

Ultra-precision positioning

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A novel rotary actuator provides greater torque, accuracy, and speed.

Ultra-precision positioning is required for the success of many scientific applications, including manufacturing semiconductors, aligning optics and manipulating cells. One of the challenges of ultra-precise positioning is providing sufficient torque through small, precise angles. In a paper accepted for publication in the *Review of Scientific Instruments*, a journal of the [American Institute of Physics](#), researchers describe a new rotary actuator that accurately delivers more torque than previous devices.

Like many other ultra-precise rotary actuators, the new device's action is driven by piezoelectric material, which converts electrical signals into mechanical movement. The researchers improved upon previous designs with a clamp that integrates the driving and stopping action and can be moved to different distances from the rotor's center. That gives the researchers both more power and control of the driving forces. Like rotating a [bicycle wheel](#), it is easier to control the torque and speed of the wheel by varying both the force as well as the distance from the center that force is applied.

The researchers report approximately four-fold improvements in both maximum loading torque and accuracy over other [piezoelectric actuators](#) at the maximum driving frequency of the other devices. While the new device can be driven at higher frequencies, the resulting higher speeds mean less accuracy because the rotor is harder to stop due to the additional [rotational inertia](#) of the rotor. The researchers are working on a new clamping design to overcome that limitation.

More information: "Design and experimental research of a novel inchworm type piezo-driven rotary actuator with the changeable clamping radius," is published in the *Review of Scientific Instruments*.
rsi.aip.org/resource/1/rsinak/v84/i1/p015006_s1

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