# ULTRA-INTELLIGENT ELECTRONIC SKIN: PIONEERING FUTURE HEALTH CARE

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## 1 Urgent Need: Access to musculoskeletal (MSK) health

Poor MSK health affects 1.7 billion people globally, obstructing daily and social life.

In UK, MSK conditions cost **~£5bn/year** (**3rd** highest cost to NHS)

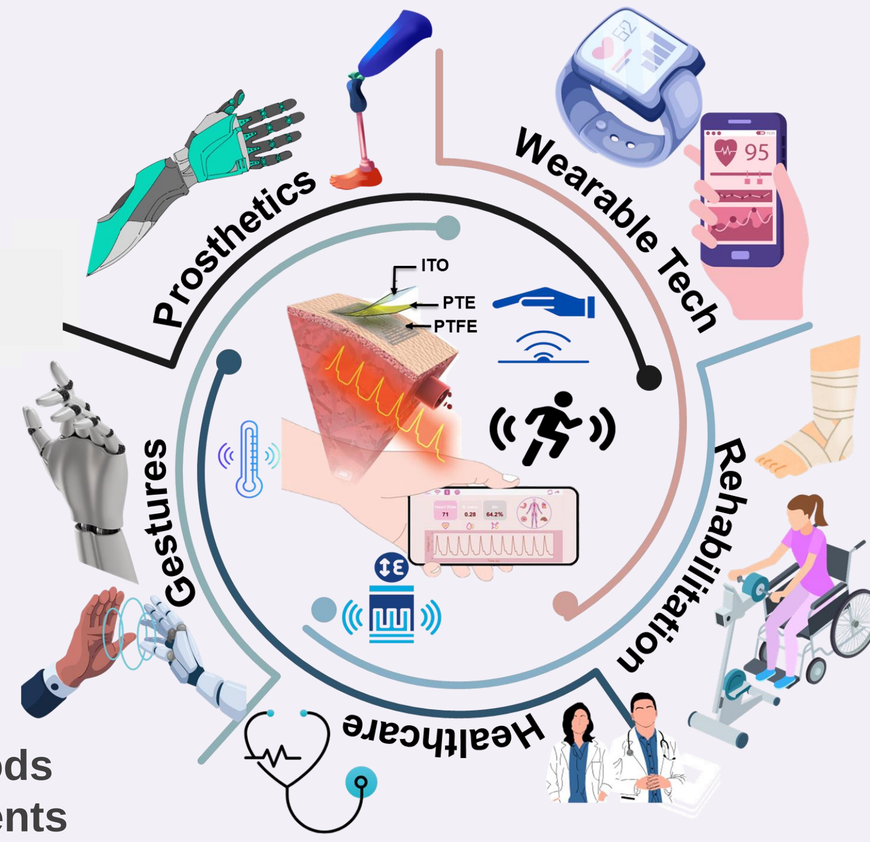
This is mostly spent on **physical assessments in clinics**, including

- Active and passive motion assessment of joints
- Observation of posture and gait
- Continuous monitoring with specific sensors by experts

**We need low cost, unobtrusive methods to provide at home physical assessments**

## 2 Solution: E-skin for MSK health?

E-skins is a skin-like technology that mimics human skin. They can measure human movements and physiological parameters




23% Global E-skin market **$10.9B** (2024)

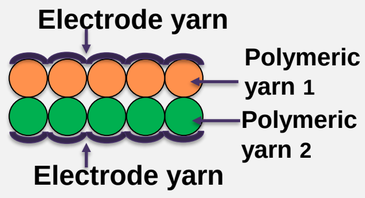
However E-skins suffer from high costs, low adaptability and poor wearability

