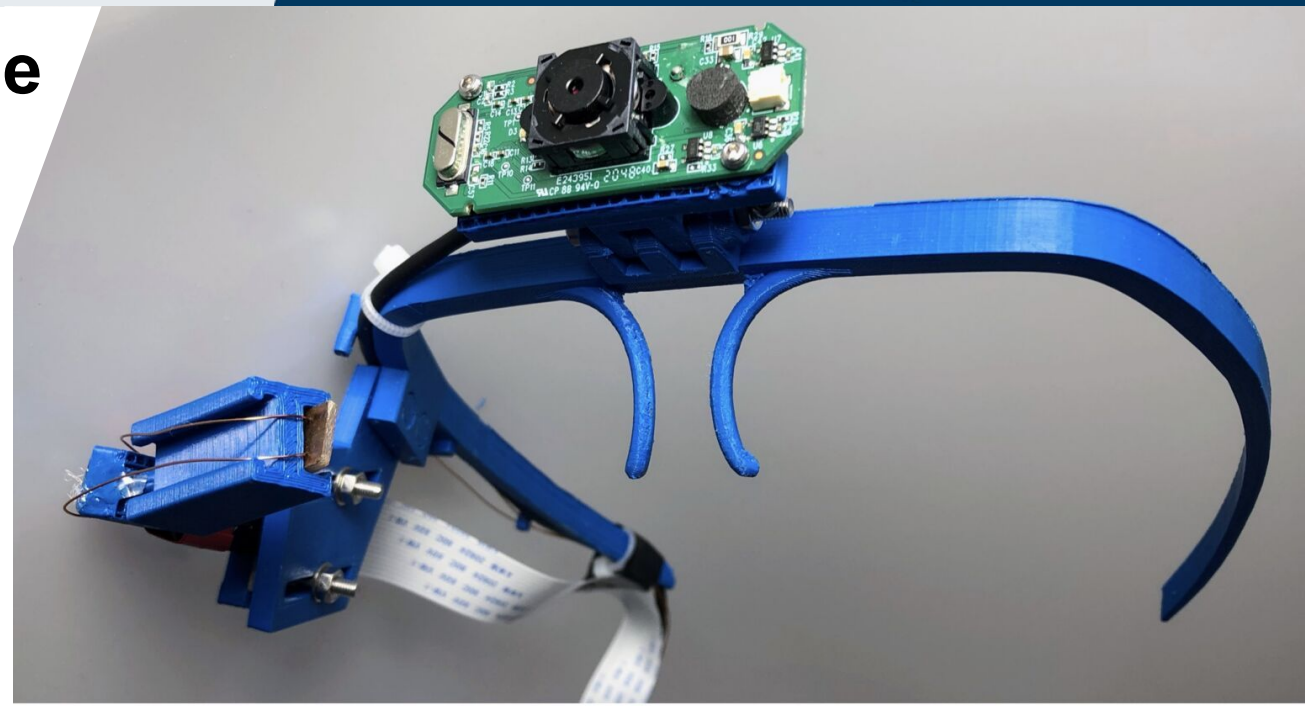
Thesis Topic

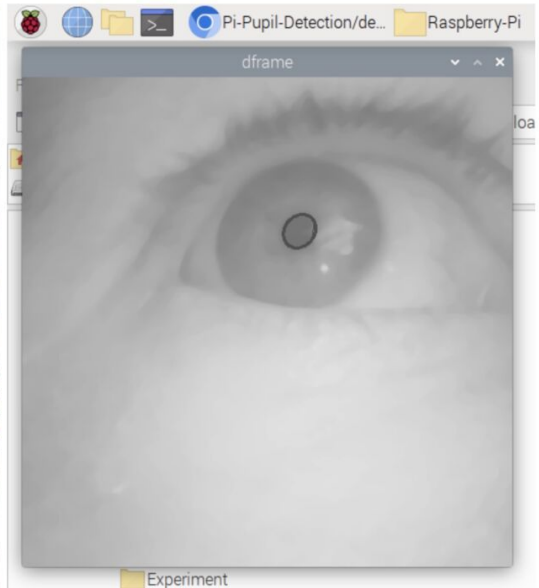
Universität Siegen

An Open-Source & Realtime Embedded Eye-Tracker

- Development of a Python and OpenCV-based wearable system on a Raspberry Pi
- Based on our existing pupil detection system
- Evaluation with two existing state- of-the-art eye tracking systems



