These Robots Are Using Static Electricity to Make Nikes

Grabit, a robotics startup, makes machines that can work at 20 times the pace of humans

By Joshua Brustein
2017 年 8 月 30 日 下午 6:00 [GMT+8]

The most labor intensive part of putting together a pair of Nikes is assembling the “upper" — the flexible part of the shoe that sits on top of your foot. On many sneakers, uppers look like a single piece of material with no visible stitching, but they can actually be made of as many as 40 pieces that are stacked up just so and then heated so they fuse. While robots handle much of the shoemaking process, this has remained beyond their capacity. So humans remain in charge.

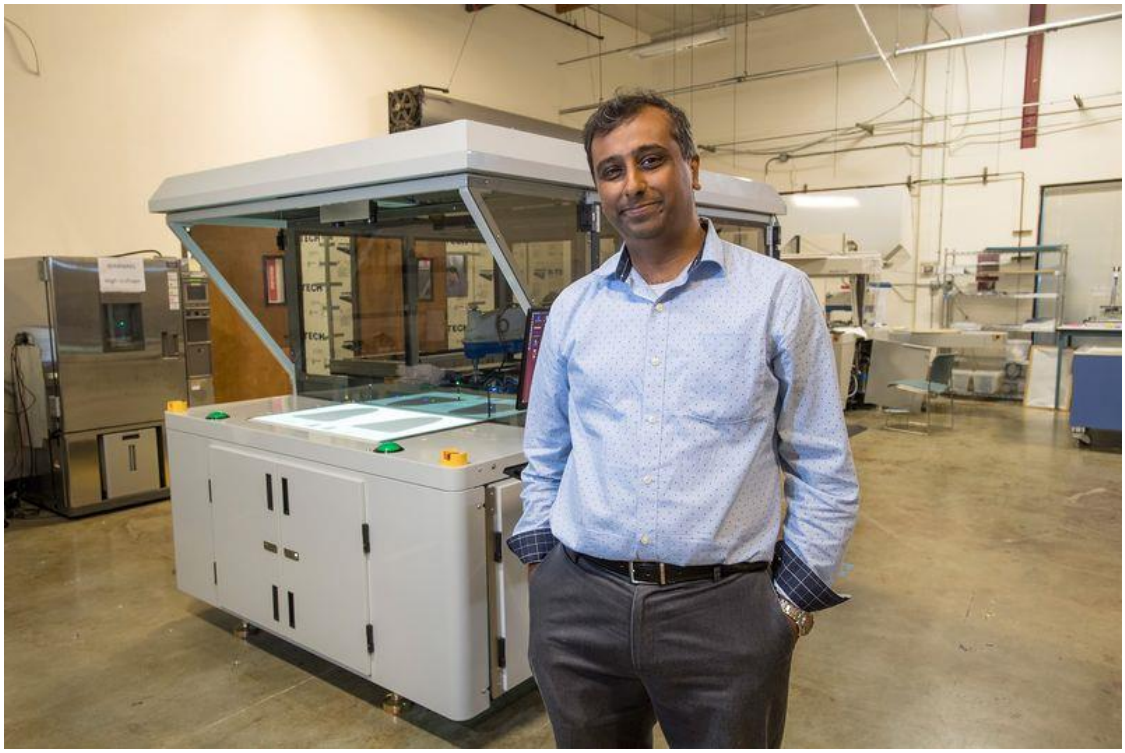
Now the robots are coming. Four years ago, Nike Inc. made an investment in a startup based in Sunnyvale, California called Grabit that uses electroadhesion — the type of static electricity that makes your hair stand up when you rub it against a balloon — to help machines manipulate objects in novel ways. More recently, Nike has quietly become one of the startup’s first customers.

In the past month, Grabit has begun providing facilities that make Nikes with a handful of upper-assembling machines that can work at 20 times the pace of human workers. By the end of the year, about a dozen of these machines will be operating in China and Mexico. This could be a step forward in Nike’s attempt to change the economics of shoemaking so it can relocate manufacturing closer to the big consumer markets in the U.S. and Europe.

Pretty much every company that makes physical objects is interested in automation. Robotic arms have been doing much of the labor in car factories for years, and Amazon sponsors an annual contest to get academics to make robots smart enough to pick up objects they’ve never seen before. For Grabit, the partnership with

Nike shows its work is catching the eye of the world's more prominent apparel companies.

Despite its name, Grabit's innovation isn't based on having robots mimic the human-style grabbing motion. Instead, the company implements flat pads of electrodes that, when charged correctly, create an electric field that adheres to nearly any surface. This makes Grabit able to do things robot-hand companies are unlikely ever to conquer, says Greg Miller, Grabit's chief executive officer. "The things we're getting pulled into, we're getting pulled into because they can't be done another way," he said.



