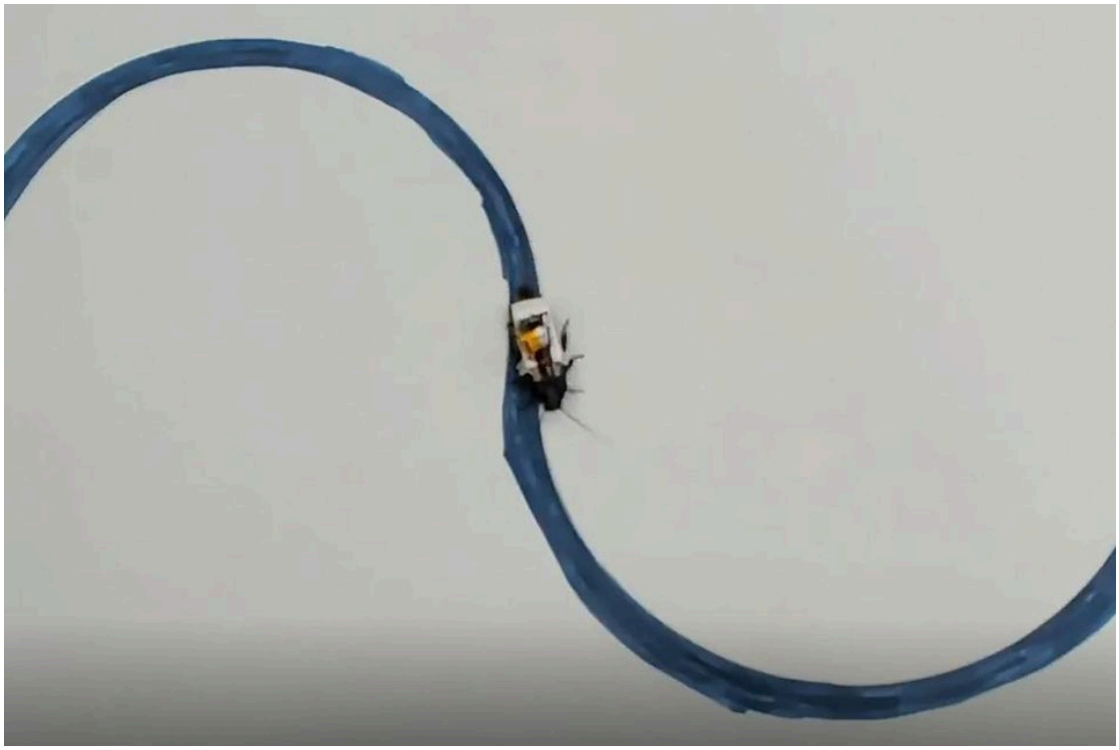
Measuring 6cm each, they can navigate tiny spaces under rubble and collection information that determines signs of life.

The field deployment in Myanmar demonstrated the potential of insect-based robotics for locating survivors in disaster-hit areas

where conventional robots would have struggled with access and short operational times, said NTU.

“With learning from our field deployment, it’s now essential to create infrastructure that supports mass production and deployment,” said Prof Sato, adding that his team aims to improve the assembly system and work with local partners to further validate the system’s effectiveness and readiness for industrial use.

“Our assembly line is the first step towards that goal, and we believe it will pave the way for more reliable cyborg applications, such as inspecting large civil structures for defects.”



A new-generation electronic “backpack” can stimulate the cockroach by using 25 per cent less voltage than the previous iteration, while maintaining precise control of movement.

PHOTO: NTU

The researchers also designed a new-generation “backpack” that can stimulate the insects using 25 per cent less voltage than the previous iteration while maintaining precise control of movement, said NTU.

“This extra power efficiency will help to extend operational time and reduce the risk of overstimulation (of the insects),” said the university.

“In laboratory tests, the hybrid insects demonstrated sharp turns of over 70 degrees and speed reduction of up to 68 per cent on command.”