**Clothing is our second skin, Can we turn them into E-skin ?**

**We develop comfortable and highly accurate E-skin for health care**

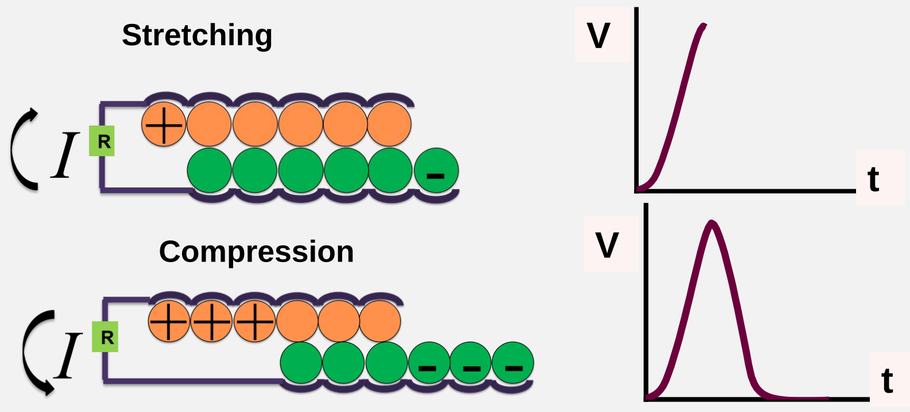
## 3 Our Technology

**Triboelectric effect**
When two materials are rubbed together, they become oppositely charged (triboelectric charges)



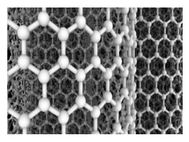

A Triboelectric Nanogenerator (TENG) has two polymer surfaces with electrodes. They use triboelectric charging and electrostatic induction to generate electrical pulses corresponding to body movements

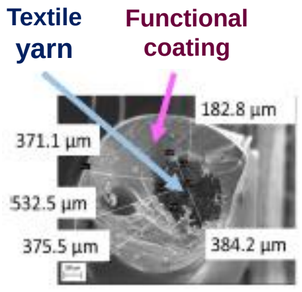
Textile E-skin for self-powered motion sensing



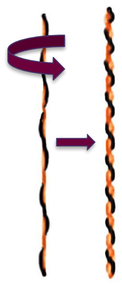

## 4 Fabricating Textile E-skin

### Developing E-skin yarn



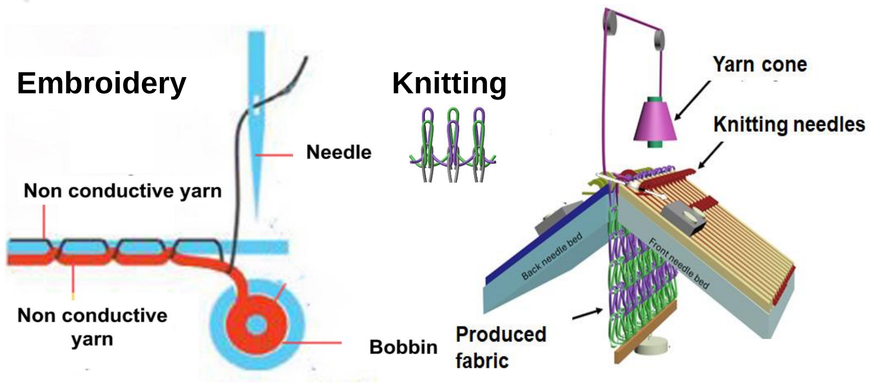



Functionalising yarns with nano materials (Graphene Oxide)



Engineering 3D yarn (Improving wearability and sensitivity)

### Constructing E-skin

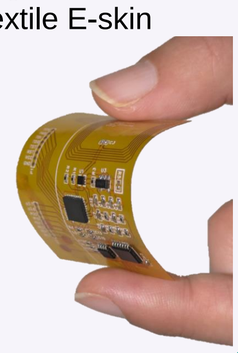



### Sensor elements

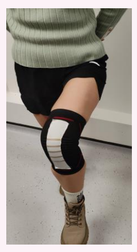
Triboelectric layer (Front)

