Artificial sensor similar to a human fingerprint that can recognize fine fabric textures

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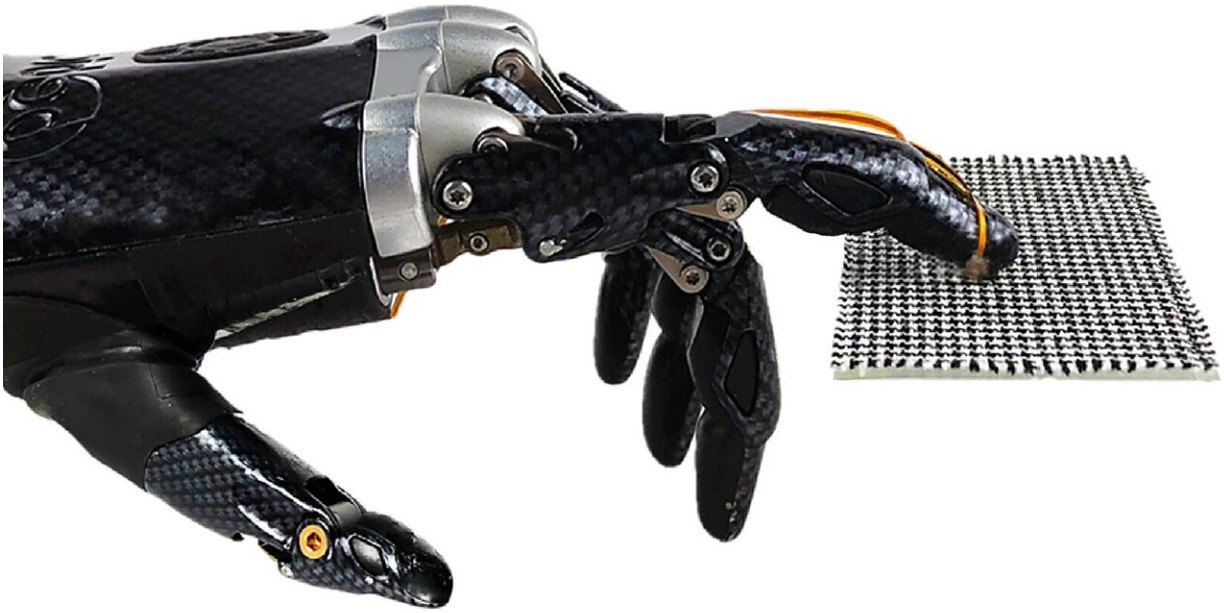

Texture recognition by slipping the slip sensor on a textile. Credit: Chuan Fei Guo

An artificial sensory system that is able to recognize fine textures—such as twill, corduroy and wool—with a high resolution, similar to a human finger, is reported in a *Nature Communications* paper. The findings may help improve the subtle tactile sensation abilities of robots and human

limb prosthetics and could be applied to virtual reality in the future, the authors suggest.

Humans can gently slide a finger on the surface of an object and identify it by capturing both static pressure and high-frequency vibrations. Previous approaches to create artificial tactile sensors for sensing physical stimuli, such as pressure, have been limited in their ability to identify real-world objects upon touch, or they rely on multiple sensors. Creating a real-time artificial sensory system with high spatiotemporal resolution and sensitivity has been challenging.

Chuan Fei Guo and colleagues present a flexible slip sensor that mimics the features of a human fingerprint to enable the system to recognize small features on surface textures when touching or sliding the sensor across the surface. The authors integrated the sensor onto a prosthetic human hand and added machine learning to the system.

They found that the sensor was capable of capturing subtle tactile signals and identifying 20 different textiles—including linen, nylon, polyester and seersucker—with up to 100% accuracy.

Future research could help improve the sensing abilities of robots, the sensory recovery of patients wearing artificial prostheses, tactile-based virtual reality and consumer electronics, the authors suggest.

More information: Ningning Bai et al, A robotic sensory system with high spatiotemporal resolution for texture recognition, *Nature Communications* (2023). DOI: 10.1038/s41467-023-42722-4