Sensorising the surface of a hand with a **single-layer soft skin** monitoring **multimodal stimuli.**

Single Layer Soft Sensory Skins exploiting High-Density Electrical Impedance Tomography[1]

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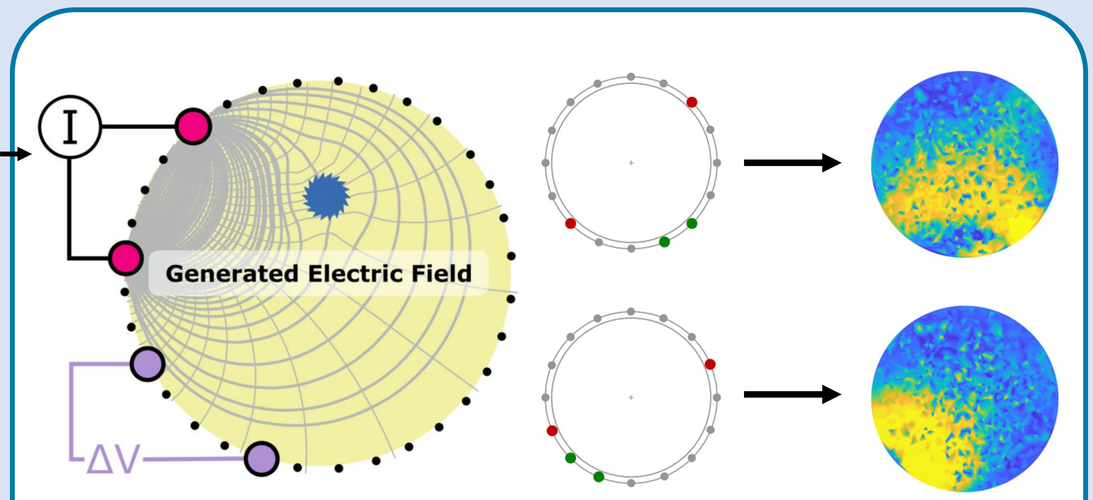
LINK TO PREVIOUS WORKS

OVERVIEW

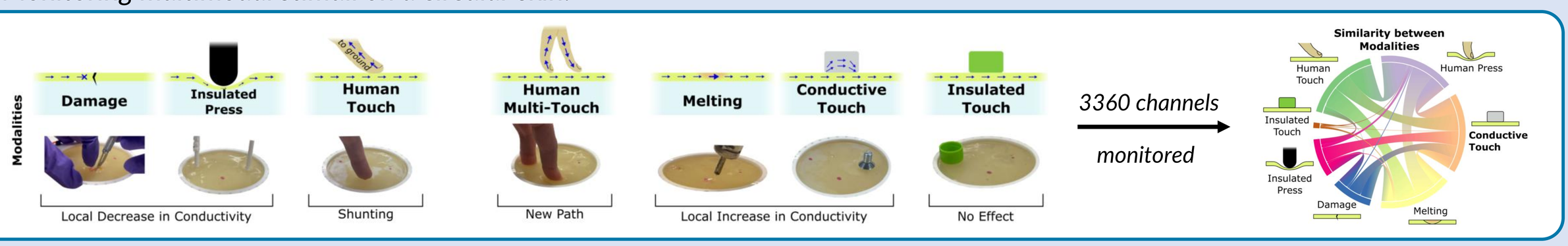
- Existing multimodal soft sensors are great at high-resolution tactile perception of small areas.
- However, many are difficult to fabricate into 3D shapes, and face delamination between their layers and soft/rigid interfaces.
- We cast single-layer skins into 3D shapes, **monitoring thousands of information channels via multiplexed impedance measurements**.