More information in **H-A8110**
kvl@eti.uni-siegen.de



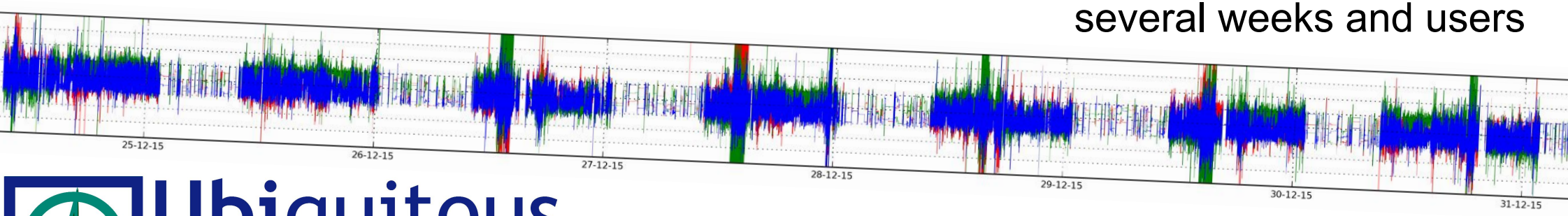
Ubiquitous Computing

Thesis Topic

Universität Siegen

A Wearable Stairs vs. Elevator Detector

- Using the internal barometric pressure and inertial sensor data from the Bangle.js.v2 watch, to detect when the wearer uses the stairs or lift
- Development of an efficient embedded algorithm in the Espruino IDE, an embedded open-source ecosystem to enable long-term operation
- Goal should be to deploy and validate the algorithms in a longitudinal deployment study of several weeks and users



Ubiquitous Computing

More information in
H-A8110 or: **kvl@eti.uni-siegen.de**

Thesis Topic

Universität Siegen

Towards A Medical-Grade Long-Term Activity Sensing Widget

- Develop an embedded Widget that fits in just a few kilobytes and operates in the Bangle open-source smartwatch ecosystem
- Design lossless compression & capture algorithms to acquire and save accurately-timed sensor data from motion and heart rate sensors
- Test your setup on a custom testbench

More information in
H-A8110 or: **kvl@eti.uni-siegen.de**

Ubiquitous Computing

Thesis Topic

Universität Siegen

LoRaWAN Path Loss Measurements in an Indoor Setting, including Human and Environmental Effects.

- We will design and implement experiments to measure LoRaWAN path loss parameters for indoor settings.
- Analyse the impact of environmental parameters and human presence on LoRaWAN signal propagation based on the acquired dataset.
- To demonstrate usage and significance of the dataset for indoor RF propagation channel modelling.

Ubiquitous Computing

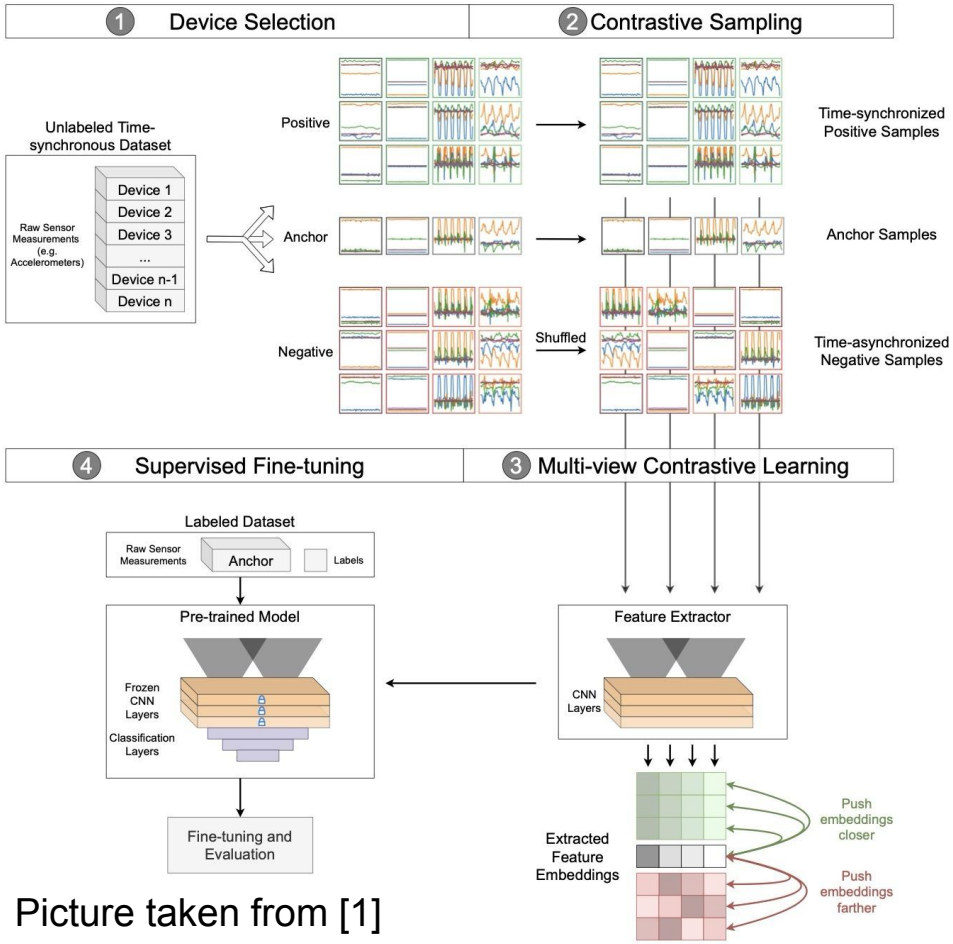
More information in **H-A8110** or: **kvl@eti.uni-siegen.de**

