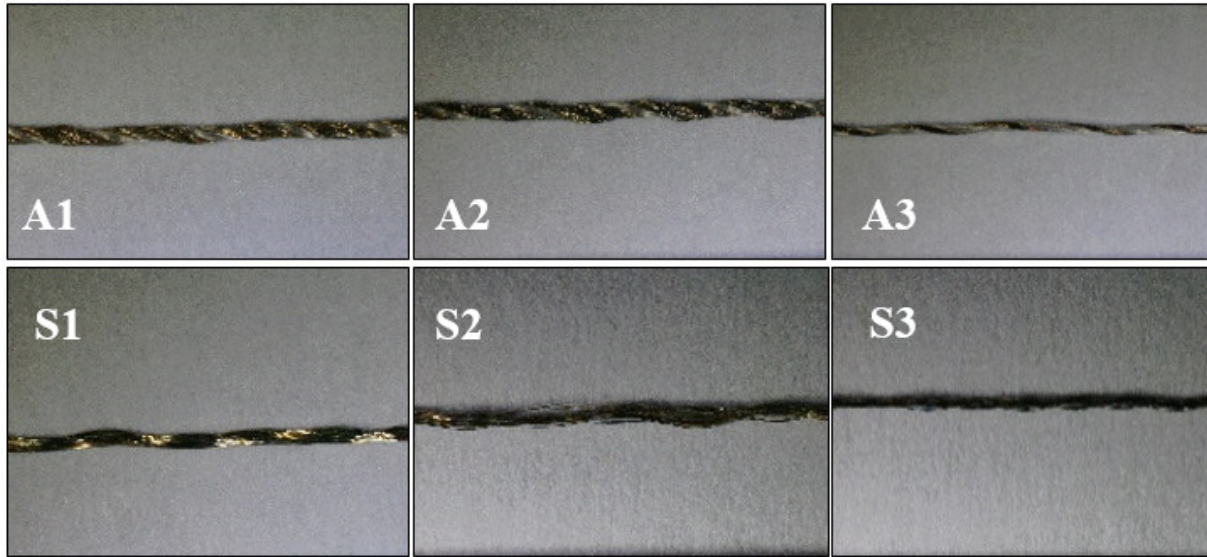


Supporting Information



| Resistivity (ohm) | Shieldex (S) | | | Amann (A) | | |
|----------------------|-----------------------------|----------------------------|---------------------------|-----------------------------|--------------------------------|-------------------------------|
| | A1 | A2 | A3 | S1 | S2 | S3 |
| | Tex 28 < 530 Ω /m | Tex 62 <150 Ω /m | Tex 96 <85 Ω /m | Dtex 235 600 Ω /m | Dtex 117 <1.5 k Ω /m | Dtex 78 <3.5 k Ω /m |

Figure S1. Optical images of conductive yarns in which 'S' refers to the Shieldex yarn (Material: Polyamide 6.6 filament, Metal Plated: 99 % Pure silver) and 'A' refers to Amann yarn (Silver coated Polyamide/Polyester hybrid thread).

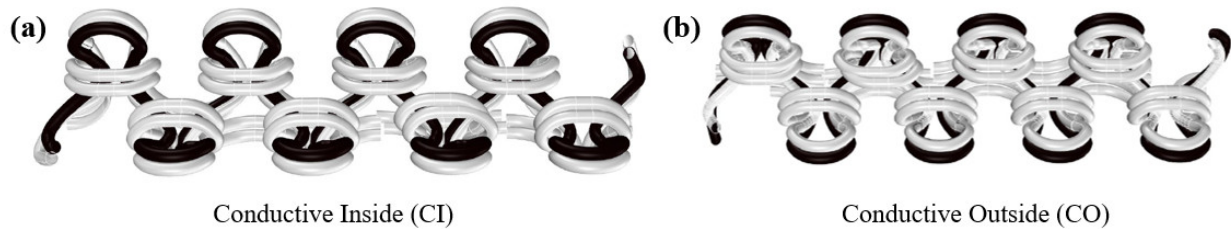


Figure S2. The position of conductive yarn within the co-knit yarn configuration: (a) Conductive yarn (black yarn) positioned inside, and (b) Elastic yarn (white yarn) positioned inside.