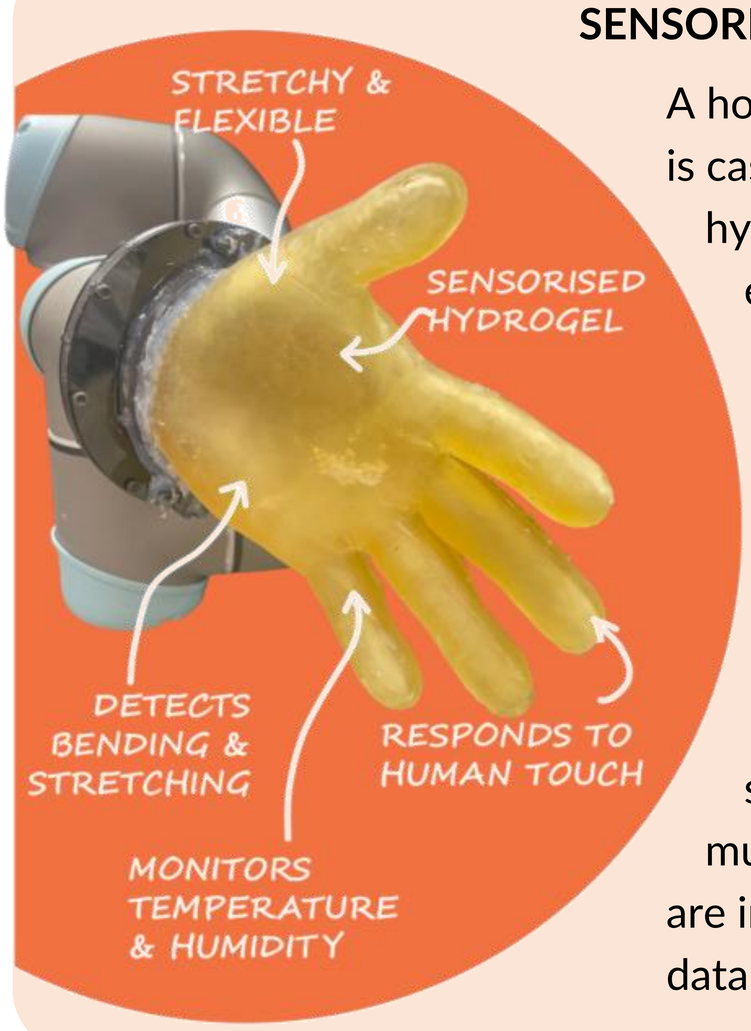
Basic case: circular skin



Changing the electrode configurations changes the most responsive locations on the soft skins[2].

Monitoring multimodal stimuli on a circular skin:

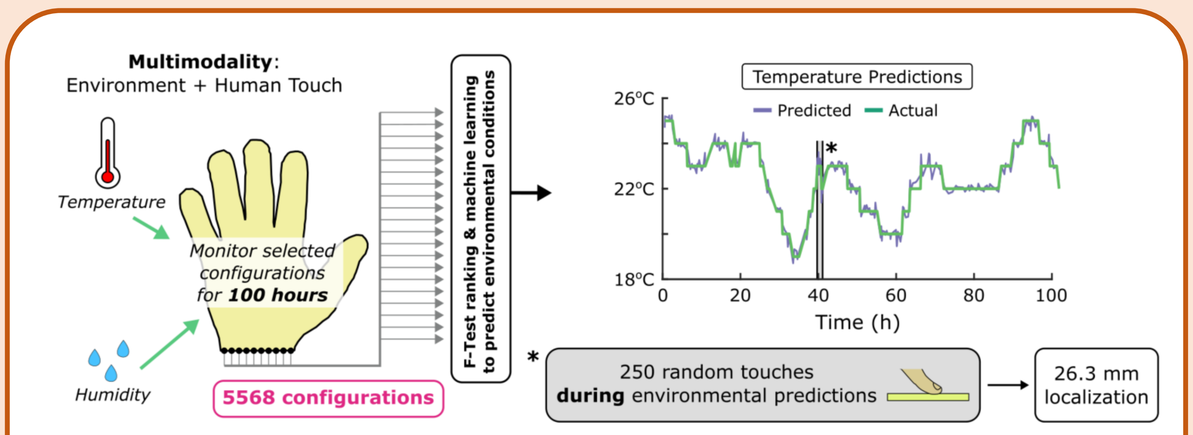




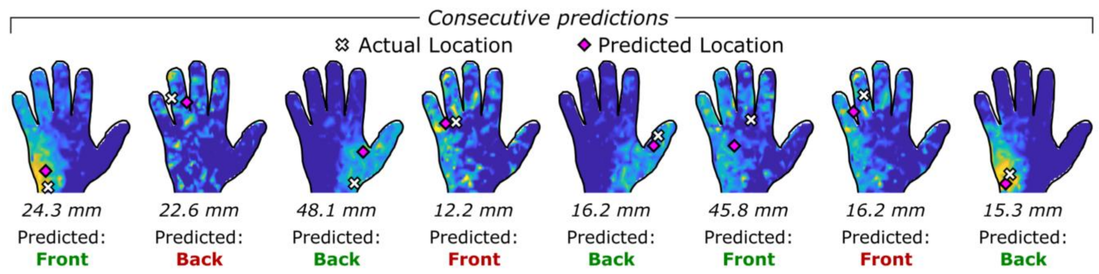
SENSORISED HOLLOW HAND

A hollow hand-shaped skin is cast from a sensorised hydrogel, and 32 electrodes attached at its wrist.

Multiplexed impedance measurements generate thousands of fields across the skin[3], which vary with multimodal stimuli. These are interpreted with various data-driven approaches.



The hand's hollow skin can simultaneously predict environmental conditions, generate proprioceptive signals, and localize human touches to 26 mm over the front and back of its 380 cm^2 area.



REFERENCES
[1] Hardman et al., Science Robotics, In Press
[2] Hardman et al., *Tactile Perception in Hydrogel-based Robotic Skins using Data-Driven Electrical Impedance Tomography*, Materials Today Electronics, 2023.
[3] Costa Cornellà et al., *Variable sensitivity multimaterial robotic e-skin combining electronic and ionic conductivity using electrical impedance tomography*, Scientific Reports, 2023.

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