Thesis Topic

Universität Siegen

Morphology-based Collaborative Self-Supervised Learning for Multi-Sensor Wearable Activity Recognition

- Collaborative capabilities of sensors in self-supervised wearable activity recognition have been shown [1]
- **Goal of Thesis**: extend existing framework in [1] using statistical and deep learning based similarity metrics to determine collaborating sensors



Picture taken from [1]

[1] https://doi.org/10.1145/3517246

Ubiquitous Computing

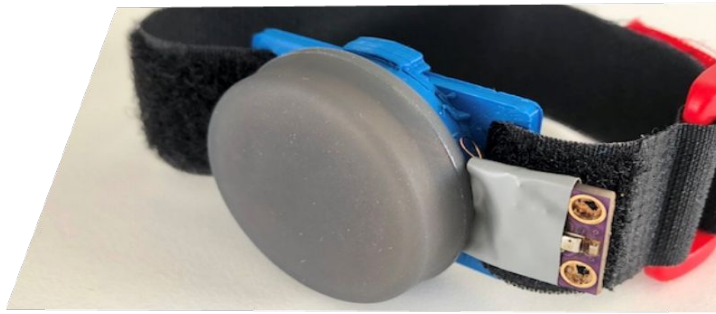
Contact: **marius.bock@uni-siegen.de**

Thesis Topic*

Universität Siegen

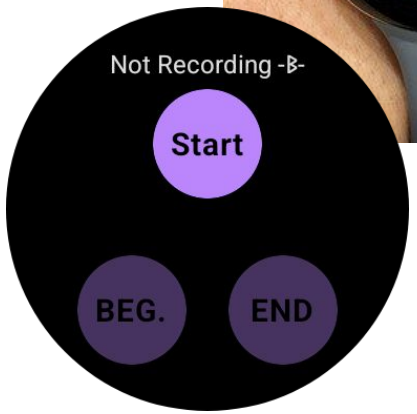
Audio-Augmented Activity Recognition (recording and processing a dataset)

Human Activity Recognition with additional Sensors (Microphone, Atmospheric Sens.)



Additional sensors can be needed to classify ambiguous or difficult activities!

- First step: recording a dataset. Includes recruiting participants and closely following a given experiment protocol, Recording 20 participants, for 4 hours each. (Recording hardware and software is already available)
- Afterward, the recorded dataset must be annotated (annotations will be created during the recording, but must be cleaned) and analyzed.
- Run Machine Learning / Deep Learning Experiments with the data, testing the influence of the addition of the audio recordings or lack thereof.



Required background:

- Strong skills in Python, Basic knowledge in the area of machine learning
- Ability to tightly stick to a given experiment protocol, in order to collect high-quality data
- Willingness to recruit and record participants

* Can also be a project work!

