

Symphysis

Syncing Mind and Motion in Knee Recovery

Problem Definition

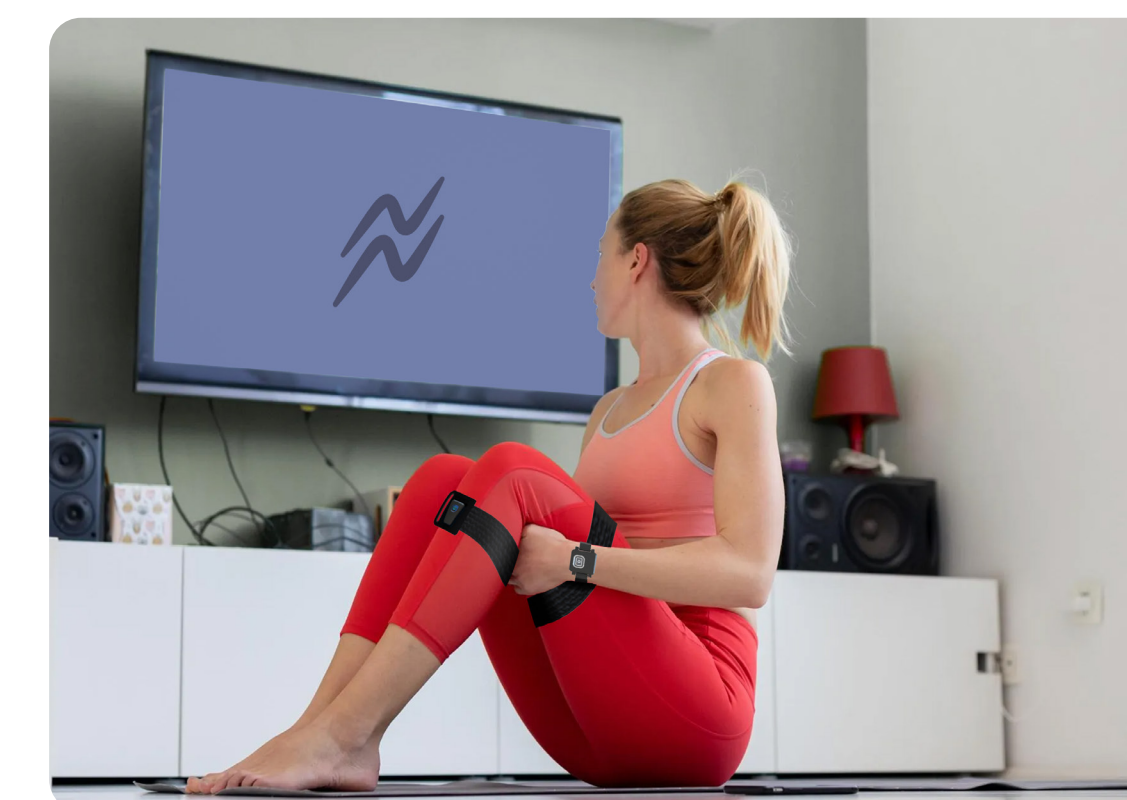
Knee injuries and conditions like osteoarthritis affect a large portion of the Dutch population, often resulting in pain, instability, and reduced mobility. Many patients struggle with fear of movement and lack of confidence even after rehabilitation. At the same time, the physiotherapy sector faces staff shortages and growing pressure to support care at home. Current solutions often fail to provide long-term support or patient engagement. This project proposes a patient-centred wearable that tracks knee rehabilitation progress, enhances motivation through feedback and gamification, and supports recovery beyond the clinic.

Solution

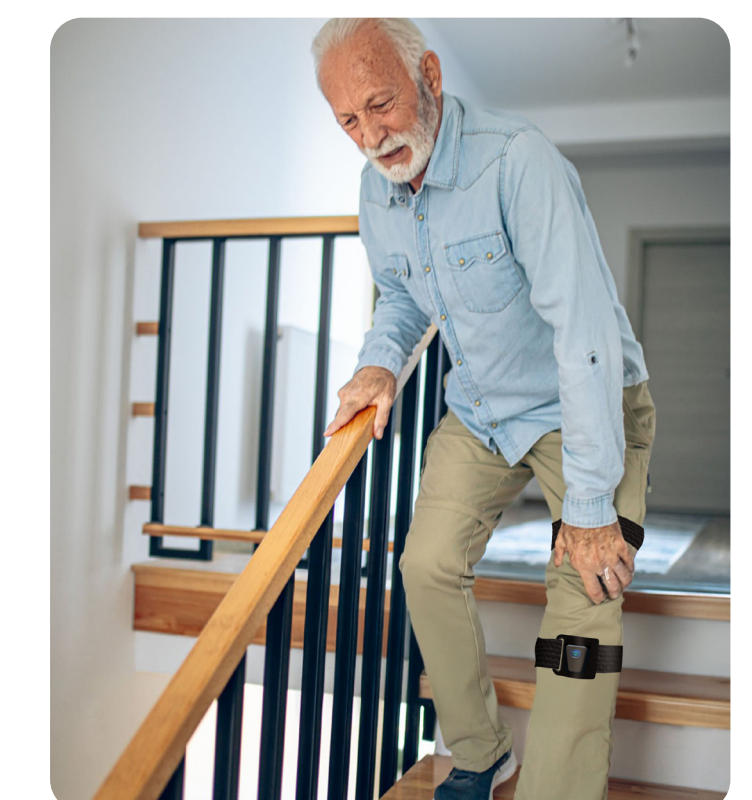
Research revealed a key challenge in knee rehabilitation: parallel recovery, the need to align physical and psychological rehabilitation. To address this, the Symphysis system was developed, combining a wearable multi-sensor kit, mobile app, and physiotherapist dashboard. It detects emotion-related physiological changes during movement (via galvanic skin response, Heart rate, Heart rate variability) and logs these moments as events, enabling reflection and informed dialogue about psychological influences on recovery. With 12-hour battery life and BLE connectivity (50+ meter range), it supports telerehabilitation, live sessions, and continuous monitoring beyond clinical hours. In functional testing, the system identified increased emotional arousal (Galvanic skin response) and movement corrections in internal and external rotation under cognitive load, indicating its potential for enhancing patient insight and therapist conversations and interventions.



Live sessions



Telerehabilitation



Daily activities

Tim Robbert Bouwmeester (name)

A patient-focused wearable for an engaging and supported knee injury recovery (project title)

19-05-2025 (graduation date)

IPD (MSc course (variant))

Committee

Dr.ir. Marijke Dekker (Chair)

Ing. Mascha Slingerland (mentor)

Company

X

