



Wearable Textile Strain Sensors for Measurement of Spinal Flexion

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Overview



Application background

- Schober's test

CNT sensor

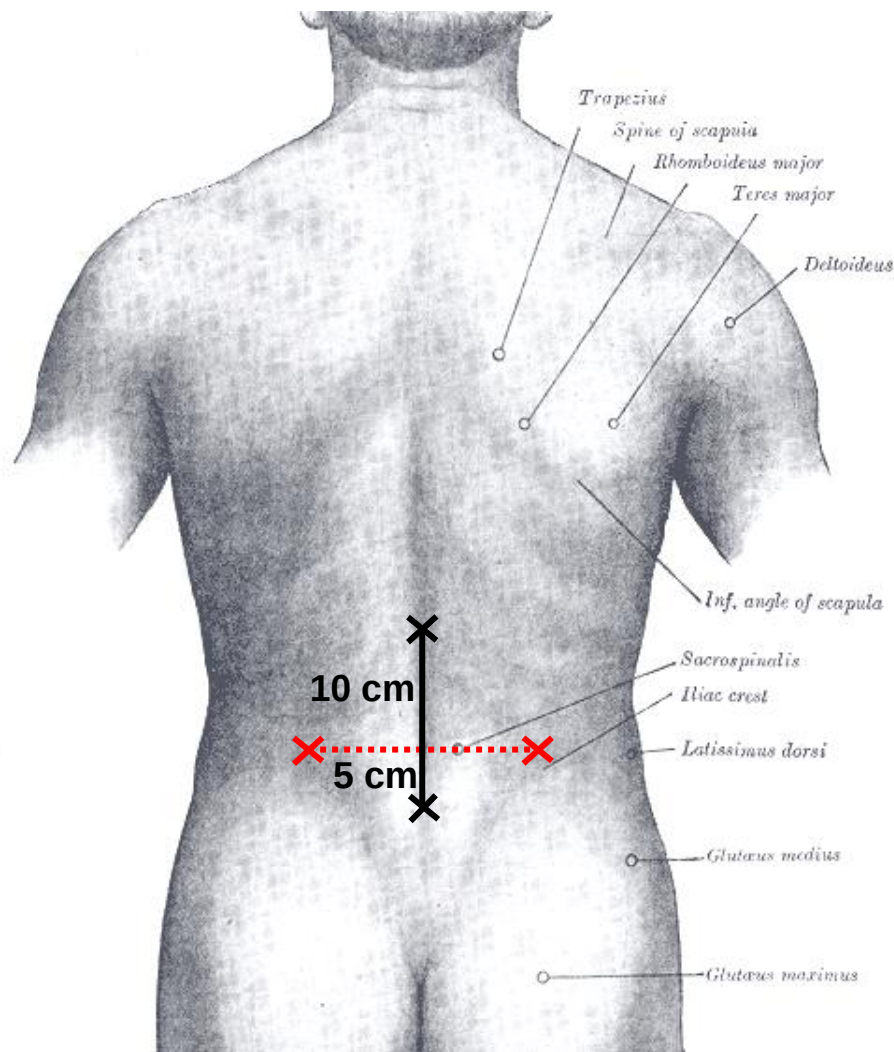
- Designing the sensor
- Testing the sensor

Carbon black sensor testing

- Designing the sensor
- Testing the sensor
- On-body application

Future Work

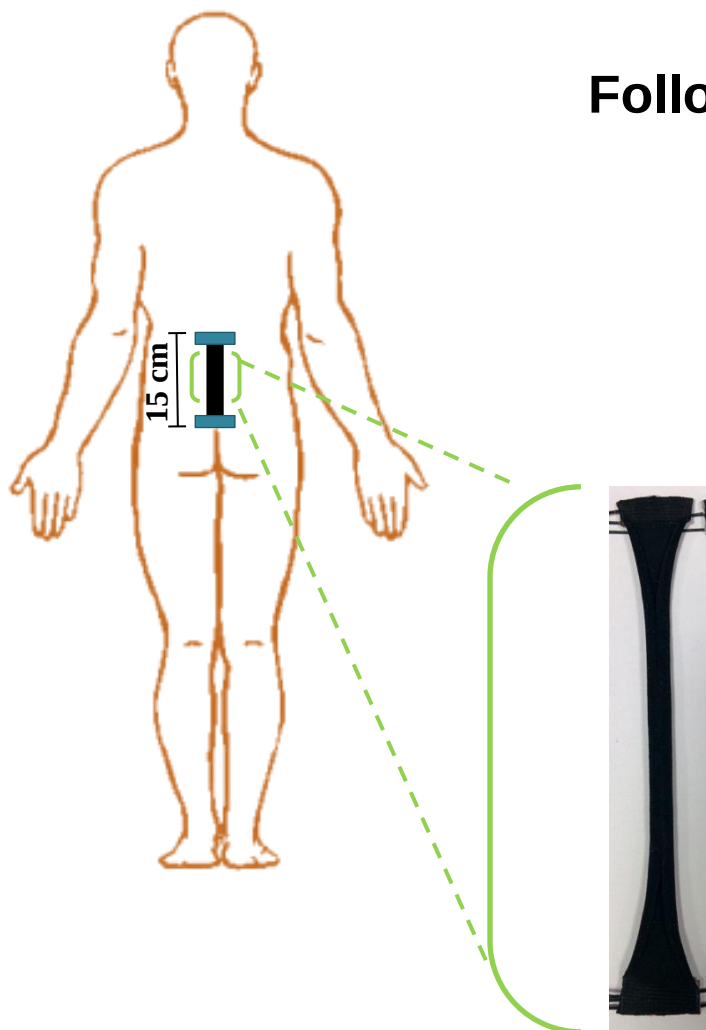
Modified Schober's Test



- Measurement of spinal flexion
- Borderline measurement is 20 cm
- Diagnosis of Ankylosing Spondylitis
- 8-10 years to diagnose

