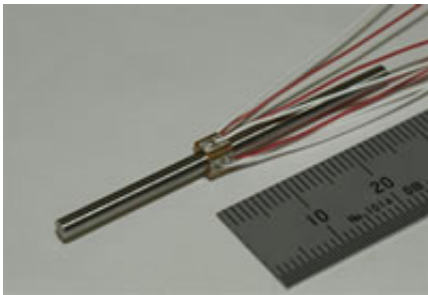


Innovative microactuators: Compact 3.5 mm cubic rotary-linear piezoelectric actuator

March 25 2011



(PhysOrg.com) -- Microactuators are critical components for industrial applications such as MEMS, micro-medical devices, and microrobotics. However, the fabrication of increasingly sophisticated, millimeter sized microactuators is complicated and proving to be a challenge.

Here, in an innovative approach, Tomoaki Mashimo has fabricated a miniature rotary-linear piezoelectric [actuator](#) with a single cubic stator with a side length of only 3.5 mm, which is capable of generating both rotary motion around its central axis and linear motion in the axial direction.

The stator consisted of a single metallic cube with a side length 3.5 mm, a 2.5-mm-diameter through-hole, and four piezoelectric elements bonded to the sides of the stator. The simplicity of the design enabled

the fabrication of a compact actuator, without requiring any special manufacturing procedures.

The resultant rotary and linear velocities obtained were approximately 24 rad/s and 80 mm/s, when the applied voltage was 42 Vrms at each [resonant frequency](#). The maximum torque and thrust force were 2.5 μ Nm and 2.6 mN, respectively.

Mashimo expects further miniaturization and improvement in the performance of this compact actuator. “We foresee micro-robotic and medical applications using the rotary-linear piezoelectric microactuator,” says Mashimo. “The microactuator simple design lends itself to many other applications as well.”

More information: Tomoaki Mashimo, and Shigeki Toyama, ‘Rotary-Linear Piezoelectric Actuator with a Cubic Stator of Side Length of 3.5 mm’, IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control, 57, pp. 1825–1830, (2010). [DOI:10.1109/TUFFC.2010.1621](https://doi.org/10.1109/TUFFC.2010.1621)

Provided by Toyohashi University of Technology

Citation: Innovative microactuators: Compact 3.5 mm cubic rotary-linear piezoelectric actuator (2011, March 25) retrieved 17 April 2024 from <https://phys.org/news/2011-03-microactuators-compact-mm-cubic-rotary-linear.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.