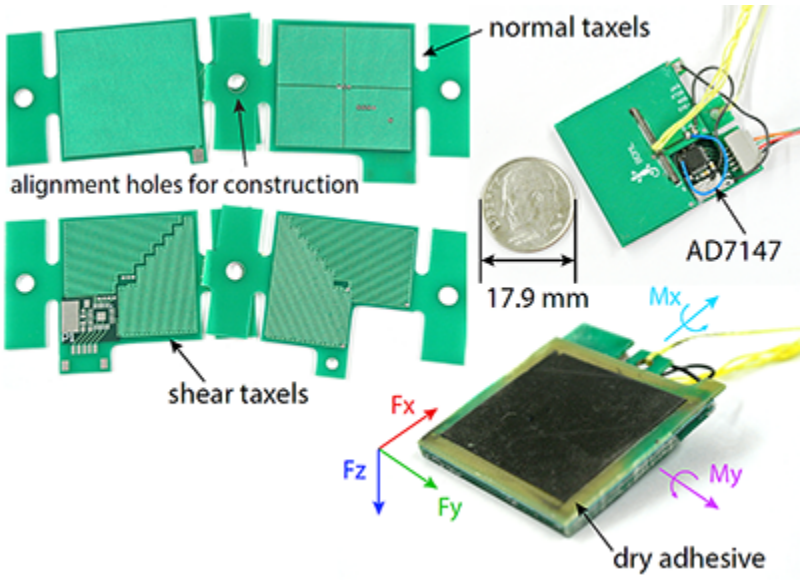
Docket #: S16-273

Small, Robust, Highly-Sensitive Six-Degree of Freedom Capacitive Force/Torque Sensor

Stanford researchers in the Biomimetics and Dexterous Manipulation Lab have patented a low cost, high performance multi-axis capacitive tactile sensor that measures all six components of force and torque. The system consists of a transducer with various high-speed digital data output options (SPI, I2C, UART). The sensor is dynamic (up to 100Hz), highly sensitive, robust, and easily customizable, in both force range and form factor (from large tactile arrays to ultra-thin FPCB), to suit a wide range of applications including robotics, automation, medical, consumer products, and wireless force sensing. The sensor can be used either a stand-alone force/torque sensor or integrated into existing hardware for closed-loop feedback control applications.

Figure



Sensor Prototype: 3-axis, 6 DOF capacitive tactile sensor and decoupled normal/shear force sensing

Image courtesy of the Biomimetics and Dexterous Manipulation Lab

Stage of Development - Prototype
Researchers in the Biomimetics and Dexterous Manipulation Lab at Stanford have successfully tested the prototype against a commercial ATI Gamma Force/Torque Load Cell.

Applications

- Real-time portable force control/torque sensing
- Robotic assembly/manipulation
- Human safe robotics
- Haptic feedback
- Automotive part testing
- Prosthetic device testing
- User Input/Interfaces

Advantages

- Low cost
- Robust
- Easily to manufacture
- Scalable design
- Ultra-thin, light-weight form factor
- Tunable, wide measurement range
- Highly overloadable
- Easy integration into existing systems
- Wireless force sensing possible

Publications

- Wu, X. A., Ulmen, J. V., & Cutkosky, M. R. (2019). *U.S. Patent No. 10,267,690*. Washington, DC: U.S. Patent and Trademark Office.

Patents

- Published Application: 20180073942
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Innovators

- Xin Alice Wu
- John Ulmen
- Mark Cutkosky

Licensing Contact

Matthew Ryan

Licensing Manager

Email