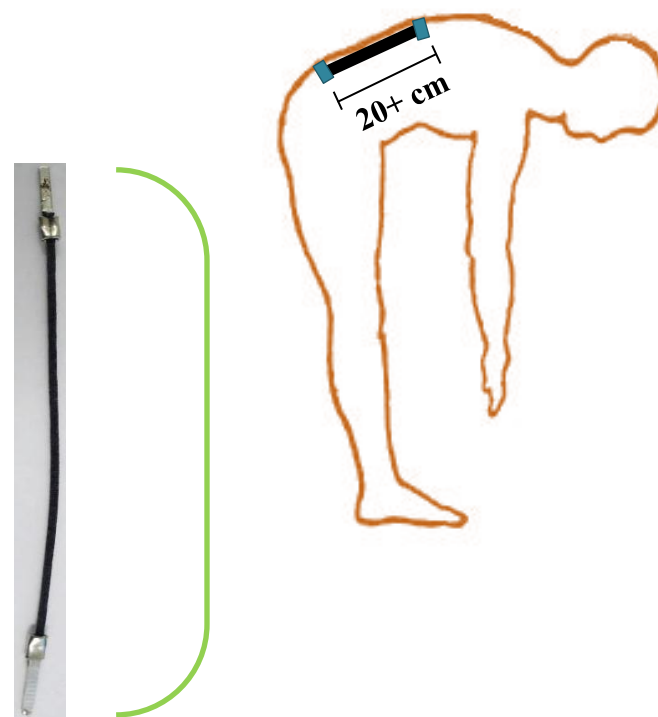
Strain Sensors

Following procedure from Modified Schober's Test



**Carbon black loaded
sensor**

OR



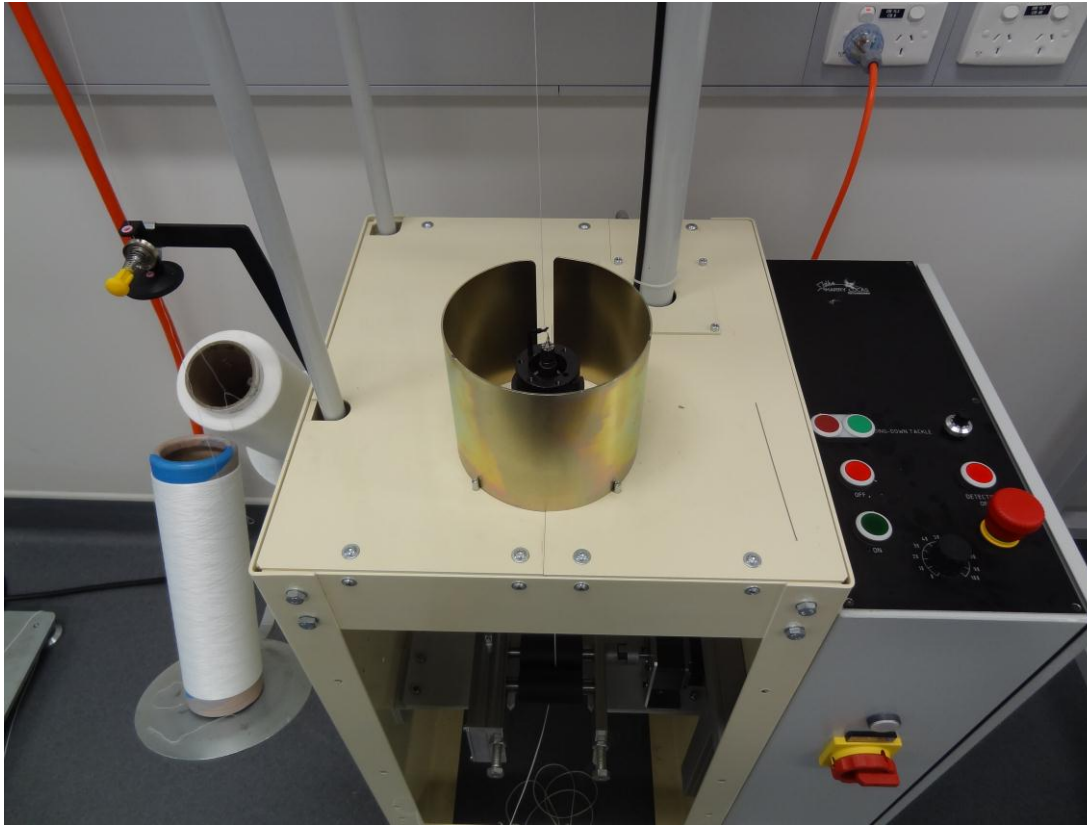
**CNT integrated
sensor**



Production of the CNT sensor

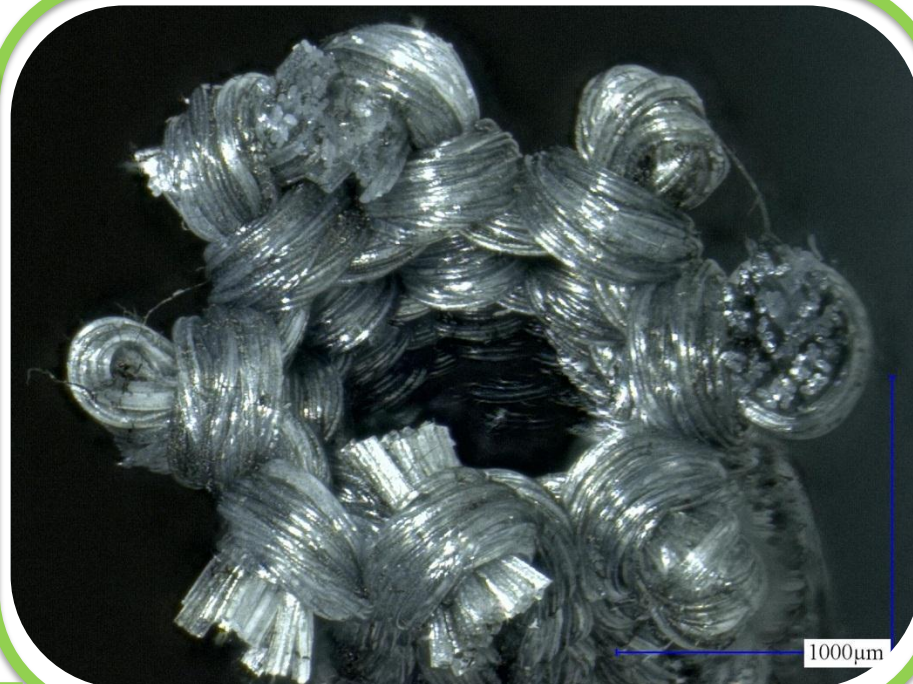
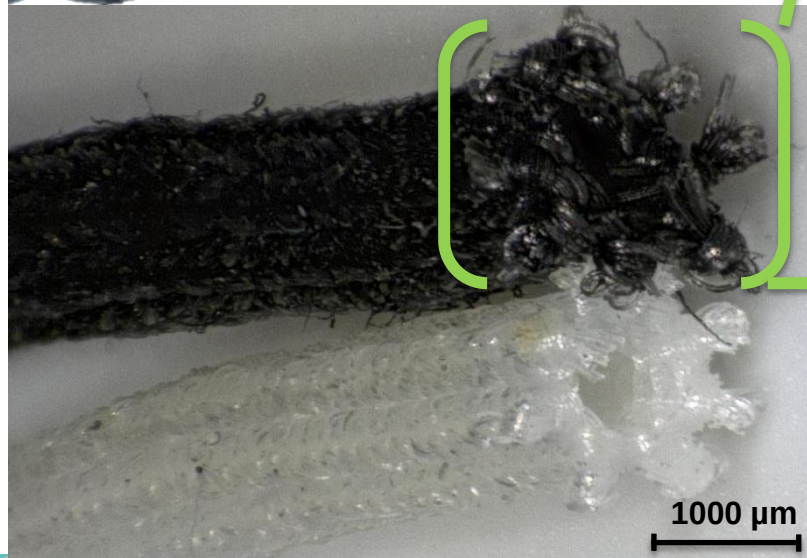


