A tiny, magnetically actuated gearbox that gives microrobots more power

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Unfortunately, as the robots grow ever tinier, their power diminishes as they have too little mass. In this new effort, the researchers have found a way to increase the power of the tiny robots using a tiny gearbox that helps them become stronger.

The gearbox comes with a magnet on its end to harness the power in a magnetic field via the gears in the box. And the gearbox is able to magnify the power of a robot using clever features including elastic components and mechanical linkages.

To use the gearbox, the tiny robots must be built in a way to take advantage of them. For example, by combining elastic components with mechanical linkages, spring-like energy can build up pressure and then release it all at once. The mechanical linkages serve to hold the elastic components in place until it is time to release the energy.

To test their idea, the researchers built box-like structures with elastic wall parts that were slowly compressed by the gearbox when it was exposed to a magnetic field. A mechanical linkage held the walls in place to allow the pressure to build. When a certain amount of pressure was reached, the walls were released, pushing the robot in a desired direction. To create a robot, several of the box-like structures were hooked together. Using this approach, the researchers were able to create winch-type robots able to lift up to 103 grams, or jumpers that reached 119 millimeters. They also created crawlers and clampers.


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