



The Robotics Startup That Got Away (From Amazon)



By Mark Di Stefano



Share article

July 22, 2021 10:28 AM PDT

When Jeff Bezos attended a private robotics and artificial intelligence event in Palm Springs, Calif., in 2018, one presentation in particular caught the attention of the Amazon founder. It was a demonstration conducted by a frizzy-haired University of California, Berkeley, professor named Ken Goldberg, showing off a robot that could deftly pick up random items from a bucket.

Amazon later made a move to obtain the technology, which could have far-reaching implications for human labor in warehouses. Amazon approached Goldberg's Ambi Robotics to possibly acquire the startup, according to a person familiar with the situation. Ambi rebuffed Amazon, this person said.

THE TAKEAWAY

- Amazon approached Ambi Robotics about a possible acquisition
- Startup's pick-and-sort robots could replace warehouse workers
- Other robotics firms recently attracting investor attention

Goldberg resisted going into any detail about Amazon's approach. But during an interview with The Information, he discussed the demo at length. "Bezos saw [the robot] with wide

eyes and he started putting in new objects trying to trick it,” the professor said. The demo included hundreds of strange-shaped items, including bananas and various objects found in a robotics lab.

Then, as Goldberg recalled, one of Bezos’ assistants took off a shoe and added it to the pile. “We were all holding our breath and the robot just reached right over and picked the shoe up.”

A spokesperson for Amazon declined to comment.

People like Bezos who are in the business of running warehouses view a robot that can replace the human hand as one of the final frontiers of automation. Companies including Amazon have been rolling out less sophisticated robots in facilities for more than a decade. The most common systems move items around the warehouse floor, cutting the need for forklifts driven by workers or reducing the amount of walking workers have to do.

But when it comes to picking up different-shaped objects, human workers and their limbs have won out. A new crop of robotics firms is seeking to change that. Recent advancements in pick-and-sort technology by the likes of Goldberg’s Ambi Robotics show early potential. If deployed at scale, the technology could reshape the employment of workers in supply chains around the world, from California to China.

Amazon, which currently employs 1.3 million pairs of hands and continues to grow rapidly, is acutely interested in using automation to replace some of those hands. Its interest in Goldberg’s robotics startup is just one of the steps the Internet behemoth is taking in an effort to slash its burgeoning labor bill.

The company has deployed boxing machines from Italian firm CMC, which can automatically scan and place objects into custom packages, **according to Reuters**. Amazon claimed the technology was only a pilot, but its report said the machines were packing four to five times faster than humans. Last month, meanwhile, Amazon ordered 1,000 autonomous driving systems from self-driving-truck company Plus, and acquired the option of taking a 20% stake in the firm.

Meanwhile, Amazon Go, one of the company's moves into brick-and-mortar retail, has removed the need for supermarket cashiers. It uses technology that allows customers to pick up items off shelves, scan them so they are automatically charged to their Amazon accounts, and walk out of the store.

But while Amazon leads competitors on its march to automation, there are reasons to expect it will take longer to replace humans than hoped. Take Amazon's much-heralded push into package delivery by drones—a move designed to cut the need for delivery drivers. Bezos announced in 2013 the company would send drones whizzing through the sky within five years. That deadline has come and gone, and the company recently **restructured the drone division** after struggling to hit targets.

Robots have their own issues. They have done some repetitive chores, like painting cars in automobile factories, for decades. But for other chores, like finding a specific toy sitting on the shelf in an Amazon warehouse, the robots are still less flexible and more costly than human beings.

Goldberg, a professor at UC Berkeley, has been working on what he calls the “grasping robot” problem for 35 years as an academic. After a breakthrough on an AI system and prototype, he and Jeff Mahler—a former doctorate student, now his business partner—in 2019 set up Ambi Robotics, along with three other scientists and engineers from the university.

The nascent robotics startup has 23 employees and has begun selling robotic kits for warehouse clients. Those robots are already replacing humans in California, doing the backbreaking, monotonous work of reaching into bins, picking up items and sorting them.

While Goldberg clearly relished Amazon's interest, he said his company wanted to remain an independent operation outside any e-commerce giant.

“It comes down to fast development and speed,” he said. “We don't need to go through three layers of approval—and look, that's very important if you're in a large company.

“We don’t have [those layers.] It’s about making products that meet demand.”

Dex-Net

The technology that makes Ambi Robotics’ picking robots possible was developed by Goldberg, Mahler and academic colleagues in the Berkeley robotics lab. His team had a breakthrough six years ago with the development of an operating system that would allow the robot to learn on its own. Dubbed Dex-Net, for Dexterity Network, the robot’s operating system was fed thousands of images of 3D models. Using new advancements in deep learning, the system scanned the troves of data and used algorithms to learn the best way to pick up the objects.