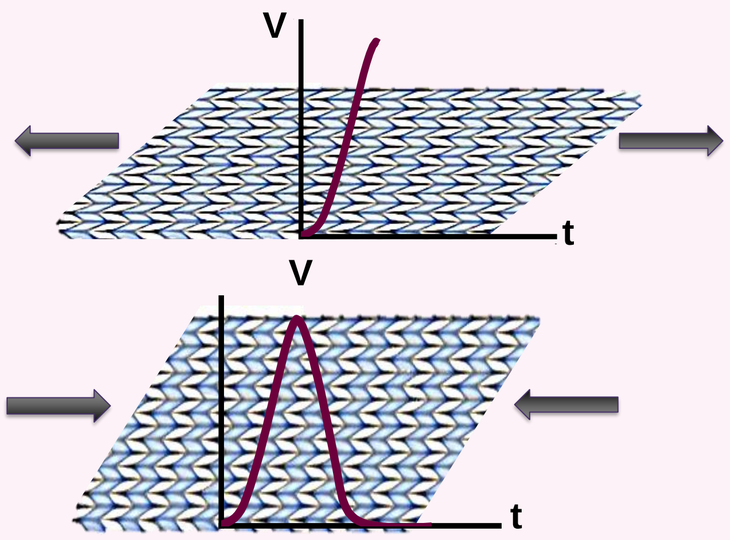
Electrode (Back)

Intelligent circuit for textile E-skin

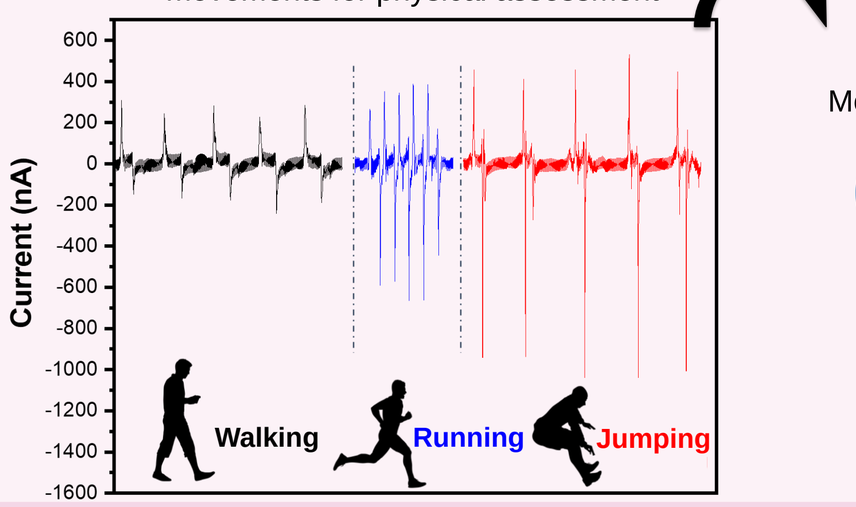


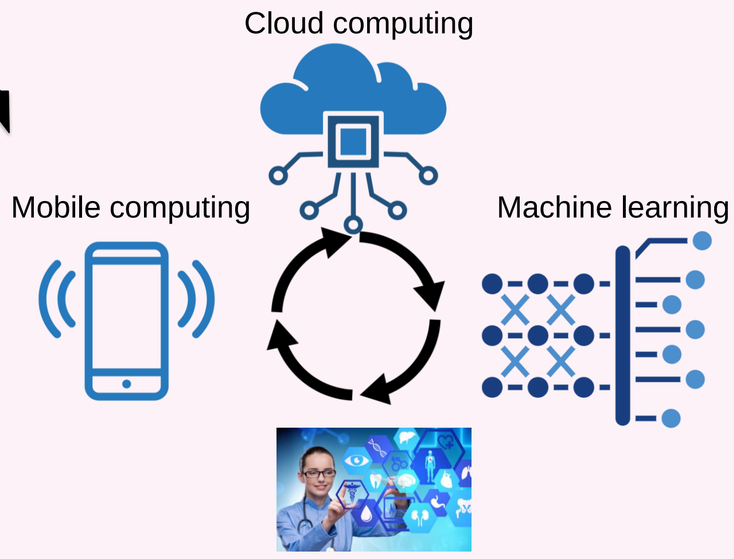
## 5 E-skin for physical assessment






Textile E-skin monitoring different movements for physical assessment




**NEXT STEPS: Extended patient trials, scaling up studies and commercialization opportunities**

**Imagine a future where clothing becomes a part of your daily wellness**

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