

Lola

Development of a smart knee-wearable for osteoarthritis patients

Detecting acoustic missions and temperature changes

Background and problem definition

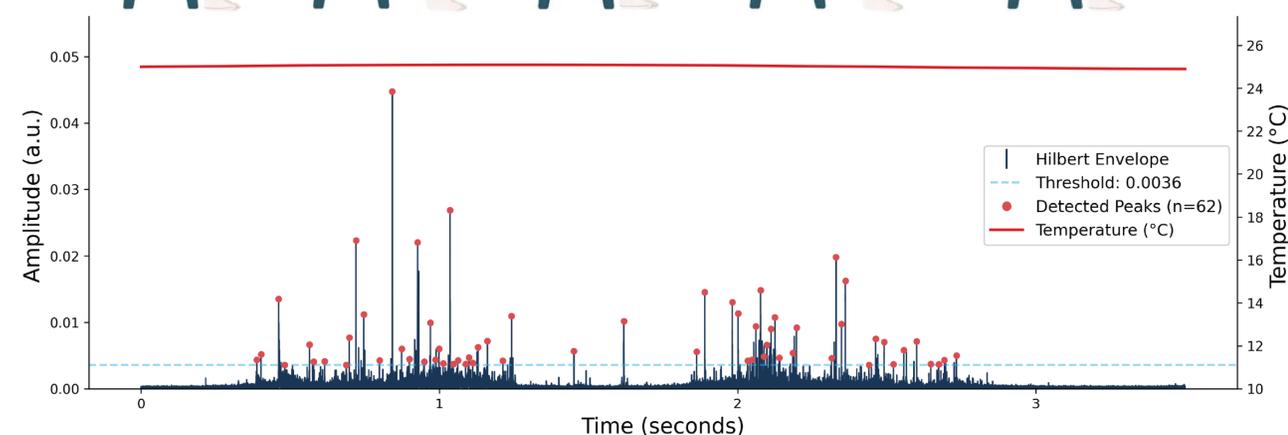
Osteoarthritis (OA) is a degenerative joint disease characterised by cartilage degeneration, stiffness, and unpredictable, painful flare-ups. During these flare-ups, it is thought that increased crepitus (joint sounds) and elevated skin temperature occur. To explore this hypothesis, a non-invasive knee-wearable is required, which is designed in this project. This wearable enables connecting the patient's subjective pain observations to measurable, objective physiological parameters using sensors.

The result

This project resulted in a comfortable, breathable smart knee-wearable intended for continuous, non-invasive monitoring, called Lola, which is short for Long-term osteoarthritis logging assistant. It is made from a spandex-like material with an open kneecap, knee hollow and silicone anti-slip edges, the device optimises movement and user comfort. By demonstrating that joint data can be tracked non-invasively, the wearable aims to objectively detect and, later, even predict OA flare-ups in daily practice, showing its value for researchers and patients.

The sensors

In the wearable, two types of sensors are integrated. For the crepitus, one MEMS microphone captures joint sounds, distinguishing between healthy and OA knees during exercises like "sit-to-stand." At the same time, 3 NTC temperature sensors are implemented around the patella to detect temperature changes. All electronics are integrated into the sleeve using conductive yarn in a zigzag stitch, preserving the sleeve's flexibility and softness.



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Integrated Product Design

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