

Each robotic arm has grippers to pick up objects and force sensors to determine how strongly the “fingers” are gripping, making the robot more human-like in its manipulation of objects.

PHOTO: NTU



# NTU-made robot builds Ikea chair in nine minutes

---

**Tan Shu Yan**

---

---

It takes some of us hours hunched over packs of screws and manuals to assemble an Ikea chair.

But a new made-in-Singapore robot can do it in less than nine minutes.

Designed by a team from the School of Mechanical and Aerospace Engineering at Nanyang Technological University (NTU), it comprises a 3D camera and two arms equipped with “grippers”.

“For a robot, putting together an Ikea chair with such precision is more complex than it looks,” said Assistant Professor Pham Quang Cuong, who is part of the three-member team.

“The job of assembly, which may come naturally to humans, has to be broken into steps, such as identifying where the different chair parts are, the force required to grip them and making sure the arms move without colliding.”

The robot starts by taking 3D photos of the parts laid on the floor to generate a map of the estimated positions of each part. This is to replicate, as much as possible, the cluttered environment after humans unbox and prepare the parts.

On its wrists are sensors that determine how strongly its “fingers” grip and push objects. This allows the robot to detect holes by sliding the wooden plug on the surfaces of the parts and perform insertions.

The team, including research fellow Francisco Suarez-Ruiz and alumnus Zhou Xian, developed algorithms to programme the robot’s two-handed motion that is fast and collision-free.

It assembled Ikea’s Stefan chair in eight minutes, 55 seconds. Earlier, it had taken 11 minutes, 21 seconds to plan the motion pathways and three seconds to locate the parts.

All its components are easily available.

The three years of research behind the robot were supported by grants from the Ministry of Education, NTU’s innovation and enterprise arm NTUitive, and the Singapore-MIT Alliance for Research and Technology.