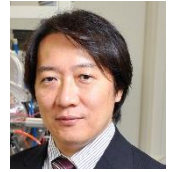


New Frontier of Tactile Sensing for Reproduction of our Fingertip Sensation

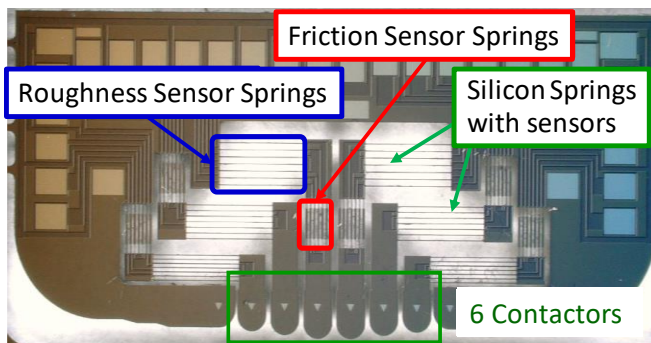
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1. New Frontier of Tactile Sensing (The purpose)

At present, 6-axis “force” tactile sensor is the state-of-the-art sensing device that we can obtain from the market. However, we have not seen tactile sensor device with detection ability of “touch-feeling” like “Soft” and “Rough” even in research articles. Sensing of “touch-feeling” is essential for our activities with hands even in the daily life. The purpose of my group’s study is pioneering the new frontier of tactile sensing technology to reproduce our fingertip sense of touch by fabricating precision tactile sensors using MEMS technology for semiconductor silicon.

2. MEMS Nano-Tactile Sensors with Performance Exceeding Fingertip’s Sensitivity



1 [mm]

Fig.1 Nano-Tactile Sensor with 6 Fingerprints.

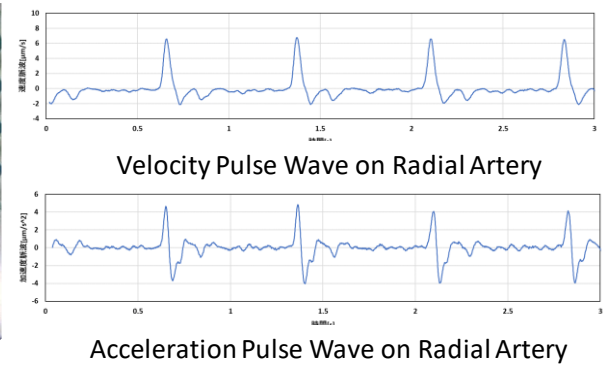


Fig.2 Measured Vascular Pulse Waves.

Measuring the surface with developed “Nano-Tactile Sensor (Fig.1)”, we can obtain the tactile values of “Rough-feeling” and “Smooth-feeling”. This device is applicable to measure damaged hair and skin condition quantitatively. Also, feature values of touch feeling on various papers and precise pulse waves of blood vessel from the skin surface (Fig. 2) have been obtained by it quantitatively.

3. Intelligent Mechanical Systems Realized by Nano-Tactile Sensor Integration

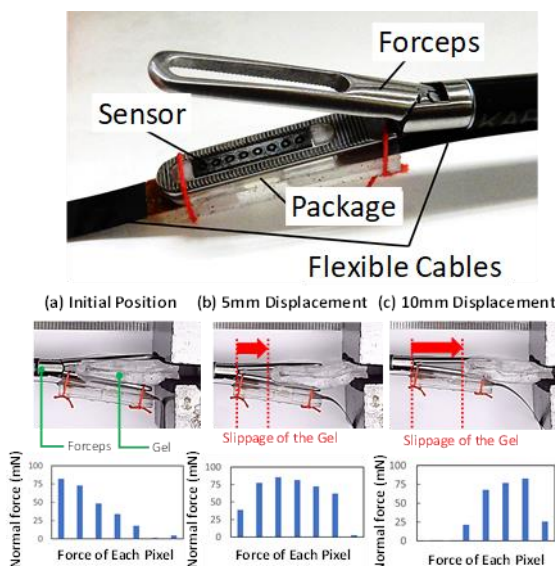


Fig.3 Forceps with a Slip Tactile Sensor.

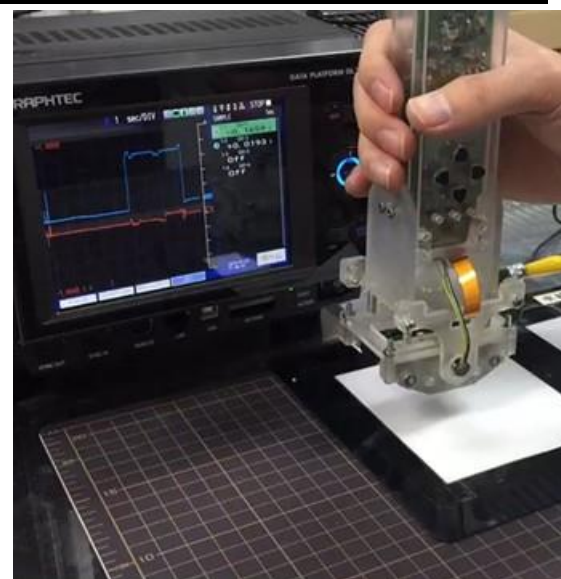


Fig.4 The “Touch Feeling Scanner”.

Integrating the “Nano-Tactile Sensor” on mechanical end-effectors and mechanical systems, they obtain a new ability of fingertip-like tactile sensation. Medical forceps with slip sensing detector (Fig.3) and a scanning device for touch-feeling measurement (Fig.4) have been realized successfully.