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Fabric Touch Sensors Using Projected Self-Capacitive Touch Technique

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We propose a touch sensor made of fabric that employs a projected self-capacitive touch technique as its sensing principle to achieve a large output signal. The touch sensor is made of fabric woven with conductive polymer-coated sensor fibers and it undergoes a change in capacitance when two sensor fibers cross under input applied pressure, which has been measured for detecting human touch. However, the change in the output capacitance of fabric touch sensors in previous studies has been small because the sensor fibers were narrow (i.e., <0.5 mm diameter) and the overlapping areas between fibers were very small. Therefore, we utilized a self-capacitive touch technique where the change in capacitance between sensor fibers and large width of human fingers (i.e., 2 cm wide) was measured to increase the overlapping areas of the capacitors on the sensor fibers. Thus, a larger change in capacitance of 2.44 pF was detected by the self-capacitance technique that we propose, while a small change in capacitance of 0.18 pF was achieved by using methods in previous studies. We demonstrated touch sensing with a 3×3 sensor fiber array and commercially available circuits to measure capacitance. We found that this technique was well suited to capacitive touch sensors made of fabric and it should lead to various applications.

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