Carbon nanotube integrated Spandex

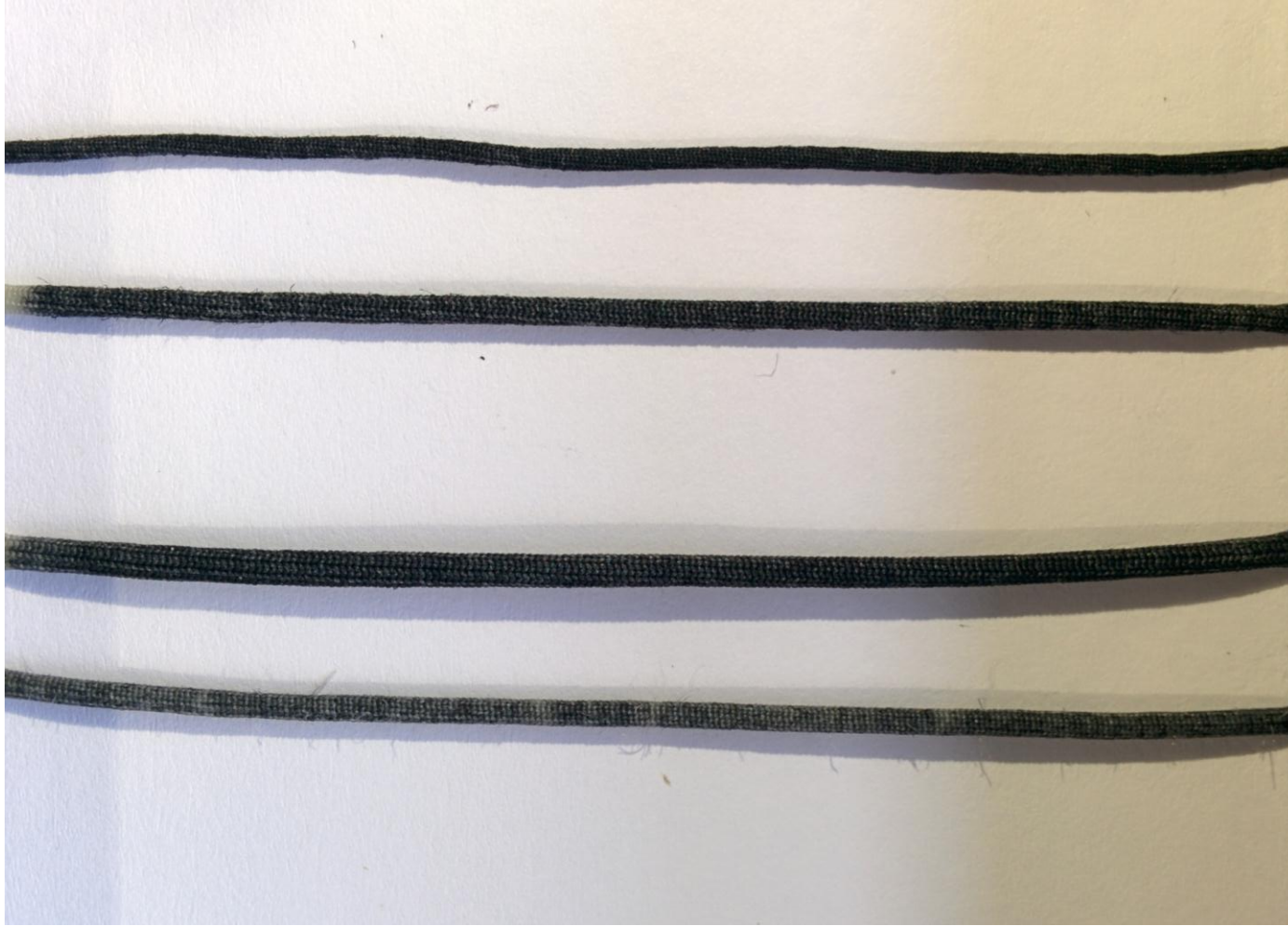




CNT integrated sensors



Variations tested



4 core

8 core

12 core

13 core