Table S1. The effect of test speed on electromechanical performance of the knitted strain sensors of NP₉Y_{S1}C₂E₁, NP₁₀Y_{S1}C₂E₁ and NP₁₀Y_{S1}C₃E₁.

| Samples | Test Speed (mm/min) | Initial Resistance (Ω) | Gauge Factor (GF) | Working Range (%) | Hysteresis |
|--|------------------------|------------------------------|-------------------------|----------------------|------------|
| NP ₉ Y _{S1} C ₂ E ₁ | 30 | 17.33 | 1.60 | 0-22 | 0.07 |
| | 40 | 17.19 | 1.80 | 0-20 | 0.07 |
| | 50 | 17.22 | 1.80 | 0-22 | 0.07 |
| NP ₁₀ Y _{S1} C ₂ E ₁ | 30 | 23.40 | 1.14 | 0-23 | 0.07 |
| | 40 | 23.60 | 1.11 | 0-24 | 0.05 |
| | 50 | 23.03 | 1.40 | 0-25 | 0.07 |
| NP ₁₀ Y _{S1} C ₃ E ₁ | 30 | 7.13 | 0.23 | 0-36 | 0.25 |
| | 40 | 7.21 | 0.37 | 0-17 | 0.30 |
| | 50 | 7.21 | 0.52 | 0-17 | 0.27 |

