A tiny soft robot that mimics jellyfish

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A team of researchers at the Max Planck Institute for Intelligent Systems has developed a soft robot that effectively mimics a tiny jellyfish. In their paper published in the journal *Nature Communications*, the group describes the robot and its capabilities.

As robotics technology evolves, the dream of building tiny robots that can swim through living organisms remains a serious goal. Such robots could deliver medicine, eat tumors or monitor vital organs. In this new effort, the team in Germany has developed an original design for such a robot based on jellyfish.

Jellyfish are quite graceful when swimming. Their umbrella-shaped bells pulsate to push them through the water. Their pulsating jelly-like mesoglea also impact the water around them, particularly just beneath them. As they pulsate, they pull water up below their bodies, which allows them to catch food—an attribute of the jellyfish that the researchers found useful.

To create a robot that mimics a jellyfish, the researchers created a bell and body from non-magnetic polymers in the form of eight arms. The also added embedded magnetic particles in the arms. One final touch—a tiny bubble of air trapped inside the top of the body to make the robot buoyant. The result was a robot (just three millimeters in diameter) that looks in some respects like a baby jellyfish—one that can be manipulated by applying an adjustable external magnetic field.

The researchers found the robot could be made to swim in different ways by varying the duration of the magnetic bursts—varying the strength of the field could also be used to steer the robot. They also found that the tiny robot could pick up and move beads in the water using the same technique that jellyfish use to catch food. It could also be coaxed into burying itself in a mass of beads or into mixing dyes placed at the bottom of a water-filled tank.

The jellyfish robots are not yet ready to swim inside of a human host, however, as there is still the problem of directing them accurately using external magnets.

More information: Ziyu Ren et al. Multi-functional soft-bodied jellyfish-like swimming, *Nature Communications* (2019). DOI: 10.1038/s41467-019-10549-7

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