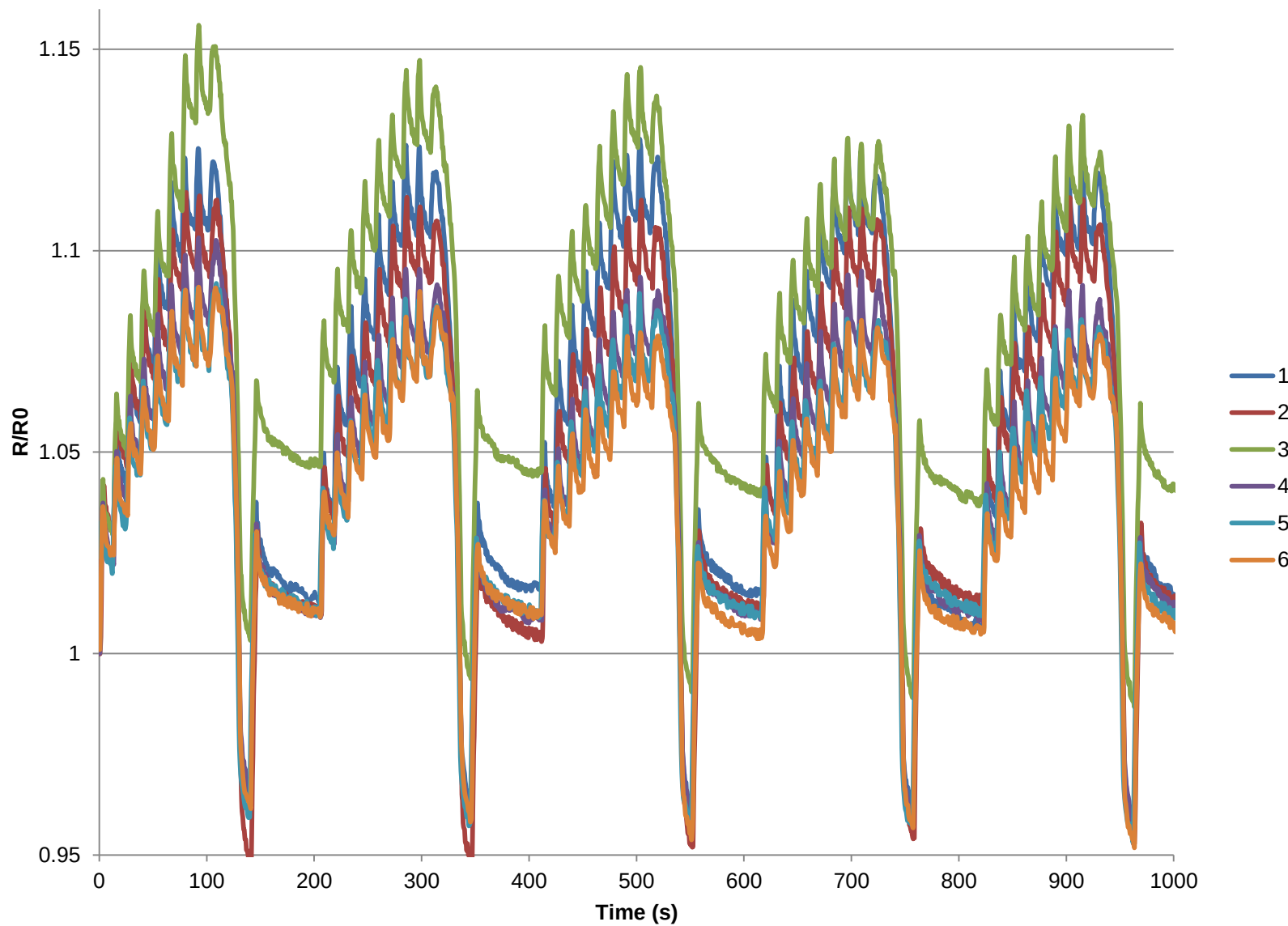
Linear actuator set-up



15 cm



8 core CNT sample



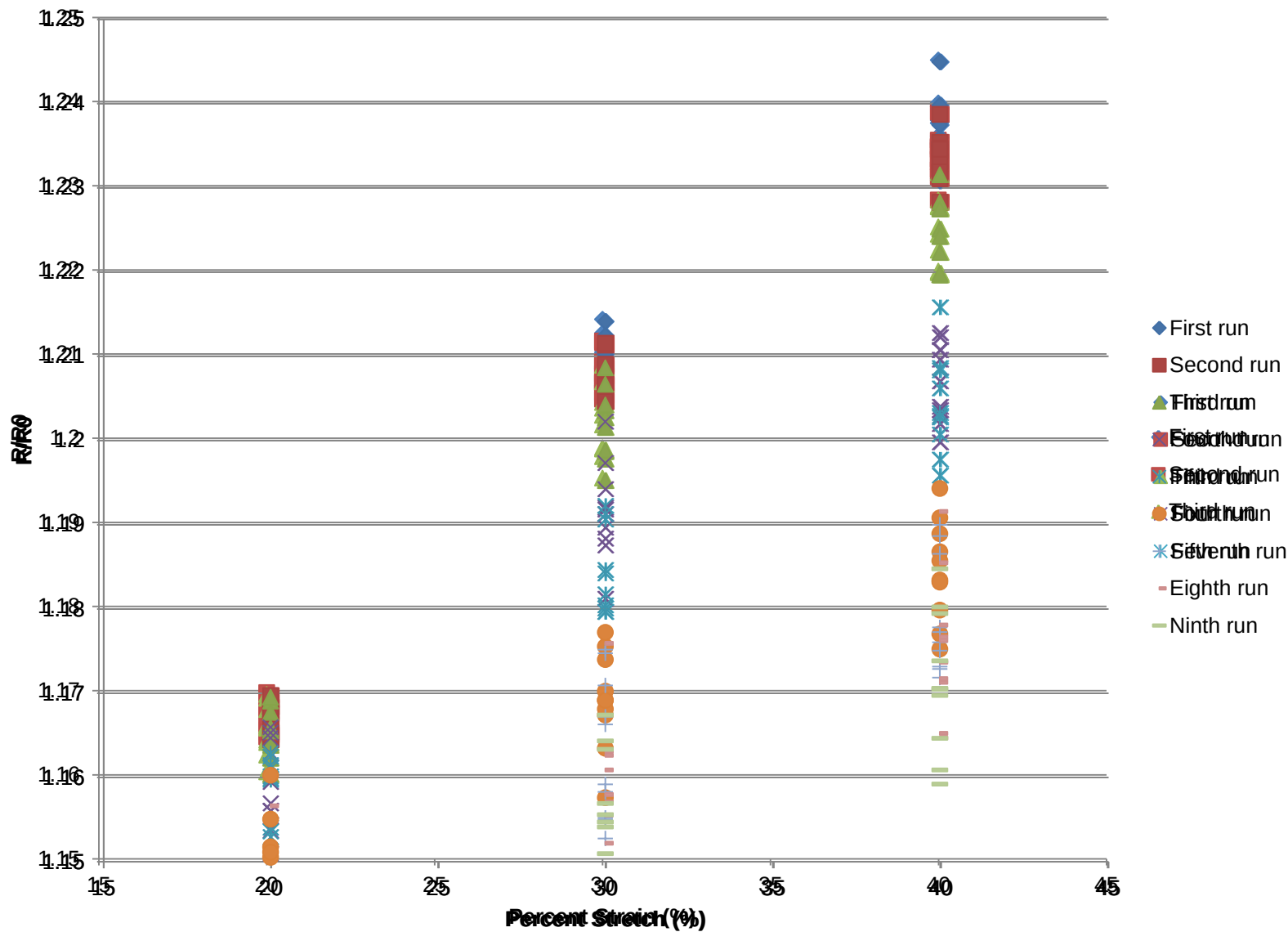
Coating with paralyene