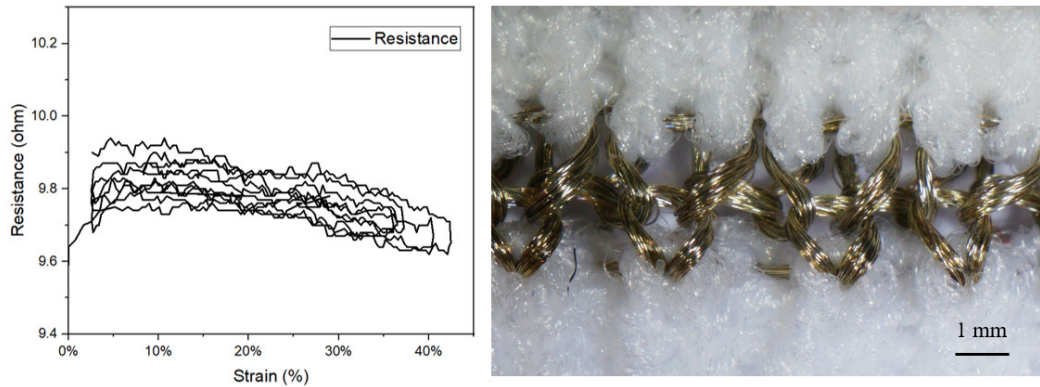
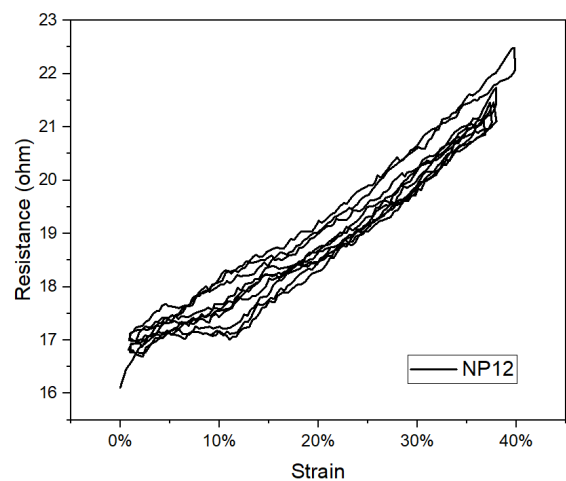
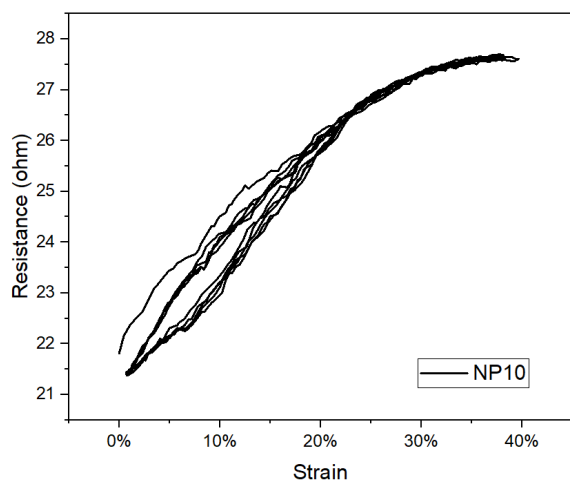
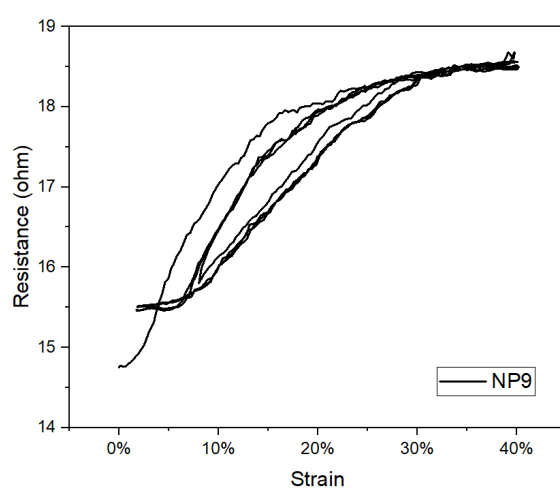
