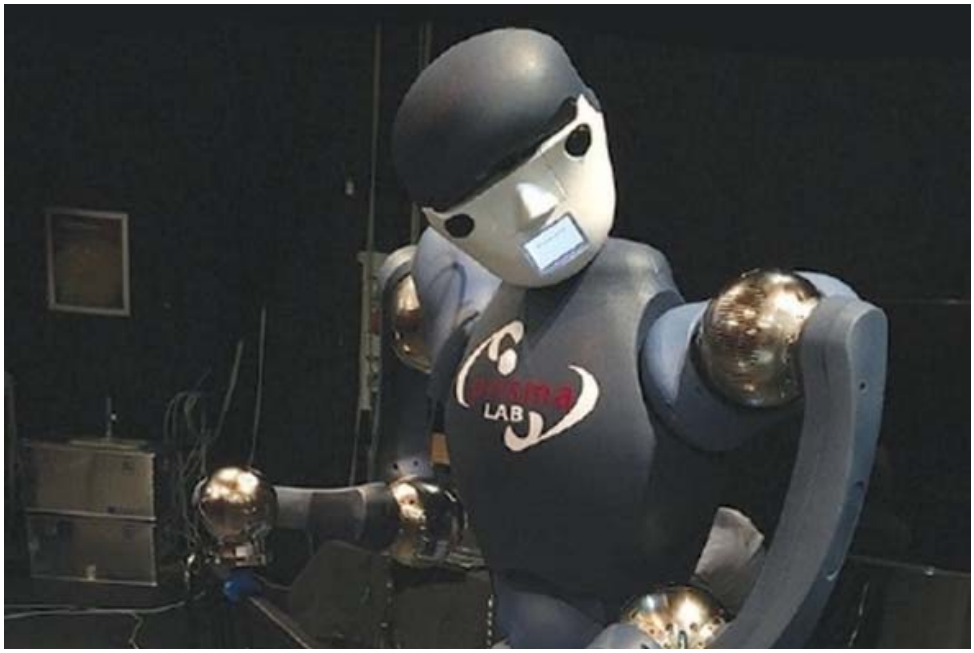
ENGINEERING

Robot Chef Learns to Twirl Pizza Like a Pro

A new bot uses feedback from sensors to stretch and fold dough

By Jeanette Beebe | Scientific American June 2017 Issue



Credit: Courtesy of Bruno Siciliano and Prisma Lab

Pizza has a proud history of fueling late-night lab work, and scientists in Naples—an Italian city famous for its slice—have easy access to some of the world's tastiest take-out. But what inspires engineer Bruno Siciliano is not just that first bite so much as how the dish is made.

“Preparing a pizza involves an extraordinary level of agility and dexterity,” says Siciliano, who directs a robotics research group at the University of Naples Federico II. Stretching a deformable object like a lump of dough requires a precise and gentle touch. It is one of the few things humans can handle, but robots cannot—yet.

Siciliano's team has been developing a robot nimble enough to whip up

a pizza pie, from kneading dough to stretching it out, adding ingredients and sliding it into the oven. RoDyMan (short for Robotic Dynamic Manipulation) is a five-year project supported by a €2.5-million grant from the European Research Council. Like a human chef, RoDyMan must toss the dough into the air to stretch it, following it as it spins and anticipating how it will change shape. The bot will debut in May 2018 at the legendary Naples pizza festival.

RoDyMan has been working this spring toward a milestone: stretching the dough without tearing it. To guide the robot, Siciliano's team recruited master pizza chef Enzo Coccia to wear a suit of movement-tracking sensors. “We learn [Coccia's] motions, and we mimic them with RoDyMan,” Siciliano says.

This strategy makes a lot of sense, says robotics researcher Nikolaus Correll of the University of Colorado Boulder. He has modeled flexible motion with rubber springs but was not involved in Siciliano's research. “Someone who's learning how to make a pizza would use feedback from their hands,” he adds. “You'd just take the dough and start pulling and try to experience it.”

RoDyMan uses visual sensors in its head to track the dough in real time. Using software, it can train itself to handle the pizza like a chef would—a task that is challenging because it is unwieldy and messy. The robot maps the dough's position and tracks how it moves. Through practice, the robot can get better—much like humans develop “muscle memory.” Researchers hope RoDyMan's technology can lead to a new generation of robots that will perform tasks in ways that are accurate, precise and responsive, if not more lifelike.

Yet Siciliano admits that nothing compares with a traditional chef. “I would never eat a pizza made by a robot,” he says. “It would not have the taste a real pizzaiolo, with his soul, would put in it.”

This article was originally published with the title "Robo Pizzaiolo"

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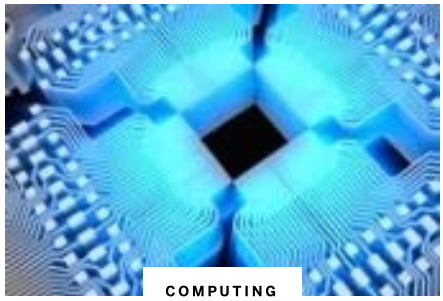

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