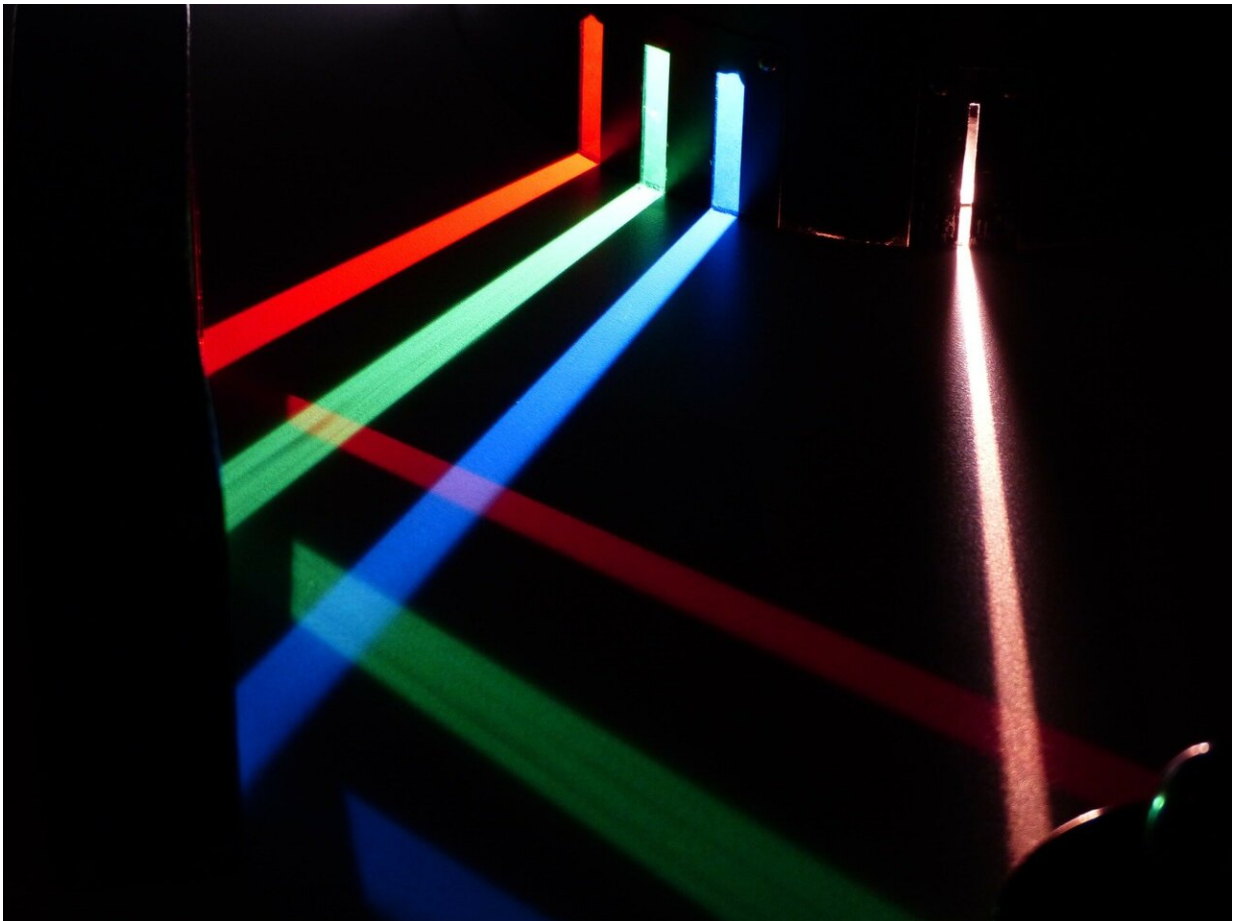


Plastic mini-robot 'walks' under the influence of light

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Researchers at Eindhoven University of Technology have developed the

first-ever light-controlled package delivery robot. Measuring 2 centimeters, this plastic mini-robot can "walk" under the influence of blue light in order to collect and deliver packages. In the future, it should be possible to use the robot to deliver medicines within the human body or to carry out simple repairs to chip machines, for example. The researchers have published their results in the journal *Advanced Science*.

No batteries, cabling or computer chips are required. This plastic mini-robot moves its limbs using [light](#). With its arms, it carries small packages on its back. The robot collects these packages from where they hang from the ceiling and neatly delivers them to the correct spot.

The robot itself consists of light-sensitive polymers. This special plastic was developed in 2017 within the Department of Chemical Engineering and Chemistry and [could only wiggle forward at that point](#). The material has now been further developed by Ph.D. student Marina Pilz da Cunha and master's student Bas Ambergen in a collaboration between the research groups of Jaap den Toonder and Albert Schenning.

Taking steps by contracting and expanding

The material owes its mobility to the fact that one side contracts and the other expands under the influence of light. Pilz da Cunha: "The robot's legs stretch when light shines on them and bend as soon as the light goes out. That's how it takes steps."

Depending on the direction from which the light is shone, the researchers can set the direction in which the mini-robot moves. "This is how we get it to make turns," says Pilz da Cunha. In addition, the arms and legs can be controlled independently of one another thanks to their different colors, which mean that they react to different wavelengths of light.

Maneuvering through the bloodstream

Although the road from the lab to practical use remains a long one, the researchers see a lot of potential for the mini-robot. Den Toonder: "In the future, this application could be used in the [human body](#) to deliver medicines to the intestines or the bloodstream, for instance. Another example would be chip machines, in which this little robot can maneuver in order to carry out repairs."

For these applications, the researchers want to reduce the size of the robot to less than a millimeter. They are also going to perfect the means to control it. In a technical system, for example, the robot can follow a trail of lights, but this is more difficult in the human body. "Perhaps we can then work with heat," suggests Pilz da Cunha.

More information: Marina Pilz da Cunha et al. A Soft Transporter Robot Fueled by Light, *Advanced Science* (2020). [DOI: 10.1002/advs.201902842](#)

Provided by Eindhoven University of Technology

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