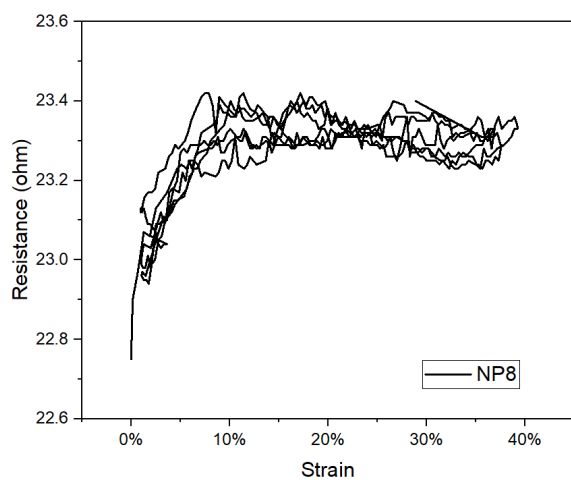
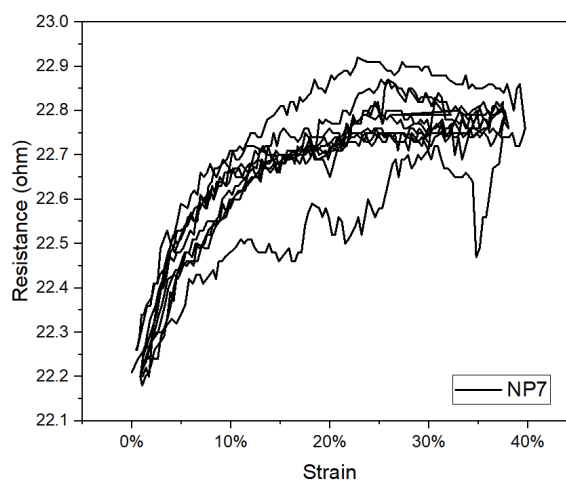
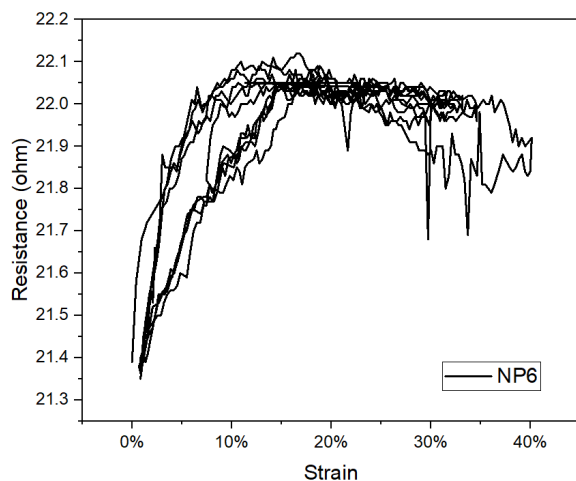


