

## Weaving of Fabric for Meter-Scale Floor Touch Sensors Using Automatic Looming Machine

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We have proposed and developed a 1.2-m-wide automatic looming machine to continuously construct a meter-scale floor touch sensor fabric. The fabric floor touch sensors are woven fabric with conductive-polymer-coated sensor fibers, and projection capacitive measurement is utilized for a human touch sensing mechanism. The automatic looming machine for floor touch sensors can weave sensitive sensor fibers as wefts and warps of the sensor fabric. For weaving different tensions for sensor fiber warps, a specific warp beam of sensor fibers is set behind the weaving machine to control the tension of the sensor warps. On the other hand, new linear actuators for the weft sensor fiber are added to weave the sensitive weft without destructive friction between sensor wefts and warps. Weaving of a  $1.2 \times 5$  m<sup>2</sup> fabric with a 5 cm pitch is demonstrated using the developed looming machine. The pitch of the sensor fibers is changed from 5 mm to 1 m. The capacitive sensitivity to touch input is tuned by controlling the coverage of sensor fibers with dielectric conventional polyester fibers. The output capacitance change at the smallest coverage of 25% is approximately twofold that at the coverages of 75 and 100%. These weaving sensor fabrication techniques will provide low-cost and large-area sensor systems of floor touch sensors in nursing homes and hospitals.

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