- Safety for on-body measurements
- Increased stability
- Overlap still present



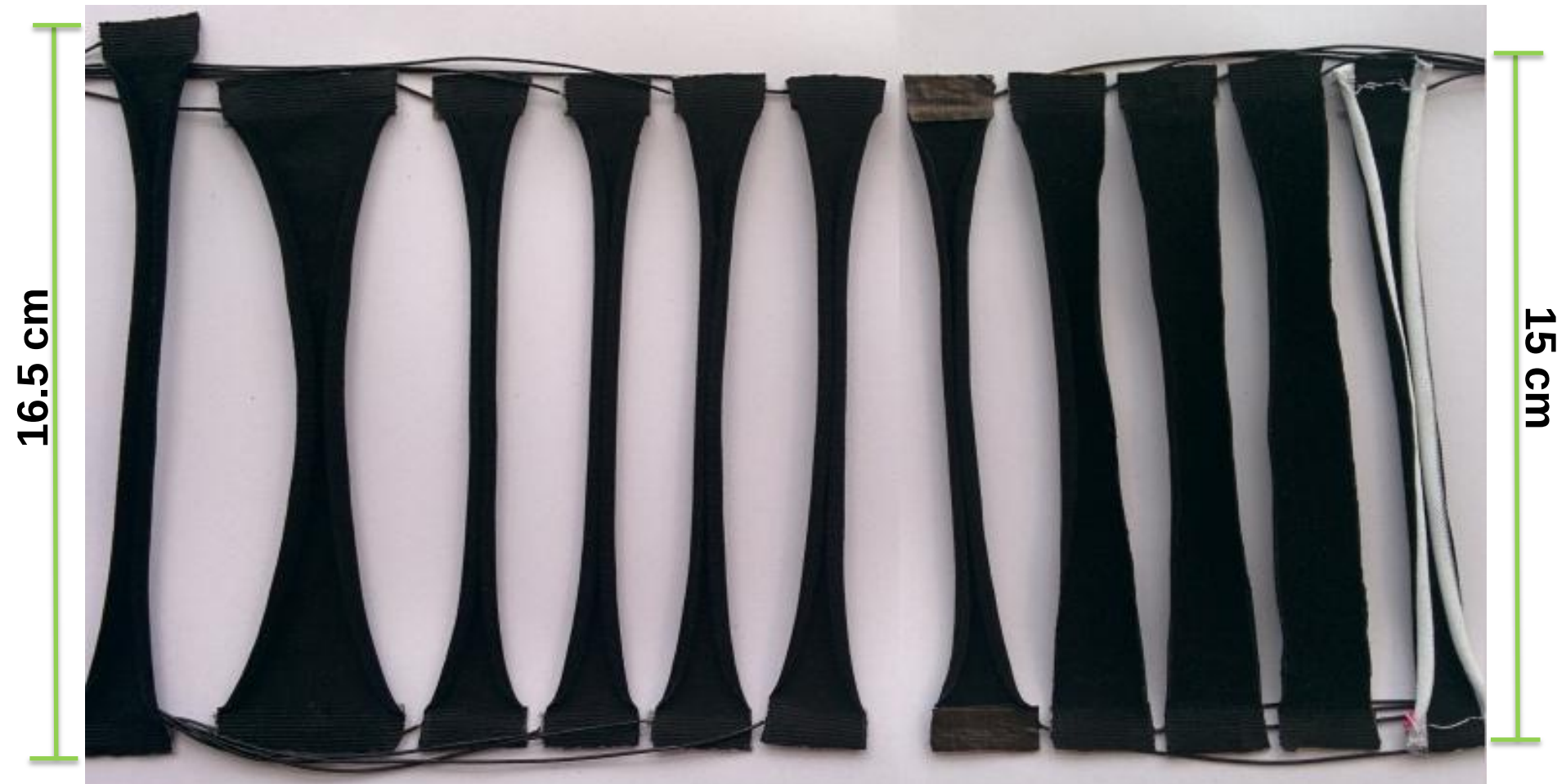


16.5 cm, 8 core sensor