Harsha Prahlad, Grabit's founder.
Photographer: David Paul Morris/Bloomberg

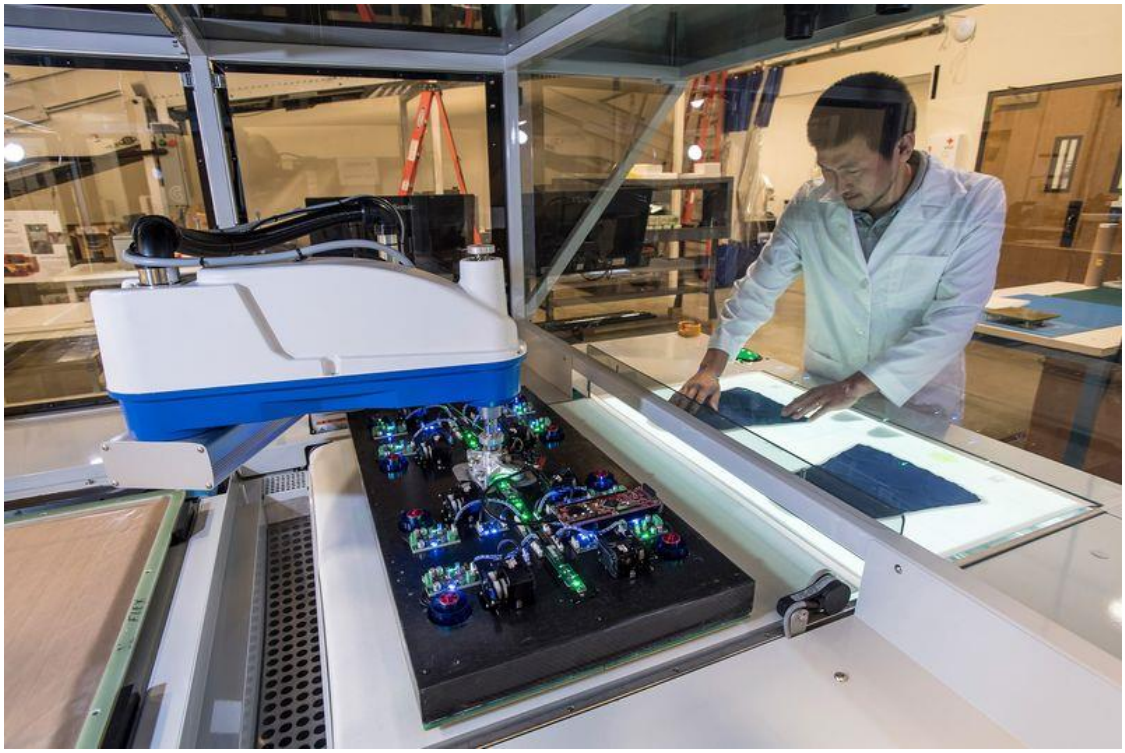
The concept for Grabit was hatched at SRI, a prominent nonprofit research institute in Menlo Park, California. Harsha Prahlad, who founded the company and now serves as its chief technology and products officer, holds about three-dozen patents related to electroadhesion. He spent some time building wall-climbing robots before deciding that the real opportunity was in manufacturing and logistics. Prahlad spun Grabit out of SRI 2013, and the company raised about $25 million from investors that

include the electronics maker Flex, and Esquel, a garment manufacturer, and Samsung.

The Grabit machines in shoe factories look more like oversized panini presses than electronic humanoids. They're also designed to work with flesh-and-bone human employees. Software decides the best way to stack pieces of the upper, then lights up portions of a glass table, showing its human partner where to set things down. A platform covered in electroadhesive pads descends to pick everything up, while cameras monitor the progress. The machine moves over to a partially finished shoe and turns the electric charge off, dropping them into the right configuration and feeding them into a heat press. It can take a human worker 10 to 20 minutes to arrange the pieces of the upper; Grabit's machine does it in 50 to 75 seconds. Over the course of an eight-hour shift, a machine monitored by a single employee can make from 300 to 600 pairs of shoes.

There are just over a million people who make Nikes in 591 factories worldwide, according to the company, with production tilted heavily toward the cheap labor markets in Asia. It would like to move operations closer to big consumer markets in Europe and the U.S. Nike runs a skunkworks for advanced manufacturing in Oregon, and in 2015 announced a partnership with Flex, one of its manufacturing partners, to develop new tech. Grabit, said Nike's Chief Operating Officer Eric Sprunk in an email, "strategically fits with Nike's drive to accelerate advanced manufacturing." Major Nike competitors like Adidas AG and Under Armour Inc. are pushing their own advanced manufacturing efforts with similar goals in mind.

Automation factors heavily into Nike's plan to move factories closer to the U.S. There are already 49 factories making Nike products here. On average, each facility employs about 130 people – the average Nike-making factory in China has about 1,300 – and they specialize in things like high-tech air bubbles, not finished shoes. Miller acknowledges that shifting work towards automated factories could threaten jobs, but argues that more efficient manufacturing plants will create better jobs for displaced workers.



Grabit's shoemaking robot at the company's headquarters in Sunnyvale.

Photographer: David Paul Morris/Bloomberg

So far robots have been too expensive to justify their middling performance in apparel manufacturing, says Dan Kara, research director for robotics, automation, and intelligent systems at ABI Research. But technology and financial incentives are changing in a way that points to a major shift in the balance between human and machine labor. "It's a huge market, it's under-served, and the manufacturers are under pressure to do things more efficiently," he said.

Grabit says the apparel industry alone is a $200 million to $300 million market for robotics makers. The robots go for over $100,000 a piece, and customers also pay a servicing fee for the software and have to periodically replace the electroadhesive pads.

Jim Kim of Builders VC, a Grabit investor, says e-commerce is an even bigger opportunity for Grabit than apparel. The company makes electroadhesive conveyor belts that can be set up at improbably steep angles, gripping boxes that would otherwise fall to the ground. They're guided by software that can selectively release the belt's grip, sending boxes tumbling off the conveyor belt at the correct location.

While these machines could reduce warehouses's need for workers, their main appeal is that they let companies relocate industrial operations. "Same-day delivery is normal, it's expected now if you're in a tier one city," said Kim. This means building warehouses in big cities, where space is tight and expensive."Urban warehouses, by definition, are going to be in crowded areas," he said. "You're only going to be able to grow vertically."

https://www.bloomberg.com/news/articles/2017-08-30/these-robots-are-using-static-electricity-to-make-nikes