The pandemic has been a catalyst for the Berkeley academics as they witnessed retailers and manufactures struggling to cope with labor shortages and disruptions in supply chains. The group moved to commercialize and build on the Dex-Net technology it had developed in the lab.

In March this year, Ambi Robotics came out of stealth mode, announcing a seed funding round of \$6.1 million with the backing of Bow Capital, Vertex Ventures and The House Fund. The company is now looking to raise more money to fund the next stage of growth. According to a spokesperson, Ambi Robotics has been meeting with prospective investors for the startup’s Series A round.

It already has begun rolling out the robotics system with a handful of clients. One of those is Pitney Bowes, a commerce and tech company that provides fulfillment services to the likes of eBay and WWE, the wrestling company. Stephanie Cannon, a vice president at Pitney Bowes, said the company last year tested an Ambi robot in a warehouse in Bloomington, Calif.

She said the robot has been able to pick up different-size parcels on an assembly line, scan affixed stickers and sort them into different sacks for postage.

“It’s got an ability to adapt to different parcels very rapidly,” Cannon said. “It sorts twice as fast as what a human can sort.”

That led Pitney Bowes to order dozens of more robotic units from the startup. Pitney Bowes

that led Pitney Bowes to order dozens of more robotic units from the startup. Pitney Bowes intends to begin soon rolling them out across the company's California facilities, she said.

Both Ambi Robotics and Pitney Bowes remain tight-lipped about the costs of the order. A spokesperson for Ambi Robotics said clients of the company pay upfront for the units, and then pay a monthly subscription cost for the use of the software. "It's a 'robotics as a service' model," he said.

Everyone Loves Robots

Of course, the startup isn't the only robotics company striving to solve the grasping problem. Other companies have built pick-and-sort robots and, like Ambi, have caught the attention of e-commerce companies hungry to find more efficient ways to run their facilities.

San Francisco-based Kindred AI has developed software and robotic arms that can sort and pick items. British supermarket technology company Ocado acquired Kindred for \$262 million last year. In the months since the sale, Kindred AI's former CEO Jim Liefer joined Ambi Robotics as the company's first chief executive.

Prominent investors are taking interest in the sector. Warehouse robotics attracted heightened attention during the pandemic, with e-commerce companies expanding warehouse and fulfillment centers to keep up with unprecedented demand. On Thursday, for instance, Berkshire Grey, a Massachusetts-based robotics and AI company, went public on the Nasdaq after a merger with Revolution, the SPAC run by former U.S. congressman John Delaney and AOL co-founder Steve Case. Meanwhile, Instacart **announced** on Thursday that it will build robotic grocery fulfillment centers across the U.S. and Canada with a firm called Fabric.

The merger values the company at \$2.7 billion. Berkshire Grey's original investors, including Khosla Ventures, Canaan and SoftBank, are rolling 100% of their prior investments into equity in the newly public company. Berkshire Grey's core business is equipping retailers such as Target and Walmart with robotic systems to enable them to go head-to-head with Amazon, according to the company's pitch to investors.

Similar trends are emerging outside the U.S. As The Information **reported earlier this**

month, China-based startup Hai Robotics, maker of robots similar to those deployed in Amazon warehouses, is in talks to raise new funding from Sequoia Capital China at a \$1.3 billion valuation—triple its March valuation. The Chinese firm has also started building out an office in California, seeking American clients for its robotic systems.

“Job Killers”

Questions about whether pick-and-sort robots will lead to massive redundancies for human workers remains a sensitive topic for Goldberg. He said “dark visions” of warehouses with nobody in them, all replaced by robots, are for “science fiction writers.”

Rather, Goldberg said, the pick-and-sort robots are “assistants” that tackle “incredibly tedious and stressful” jobs, many which lead to injury and burnout for workers.

Others in the field are more blunt. Oren Etzioni, CEO of the Allen Institute for Artificial Intelligence, said these robots are inevitable “job killers” in warehouses. There’s a good reason companies like Amazon are seeking out technologies that will automate picking and packing, he said. Over the long run, he predicted those systems will replace human labor, driving down warehouse costs.

That’s not necessarily a bad thing, Etzioni said. He pointed out that tollbooth workers and elevator operators, whose jobs became redundant, found other, often better jobs in other industries.

“We have a really remarkable piece of hardware—our limbs—and we have remarkable associated software—our brains,” he said. “But it’s just a question of time and data as to when it can be done.”

Mark Di Stefano is a reporter covering European tech policy and Amazon. He has previously worked at BuzzFeed News and the FT. He can be found on Twitter at [@MarkDiStef](#).

Subscriber Comments