

Ikea assembly without the swearing as robots pass flatpack test

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Those who fear the rise of the machines, look away now: two robots have mastered a task that roundly defeats humans every weekend - successfully assembling an Ikea chair.

Engineers at Nanyang Technological University in Singapore used a 3D camera and two robot arms fitted with grippers and force sensors to attempt to build an £18 Stefan chair.

Working in unison, the robots completed the job in just 20 minutes.

More than half of the time was spent planning moves, with the execution taking nine minutes. Typically, a human takes 10-15 minutes, Ikea said.

Lead researcher Quang-Cuong Pham said the task requires the machines to recognise the parts, work out how to lift and move them without

causing damage, and then perform the moves flawlessly. "Our aim was to bring all these capabilities together and push them to the limit," he said.

Some moves required a part to be held by both robots at the same time, and since industrial robots are far stronger than Ikea furniture, a number of mistakes ended badly.

"We bought four chair kits and broke a few of them," said Pham. The robots were programmed to know



▲ *Stress-free job: robots set about putting together the Stefan chair*

what the parts of the chair looked like, how they should go together and in what order. "What it works out on the fly is how to do it," said Pham.

So far the robots can only assemble the chair frame, which is held together with wooden pins. The next step is to have them finish the job by bolting the various parts together. "That could take a few more months," said Pham. "It's not significantly more difficult."

The study, reported in the journal



Science Robotics, is a reminder that engineers are making progress in the field despite recent videos that show robots repeatedly falling over or being defeated by a door.

Pham believes the work paves the way for robots to move on from industrial assembly lines where they perform precise, repetitive movements, and tackle more complicated tasks, such as building computers and aircraft from stores of parts.

Plenty of challenges remain for robots, said Manuel Giuliani at the Bristol Robotics Laboratory at the University of the West of England. Machines struggle to recognise parts that are lying on top of each other; are bad at handling slippery objects; and struggle to pick up soft items, such as fruit, without squashing them, he said.

Pham is now keen to see if robots can learn to build a chair using only an image of the finished article as a guide.