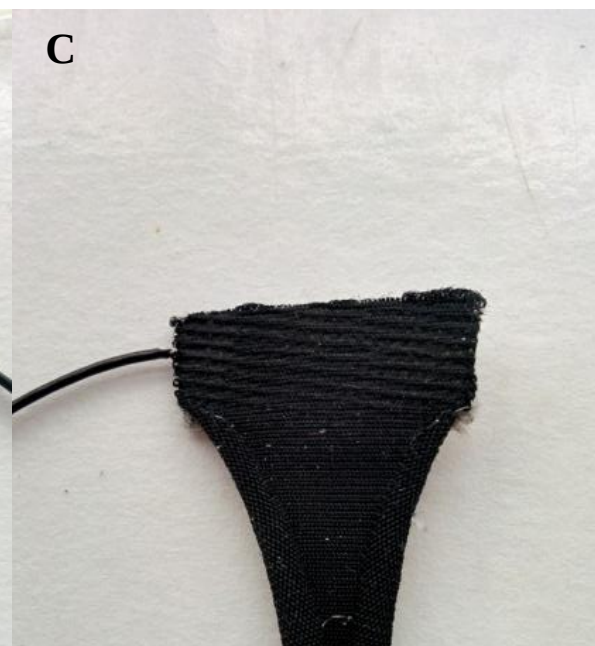
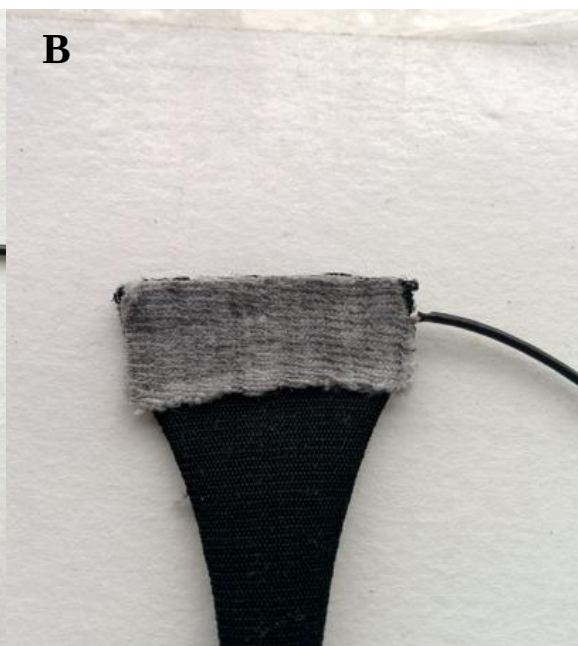
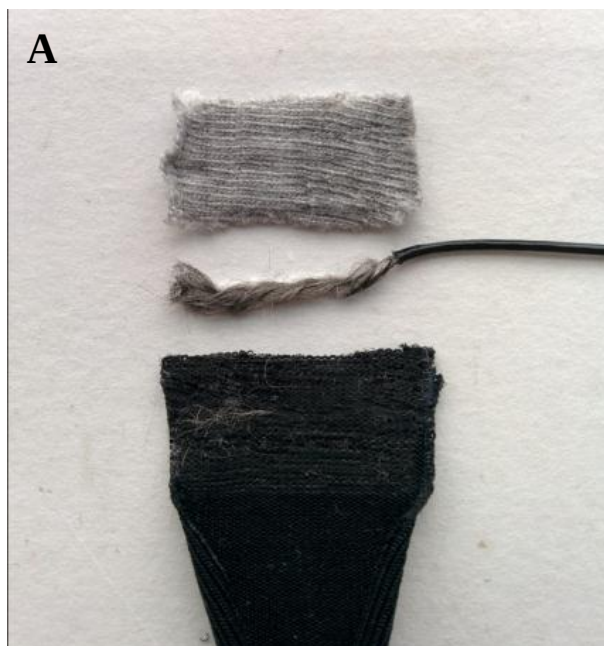
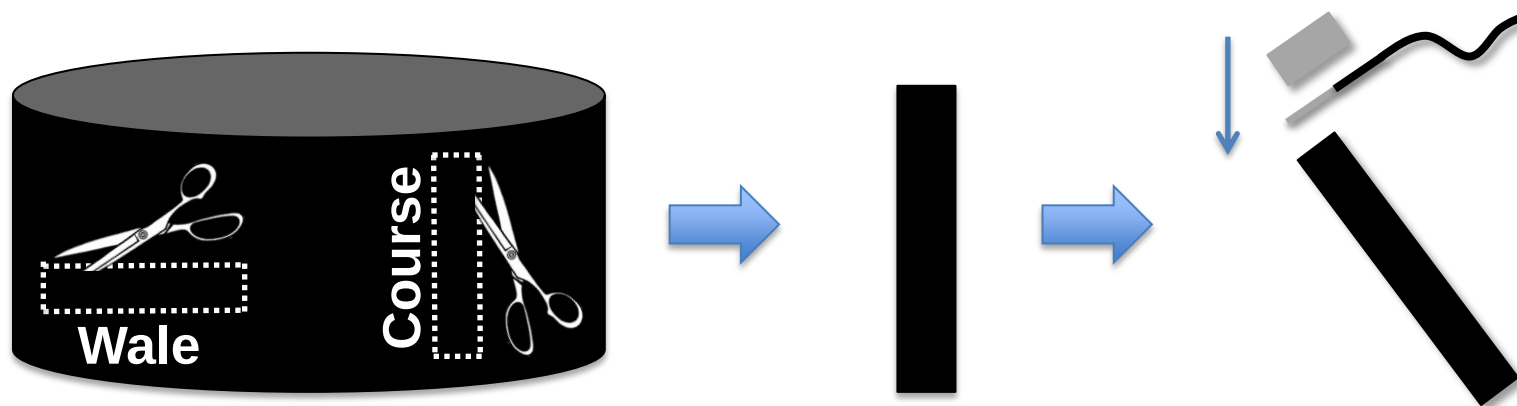


