

Watch A Robot Assemble Its Own IKEA Chair (VIDEO)

How long does it take you to assemble IKEA furniture? This robot can do it in under nine minutes without any external help.



AsianScientist (Apr. 19, 2018) – Using off the shelf components and open-source libraries, a team of researchers has developed a robot that can autonomously assemble an IKEA

chair. Their results have been published in Science Robotics.

The robot, equipped with a 3D camera and two robotic arms, assembled IKEA’s Stefan chair in 8 minutes and 55 seconds. Prior to the assembly, the robot took 11 minutes and 21 seconds to independently plan the motion pathways and 3 seconds to locate the parts.

“For a robot, putting together an IKEA chair with such precision is more complex than it looks,” said study team leader Pham Quang Cuong, an assistant professor at Nanyang Technological University, Singapore. “The job of assembly, which may come naturally to humans, has to be broken down into different steps, such as identifying where the different chair parts are, the force required to grip the parts, and making sure the robotic arms move without colliding into each other.”

The robot starts the assembly process by taking 3D photos of the parts laid out on the floor to generate a map of the estimated positions of the different parts. Next, using algorithms developed by the team, the robot plans a two-handed motion that is fast and collision-free. This motion pathway needs to be integrated with visual and tactile perception, grasping and execution.

To make sure that the robotic arms were able to grip the pieces tightly and perform tasks such as inserting wooden plugs, the amount of force exerted had to be regulated. This was challenging because although industrial robots are designed to be precise at positioning, they are bad at regulating forces, Pham explained.

Force sensors mounted on the 'wrists' of the robotic arms helped to determine the amount of force required, allowing the robot to detect holes by sliding the wooden plug on the surfaces of the work pieces and perform tight insertions.

The researchers believe that their robot could be of greatest value in performing specific tasks with precision in industries where tasks are varied and do not merit specialized machines or assembly lines.

"The way we have built our robot, from the parallel grippers to the force sensors on the wrists, all work towards manipulating objects in a way humans would," he added.

"We are looking to integrate more artificial intelligence into this approach to make the robot more autonomous so it can learn the different steps of assembling a chair through human demonstration or by reading the instruction manual, or even from an image of the assembled product."

The researchers are also working with companies to apply this form of robotic manipulation to do glass bonding that could be useful in the automotive industry and drilling holes in metal components for the aircraft manufacturing industry.

The article can be found at: Suárez-Ruiz et al. (2018) Can Robots Assemble an IKEA Chair?