Figure S3. The resistance versus strain graph without E₁ plating/elastic yarn as a co-knit material for the NP₉Y_{S1}C₂ sample (**left**)—Optical image of the NP₉Y_{S1}C₂ sample without elastic plating yarn (**right**).



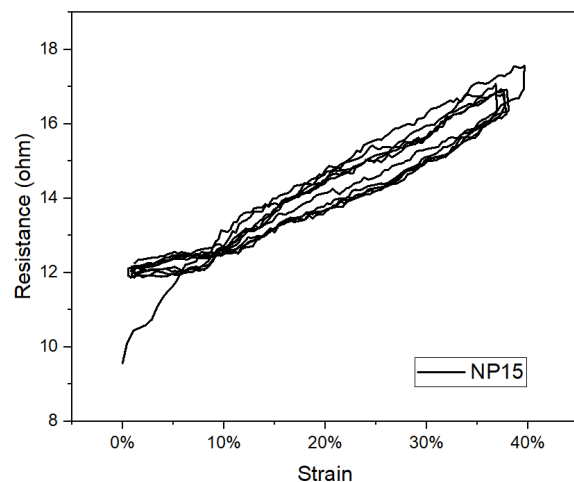
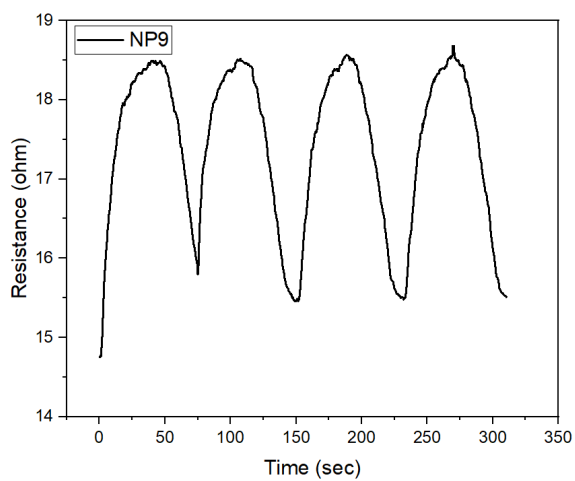
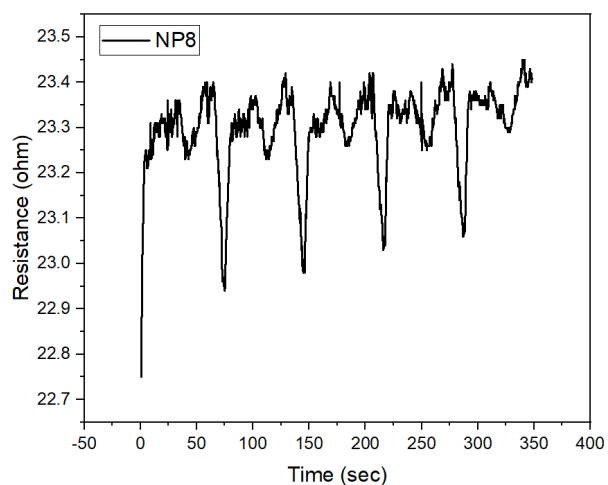
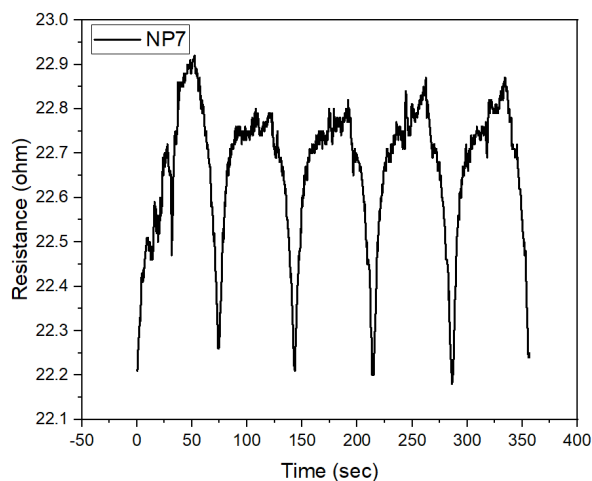
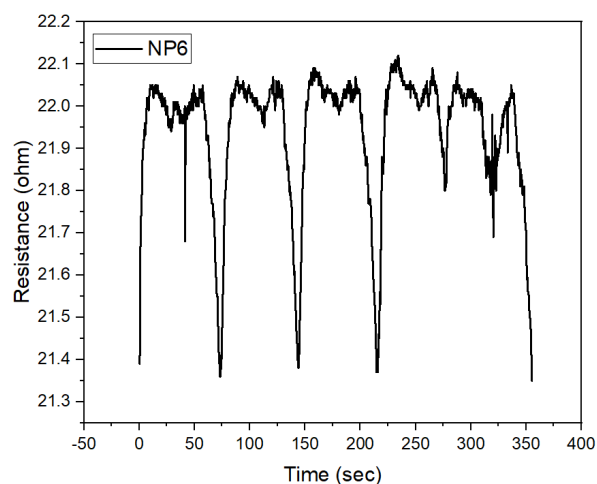


