Democratizing robotics

By partnering with Capgemini, Kinova was able to adapt its robots for use in industry and deliver the Robotics-as-a-service (RaaS) service model.

The need for flexible robots

Companies are often asked to produce customized products, and that means being productive and cost effective when manufacturing at a lower volume. Robots can be used to increase productivity in manufacturing, but the typical robot is highly specialized for a particular task. It's ill-suited to the evolving requirements of a manufacturing plant that might have 25 assembly lines and produces a diverse range of products.

Kinova makes portable, adaptable, and open robotic arms that are used within the medical, security, and industrial fields as well as for academic and industrial research. Collaborating with Capgemini, Kinova identified the opportunity for its robots to be used in industrial environments. Weighing between 4.5kg and 8kg, and capable of lifting between 0.5 and 4kg, the robots assist employees with some of their most challenging tasks.

By introducing these arms into industrial environments, the partners planned to assist employees with repetitive, mundane, or high-risk activities.

Introducing Robotics-as-a-Service

Kinova and Capgemini have pioneered a low-risk deployment model, called Robotics-as-a-Service (RaaS). Taking inspiration from Software-as-a-Service and similar models, RaaS enables companies to acquire the robotics capabilities they need without making a heavy up-front investment.

Overview

Client: Kinova

Region: North America

Industry: Manufacturing & Industrial Products

Client Challenge:

Kinova and Capgemini wanted to develop a solution that not only introduced robotic arms to industrial users for the first time, but also that could be easily trained for a variety of tasks.

Results:

- Created Robotics-as-a-Service model with Capgemini
- Capgemini XIoT platform enables industrial data collection and processing
- Capgemini's Teach Robot Yourself (TRY) enables operators to program robots themselves
- A large European aircraft manufacturer is using Kinova robotic arms for cockpit testing

Unlike a simple rental agreement, under a RaaS contract, Kinova and Capgemini are responsible for delivering the robotic capabilities required, including supporting installation, configuration, and staff training. The robot can be customized under the terms of the contract if more suitable hardware becomes available.

Using its extensive experience in the industrial field, the Capgemini team begins by analyzing the customer's needs and identifying how robots can help. The robots connect wirelessly to an Intel IoT Gateway, which hosts the Capgemini XIoT platform, developed in collaboration with Intel. The XIoT software sends the data from the robot to the cloud, where Capgemini software for analytics processes the data collected. Users can analyze the number of tasks completed, the success rate of tasks, data from the robot's sensors, and additional operational data to help with preventative maintenance of the robot.

"The best thing about the Capgemini XIoT platform is its versatility," says François Boucher, VP Sales and Marketing, Kinova. "It's extremely open, like our hardware, so the robots can be adapted, making them ideal for use in assembly lines dealing with diverse products or tasks. They can also be integrated with other systems easily."

The data in the cloud can be used with artificial intelligence (AI) or Big Data platforms to enhance the robot's capabilities. The IBM Watson AI platform could be used, for example, to help identify products coming along the production line, or to help recognize manufacturing flaws. The cloud can also be used for voice processing, so that the robot can be controlled using spoken commands.

"You have to see robots as a tool to carve new possibilities; they're gathering information at a much faster pace than humans do. The robot can then proceed to an action depending on the analysis of that particular data, within inspection tasks for example," says Mr. Boucher. "By integrating with the Manufacturing Engineering System (MES), the robot can collect the criteria for a pass or no pass, and be given a task to check specific parameters."

Teaching the robots

"One of our goals is to democratize robotics technologies for people who are not necessarily engineers or scientists," says Mr. Boucher. "It's a hardened myth that robots are here to replace us. They're actually here to assist us with repetitive, dull, or dangerous tasks while people can do value-added things."

To that end, the robot is designed to be easy for everyone to program. Capgemini has created a platform called Teach Robot Yourself (TRY), which enables operators to program sequences by physically manipulating the robot, using a joystick, or on-screen controls. Recorded sequences can be combined in any order and given parameters, such as

the speed of operation. The programming language uses visual blocks that lock together like jigsaw pieces, similar to the Scratch programming language widely used in schools. Because the robots are portable and can easily be reprogrammed, they can be moved around the factory to carry out tasks as required.

The solution also has application programming interfaces (APIs), so that engineers can write sophisticated functions using their usual languages and tools.

Putting the robots to work

The RaaS solution has already been used by a large European aircraft manufacturer for testing helicopter cockpits. The robotic arm is able to conduct repetitive movements that would be boring and potentially harmful for humans to carry out, and the robot is able to work through the night so the manufacturer can get results faster and maximize the use of its test bench. Unstaffed testing makes new kinds of assessments possible, and reduces the cost of the process. While the robot does the hard physical work, the staff are free to focus on designing the tests and analyzing the results.

A Kinova robot is light and power efficient, so it can be mounted onto the customer's choice of transport for the remote use. It can be fitted to mobile bases or even drones to enable inspections in inaccessible or inhospitable environments, such as inside plane wings, under bridges, or in areas with extreme temperatures or chemical hazards.

Combining inspection data with AI in the cloud, the solution can help predict when structures or parts are likely to fail so that maintenance cycles can be optimized.

Working with Capgemini

The RaaS solution emerged from transatlantic cooperation, with the Capgemini team based in Europe and Kinova based in Canada. "We're always looking for partners that are passionate, and the Capgemini team was passionate about our shared vision of democratizing robots and respecting the people who work with them," says Mr. Boucher. "Due to a combined vision, we were able to succeed in reaching our goal, Capgemini's team brought a detailed understanding of this specific industry to the table."

Working with Capgemini has enabled Kinova to transform its business to enter the industrial market, and Kinova is now hiring talent to grow its new division dedicated to this market. The companies are working together to explore new opportunities in Asia, Europe, and North America.

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About Kinova

Kinova is a global leader in professional robotics. Founded in 2006 in Boisbriand, Quebec, Canada, the company's mission was initially to empower individuals with upper-body limitations through the use of assistive robotics. Almost 15 years later, the company has evolved its product line to service new markets — helping researchers, medical professionals, governments, businesses and educational institutions achieve their innovation goals through strategic partnerships and collaborative efforts. Today, with robotic technologies built up over more than a decade of inspired ingenuity, Kinova's dedication is to provide solutions to professionals in industries such as agrifood, healthcare, security, nuclear, hazmat and advanced manufacturing to go well beyond their ambitions.

Visit Kinova at
www.kinovarobotics.com

Reference video: Collaborative robotics for testing at a large European aircraft manufacturer.
https://www.capgemini.com/resources/collaborative-robotics-for-testing-at-airbus-helicopters/

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