Ubiquitous Computing

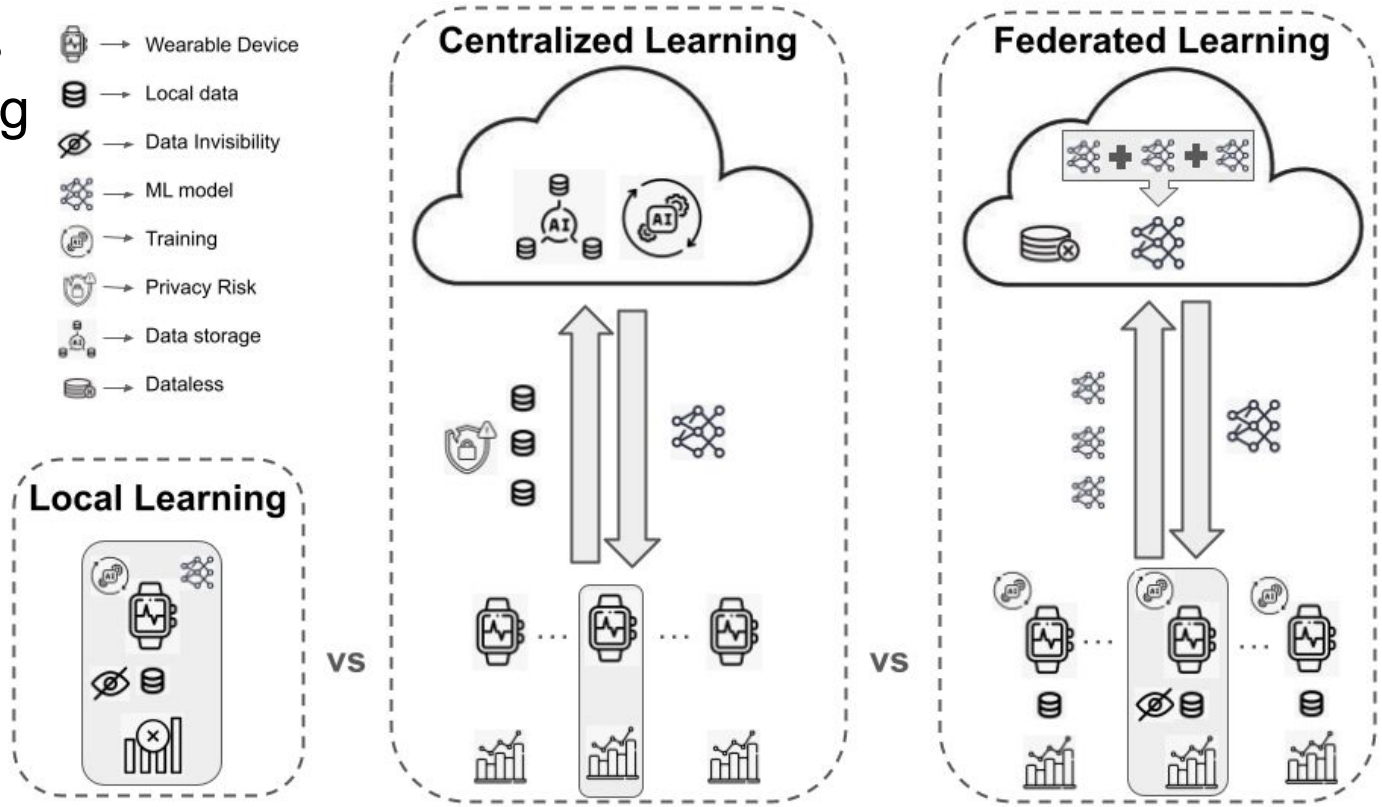
More information:
robin.burchard@uni-siegen.de

Thesis Topic

Universität Siegen

Enabling Trustworthy Collaborative Learning Systems for Human Activity Recognition

- Development of ML systems for the HAR domain by taking GDPR measures.
- Enhancing Federated Learning considering the characteristic of the target application.
- Evaluating metrics of designed system with existing learning systems using wearable device data.



Ubiquitous Computing

Contact: **zeyneddin.oez@uni-siegen.de**

Thesis Topic

Universität Siegen

Updating the process to record entry's of the WEAR Dataset

- Implementing Bluetooth synchronisation
- Implementing approximation saving
- Creating a more user-friendly way to convert data
- Compare recording between old and new method

More information in **H-A 8115** or
michael.brilka@uni-siegen.de

Ubiquitous Computing