EVALUATION OF A CONCEPT MULTILEYER DEFORMATION SENSOR

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Recently, wearables have gained a lot of attention among manufacturers, consumers, and the general public. While rapid progress is being made, there is still room for improvement and areas where wearables are not used to the fullest if at all. The three main fields that could benefit from accurate multimodal deformation sensors are sports, animation and medicine.

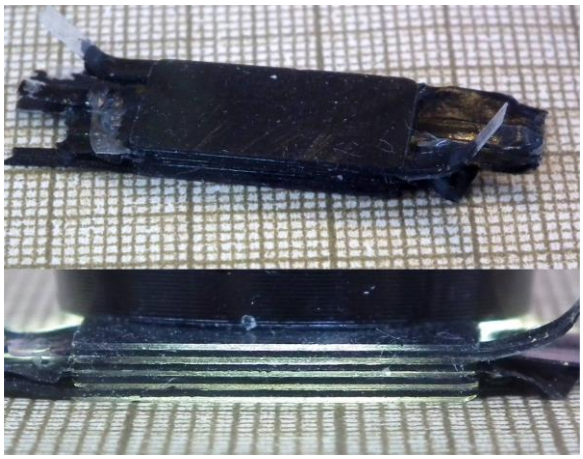

Fig.1 Images of a sensor illustrating the layered structure of the sensor (grid on the background has 1 mm squares for reference).

The concept of a compliant deformation sensor was first presented in depth and proven in [1]. In short, the sensor has a layered design consisting of alternating conductive and isolating layers (Fig 1). These layers are connected in a way that they form a Wheatstone bridge, the output potential of which is linearly related to the curvature (bending) of the sensor. On the other hand, the capacitance change between the innermost conductive layers is linearly related to the elongation. In addition to the two response modes of the sensor being linear and relatively independent of each other, the sensor has more advantages over other similar sensors. Our sensors have a simple design and make use of industrial grade materials, enabling the sensors to be produced in larger volumes later on. The multiwall carbon nanotubes are industrial grade (Bayer Baytubes C 150 P) and the silicone used is an architectural mold making silicone (Quantum Silicone QM240T). New take on the measurements conducted on the sensors will be discussed here, with some insights regarding the design of the sensor.

References

[1] K. Leemets, U. Mäeorg, T. Tamm, Development of soft and compliant multimodal deformation sensors, Sensors Actuators A Phys. 252 (2016) 42–47. doi:10.1016/j.sna.2016.11.015.

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