Carbon black loaded spandex

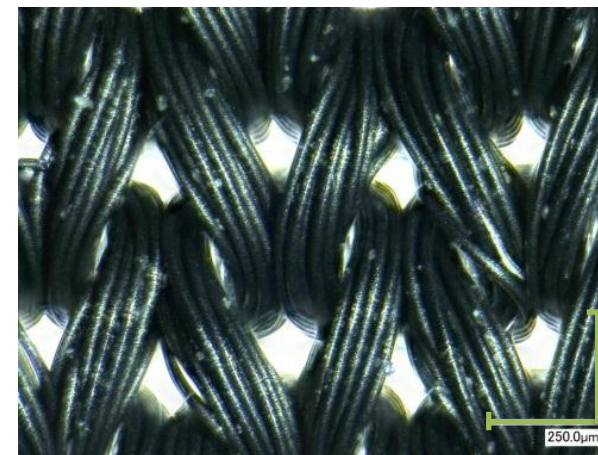
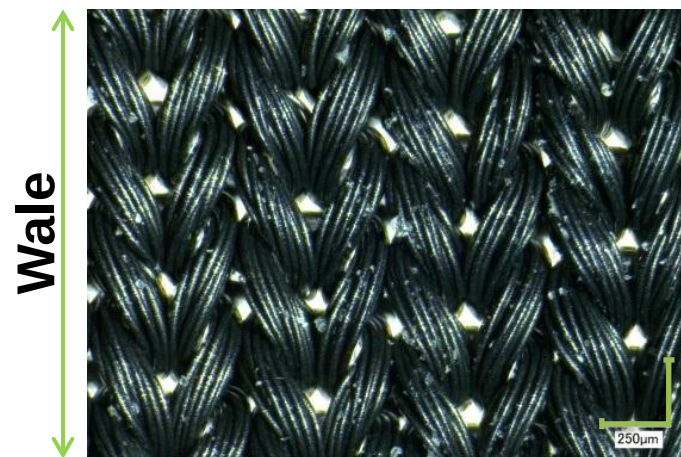