Figure S4. Examples of irregular and regular cyclic patterns: NP₆, NP₇, NP₈, NP₉, NP₁₀, NP₁₂, NP₁₅. Resistance versus strain graphs for the series of NP_xY_{Si}C₂E₁.



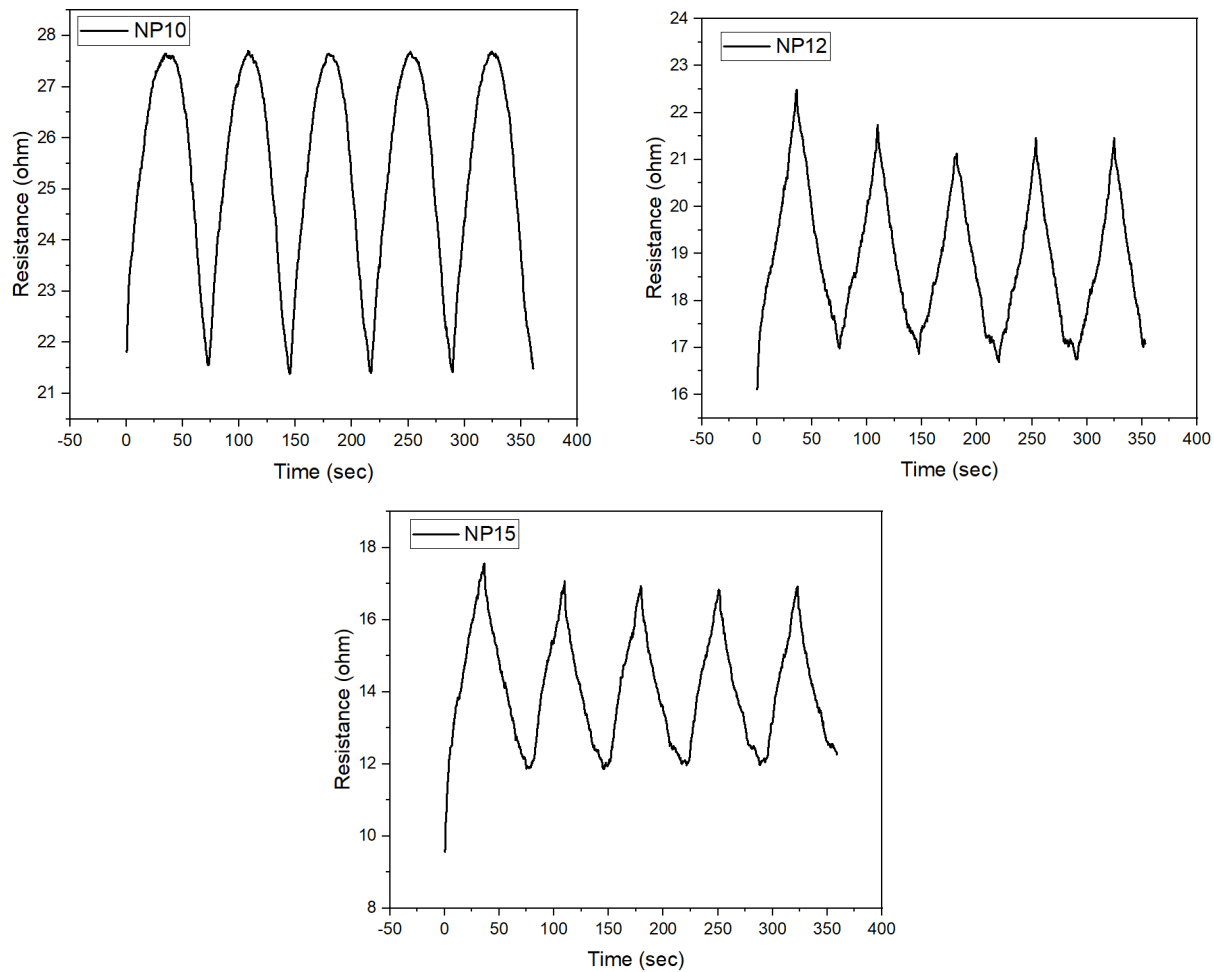


Figure S5. Examples of irregular and regular cyclic patterns: NP₆, NP₇, NP₈, NP₉, NP₁₀, NP₁₂, NP₁₅. Resistance versus time graphs for the series of NP_xY_{S1}C₂E₁.

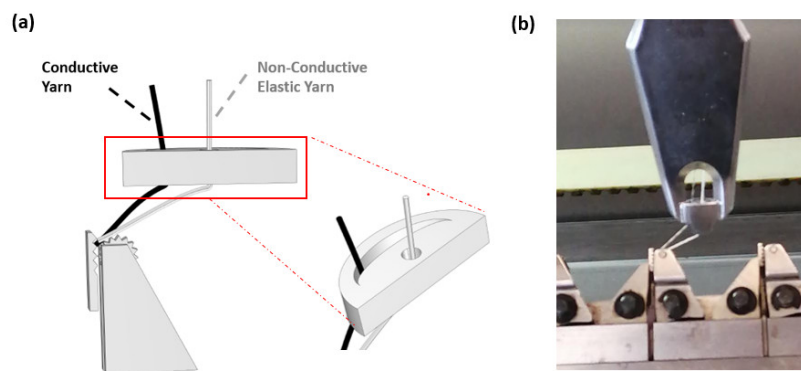


Figure S6. The schematic of yarn carrier (a), and picture of plated yarn carrier with 2 yarns consisting of conductive yarn and non-conductive elastic yarn (b).



Figure S7. Optical image of plating elastic yarn (white) and A1 conductive yarn (white and silver).