Wearable Sensor Based Continuous Gait Analysis @Home

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Introduction

State of the art for gait analysis

Clinical assessment by human experts

- Standardized gait tests
- During semi-regular clinic visits

Assistant stationary systems (e.g. MoCap)

Challenges

High costs and manpower involved

Subjective assessment

Not reflecting real life situation

(Subject) expectancy bias

Our approach

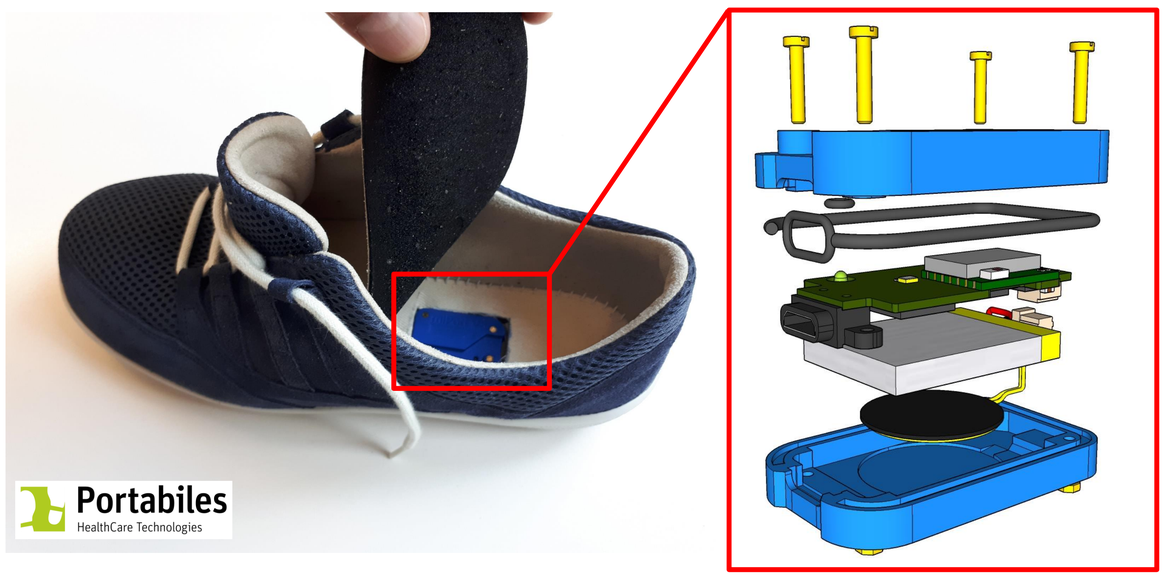
Low cost wearable sensors

Unobtrusive measurements @home

Continuous long-term data collection

Machine learning based signal processing

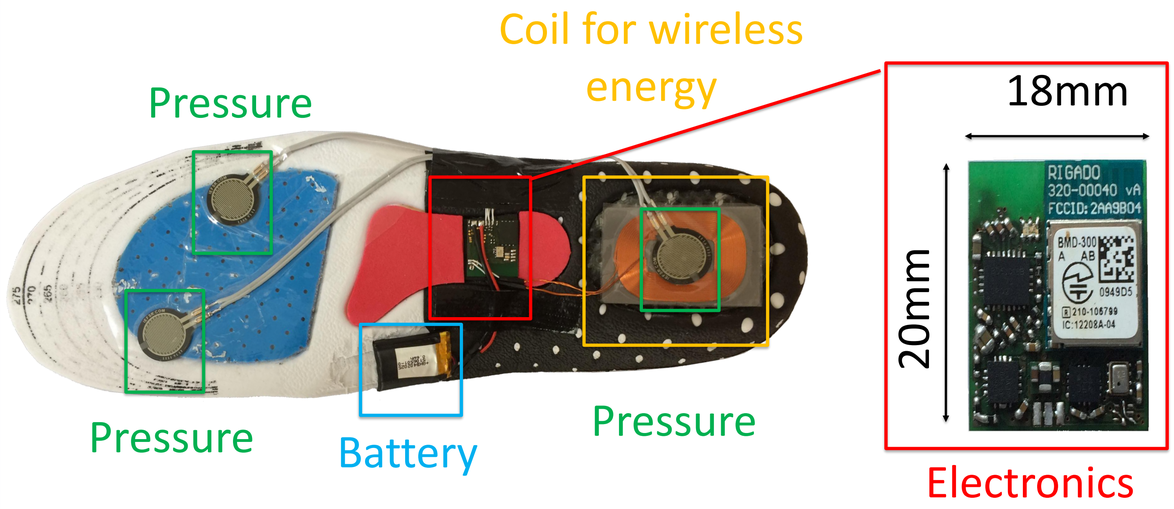
miPod



Acc | Gyro | Mag | Flexible | Runtime 10h

Blank et al. *UBICOMP* (2016)

