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Supplementary Materials: Skin-Like Strain Sensor Enabled by Elastomer Composites for Human–Machine Interfaces

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Table S1. Summary for the flexible strain sensors based on piezoresistance.

Materials	Typical Performances	Flexibility	Sensitivity	Reference
PDMS, copper electrode, graphene/carbon nanotube (CNT)/Ecoflex composite	The strain sensor is stretched from 0% to 20 % and the ΔR/ R0 increase from 0.0144 to 4.856	Against tensile strain up to 20%	The gauge factor is 26	This work
SWNTs and nylon textile	The 20 bilayers of SWNT/ nylon textile exhibited a gauge factor as high as 72 at 100% strain.	Stretchability up to 100%	The gauge factor is 72 at 100% strain	[7]
Ni, SiO2, Si graphene and PDMS	The resistances measured from the three gauges increase continuously as the increase of the strain.	Against tensile strain up to 7.1%	<1.8% strain, the gauge factor is 2.4. >1.8% strain, the gauge factor ranges from 4 to 14.	[9]
Ultrathin gold nanowires and polymeric substrates	The ultrathin sensors could detect dynamic tensile strain over a wide range (0.01%–200%).	Stretchability >350%	The gauge factor ranges from 6.9 to 9.9	[11]
Conductive thermoplastic polyurethane/carbo n nanotubes/polydim ethylsiloxane (TPU/CNTs/PDMS)	The sensing intensity for TPU/CNTs-50/PDMS-360 is around 10.3% under 30% strain, and it increases to about 17% and 19.5% with increasing the strain to 50% and 100%, respectively	Against tensile strain up to 100%	The gauge factor ranges from 0.194 to 0.339	[13]
Carbon nanotube (CNT) layers and polydimethylsiloxa ne (PDMS) substrate	All the sensors exhibited similar piezoresistive responses to the strain, and with the increasing of strain, the electrical resistance of all the sensors increased	Stretchability up to 45%	The gauge factor is 35.75	[20]
Ag nanoparticles (NPs), carbon nanotubes (CNTs) poly-dimethylsiloxane (PDMS)	When the Ag NPs concentration is 2.82 × 10^4 mM and the applied strain increases to 25%, the maximum difference in the relative resistance change ratio between the stretching and	Stretchability of 95.8%	The gauge factor ranges from 2.1to 39.8	[30]

	releasing process is 10.3%. When the Ag NPs concentration increases to 8.46 × 10^4 mM and the applied strain reaches 95.6%, the maximum difference is only 1.66%.			
Thin films of aligned single-walled carbon nanotubes and polydimethylsiloxane (PDMS) substrate	The sensor was cycled between 5 and 100% strain at a speed of 10.6 mms^{-1} and with a recovery time of 5 s. The response of the carbon-nanotube strain sensor to this strain was fast, with a low overshoot of 3.0% and recovery time of ~5 s	Stretchability up to 280%	The gauge factors were calculated to be 0.82 (0 to ~40% strain) and 0.06 (~60 to 200%)	[34]

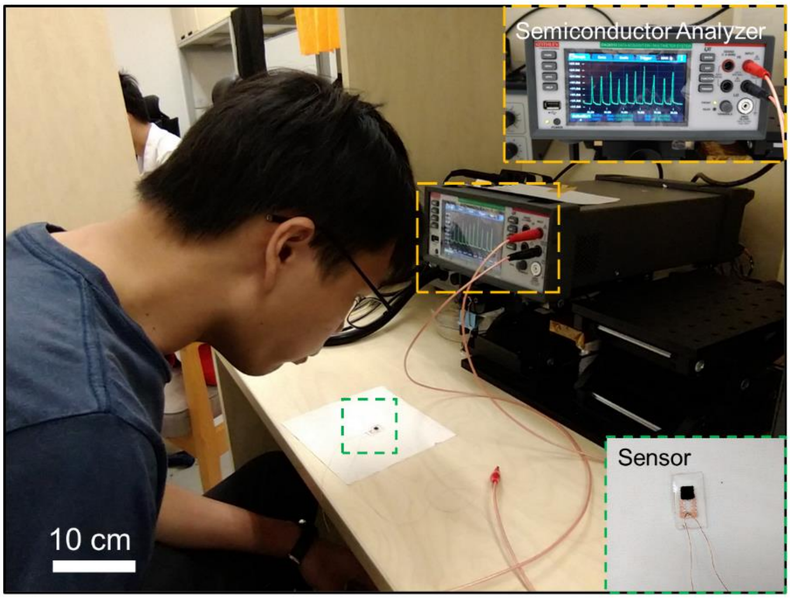

Figure S1. The complete data acquisition chain as measuring the data in Figure 3c.

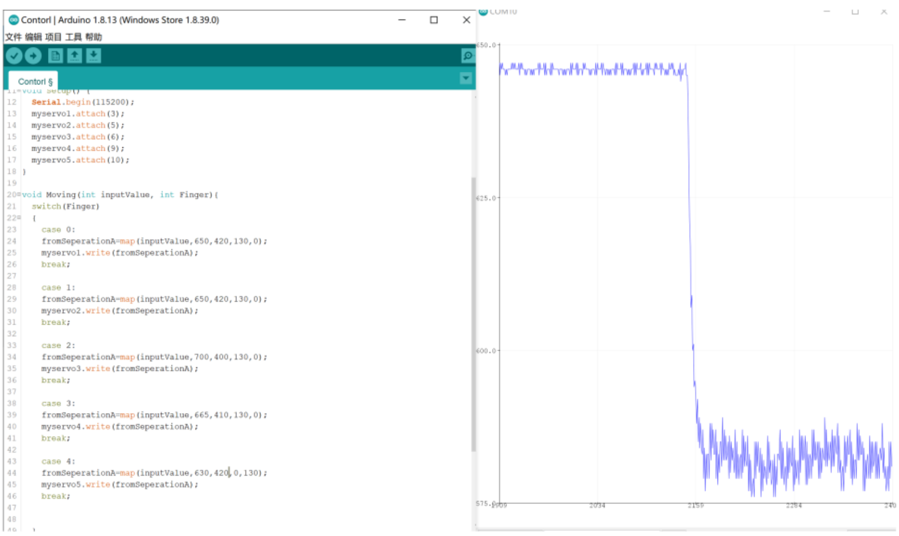

Figure S2. The self-developed software interface for controlling robotic hand.