Smartex

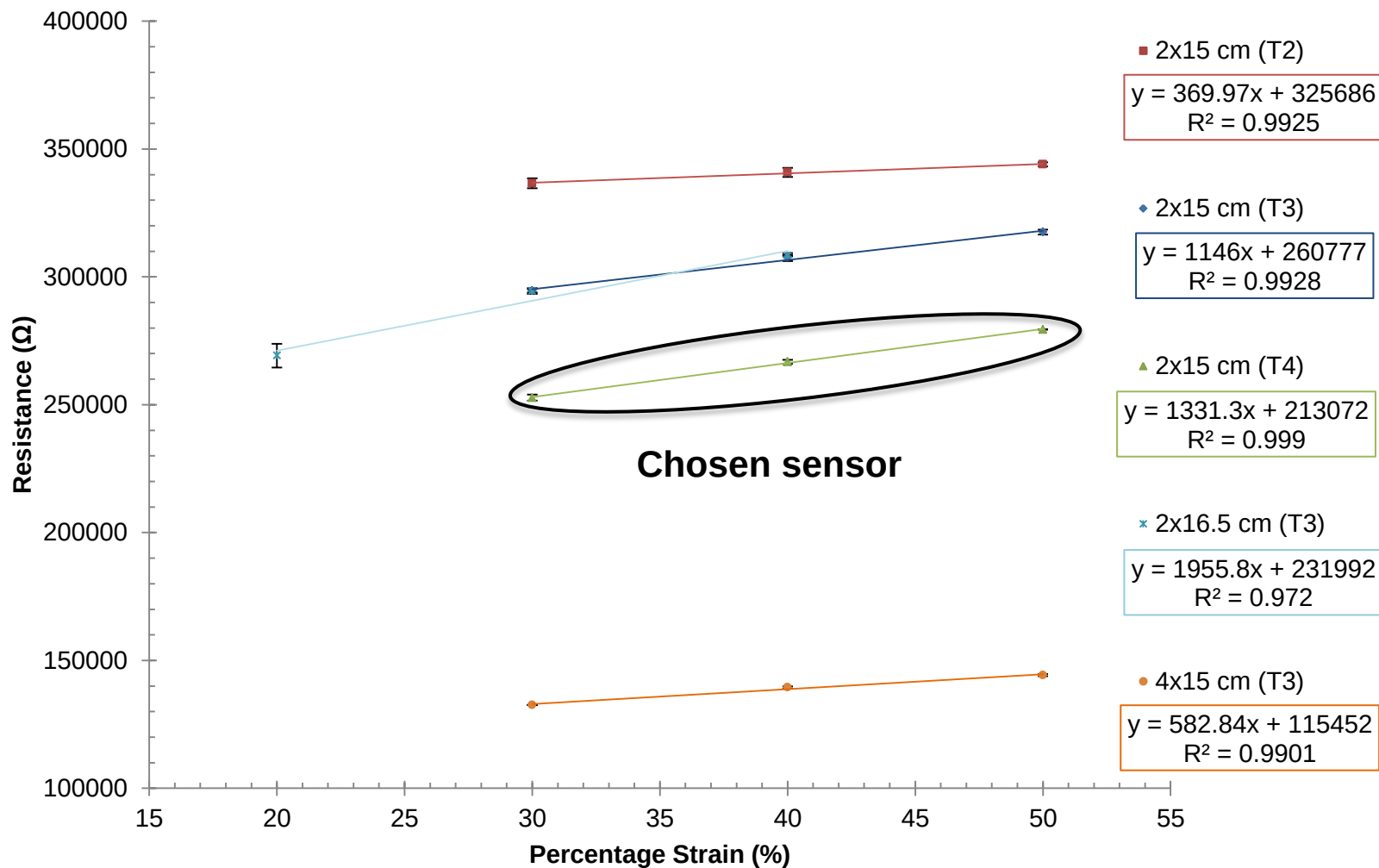
Production of the sensors



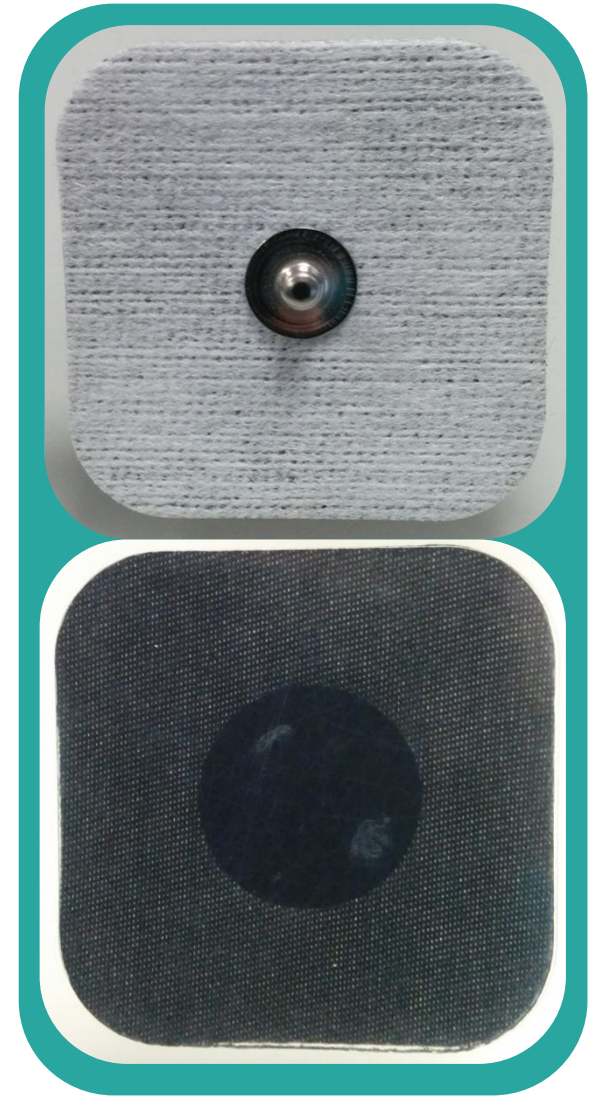
Course vs Wale



Sensor Comparison

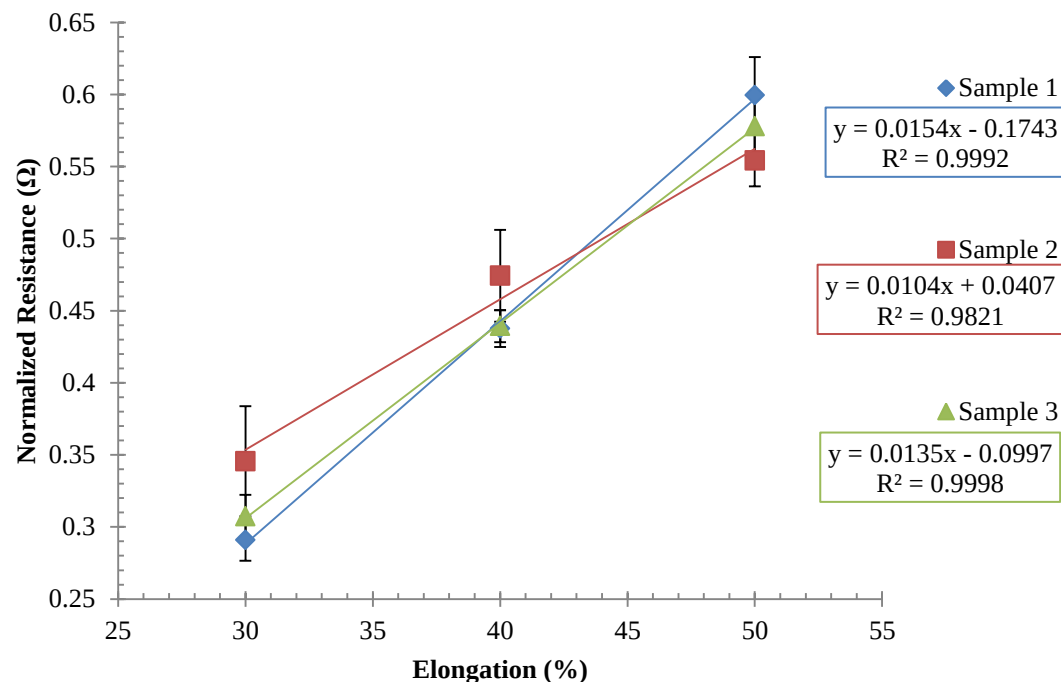


On Body Attachment



Future Work

- Further testing of Smartex sensors
- Shimmer integration for on-body testing
- Clinical Trials





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