Smart Insoles

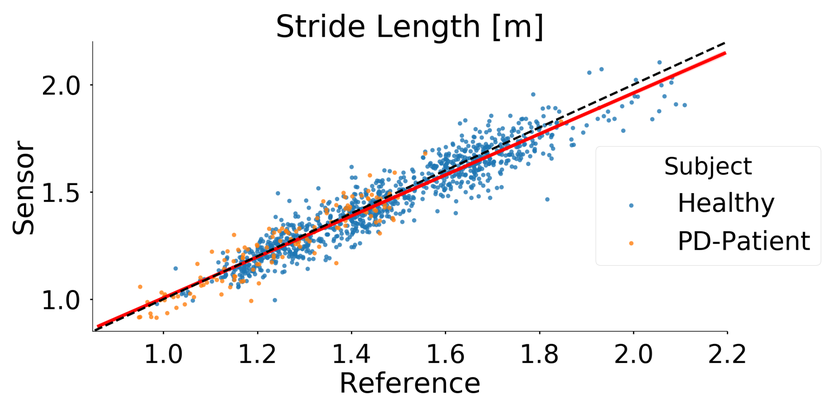


Acc | Gyro | Pressure | Sync | Runtime 40h

Roth et al. *DGBMT* (2018)

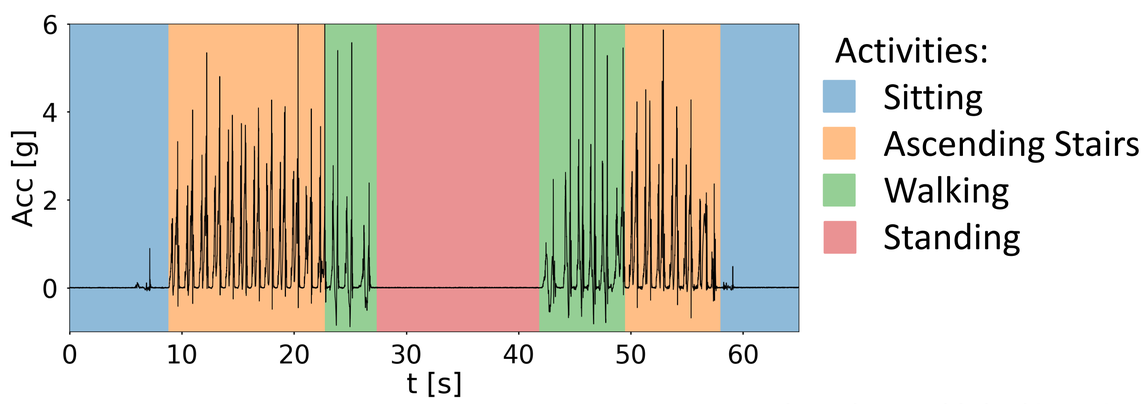
Current State of Research

Validation of stride parameters in supervised gait



Kluge et al. *Sensors* (2017)

Recognition of activities in unsupervised gait



Joneck et al. *Unpublished* (2018)

Towards…

Robust @home monitoring

Standardized gait tests in home environment

Recognition of activities of daily living

Extraction of clinical parameters from unsupervised gait

Computer aided diagnostics

Prediction of fall risk

Classification of diseases and disease stages (e.g. Hoehn & Yahr stage)

Integration in individualized digital health pathways

References & Acknowledgements

Rampp et al. *TBME* (2014), Barth et al. *Sensors* (2015), Hannink et al. *Sensors* (2017), Martindale et al. *Sensors* (2017), Kluge et al. *Sensors* (2017), Ghassemi et al. *Sensors* (2018)

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