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## From Genoa to Catania, Italian universities are at the forefront of robotics research

by *Riccardo Oldani*

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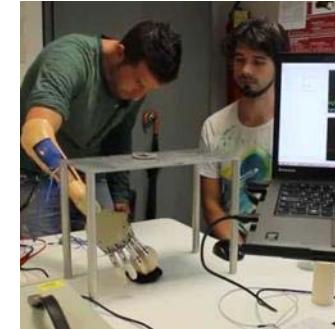
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It is not often that a prestigious scientific periodical like Nature cites Italy as a frontier for research. But when, in an article published on February 3, it came to talk about soft robotics, a new discipline which develops robots privy of rigid structures, it was necessary to cite Italy. Because soft robotics was born thanks to a pool of researchers of the BioRobotics institute of the Sant'Anna School of Advanced Studies, in [Pisa](#), coordinated by Cecilia Laschi. The idea is to create robots devoid of metal or plastic skeletons and which are based on the properties of certain materials, like silicone rubbers and specialty polymers, in order to have a strong and solid form and the ability to move and perform various types of tasks.



The robot that represents this line of research is called PoseiDrone and looks like an octopus. Its arms simulate the movements of the animal's tentacles enabling it to swim or walk. It can inspect the bottom of the sea, to evaluate the environmental conditions for example. "But we are thinking to develop the concept," explains Cecilia Laschi, "in order to create a soft robotic arm capable of helping elderly people take a shower."

As evidenced by plantoid, brainchild of Barbara Mazzolai of the IIT (Italian Institute of Technology) in [Genoa](#), another Italian pioneer of this line of research: it simulates the growth of roots of a plant to penetrate into the ground and collect data on the pollution level by means of sensor-rich ends. Soft robotics is well liked by the scientific community, because it opens up possibilities which would be impossible through following a traditional approach. But it is not the only area in which Italy is providing a

fundamental contribution to the development of the latest generation of robots.

Italian researchers are also very active in developmental robotics, which aims to create machines capable of learning by themselves, through their experiences, and also capable of improving themselves by observing man. It is owed, for example, to the work of Bruno Golosio, with his staff at the University of *Sassari*, and Angelo Cangelosi, director of the Centre for Robotics and Neural Systems at Plymouth University, in the United Kingdom, the birth of Annabell, a neural network which learns to speak, conversing with man, starting from the standard endowment of a few hundred words and expressions. In an experiment, the Italian researchers simulated a conversation between a mom and her virtual child, Annabell, comparing it with what really happened with the natural child. And while the child responded to the questions in monosyllables and annoyed grunts, Annabell turned out to be far more talkative and almost eager to communicate.

In Italy, the mechanics and industrial robotics sectors are also very strong. The contributions of the researchers in this area are important. It is impossible to name them all, but RoDyMan, the pizza chef robot which comes out of the Prisma Lab of University of *Naples* Federico II under the direction of professor Bruno Siciliano, could introduce an important innovation. The idea is to enable him to shape a piece of dough into the classic flat pizza shape, put toppings on it, put it on a pizza peel, into the oven and then gently rotate it until its perfectly done. “This is not so much about the exercise in itself,” says Siciliano, “but the creation of a robot which can handle materials subject to plastic or elastic deformation, and thus yielding to touch. A function which current industrial robots are not capable of performing and which could find application in many fields of production The idea behind the pizza is at the same time a provocation and a signal. Last October, when we presented our Robot to Naples for the first time, for the Futuro Remoto event, the public’s attention was very high.”

Another revolutionary concept is being worked on in *Catania*, in collaboration with the study group of Giovanni Muscato, of the Department of electrical engineering, electronics and computer science at the University, and STMicroelectronics. The idea is to control the movement of a robotic arm in an innovative way, using many small inertial sensors (MEMS) placed on the arm that, with a set point of arrival, follows the movement of the robot instantly correcting him until it reaches its destination. Today the movement of industrial robots is programmed in advance. The solution tested in Catania works and could transform the way we think about the robots of the future.

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