Human Motion Tracker

Powered by Movesense

The Problem

- Human Activity Recognition Systems are hard to built

  - Long Non-Linear Development process

    - Hardware software co-design

    - Good Data Acquisition

  - Large decision space

    - Sensors

    - Machine learning algorithms

    - Features to extract

Motivation

- Human activity recognition systems can be used for healthcare and sport related applications.

- Most of the devices in the market are expensive.

- Promising market: the number of connected wearable devices worldwide is expected to jump from an estimate of 325 million in 2016 to over 830 million in 2020 *

* https://www.statista.com/topics/1556/wearable-technology/

Benefits of using Movesense for HAR

- Size
- Weight
- Waterproof
- Easy connection
- Data processing in Sensor

The Solution

aws

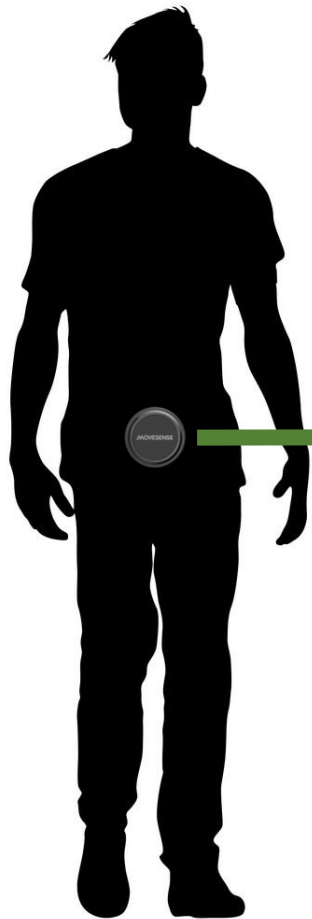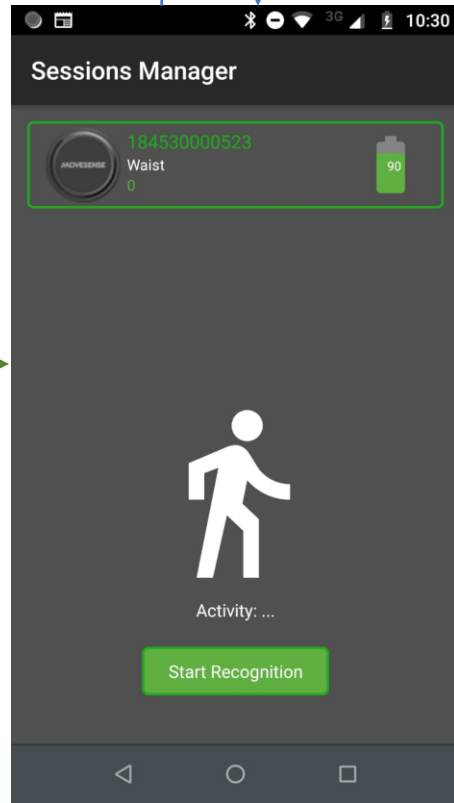- Signal Processing
- Features calculation
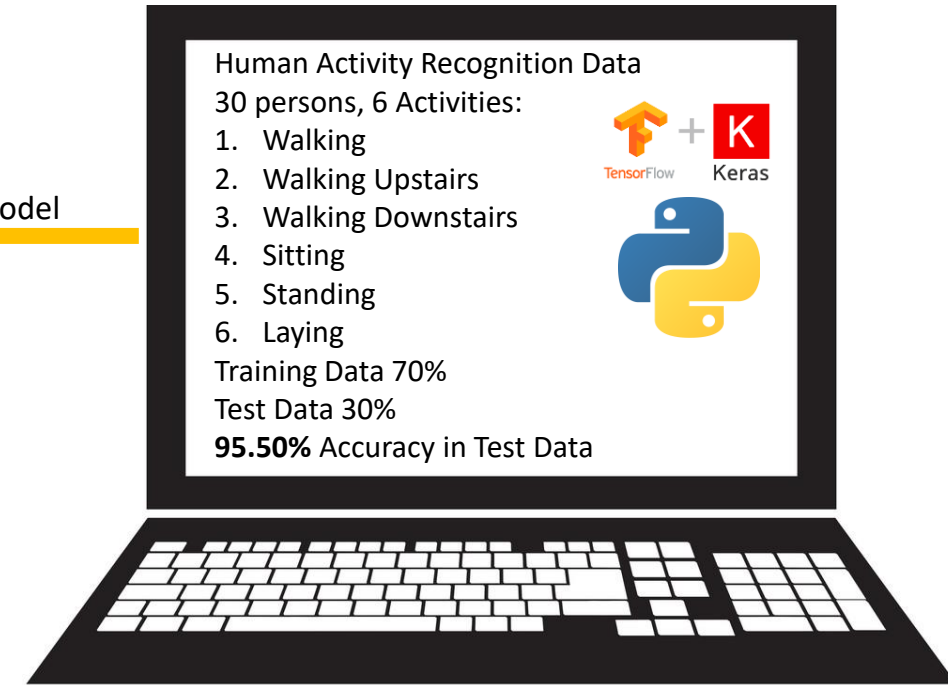- Feature vector creation

128 samples

Feature Vector

Sessions Manager

184530000523
Waist
0

90

/Meas/IMU6

TensorFlowLite trained model

Activity: ...

Start Recognition

Human Activity Recognition Data
30 persons, 6 Activities:
1. Walking
2. Walking Upstairs
3. Walking Downstairs
4. Sitting
5. Standing
6. Laying
Training Data 70%
Test Data 30%
95.50% Accuracy in Test Data

TensorFlow + Keras

Mobile Collector (Android Application)

- Windowing (128 samples)
- 50% overlapping
- Amazon kinesis

- Accelerometer
- Gyroscope
- 52Hz

*Attatched to the waist

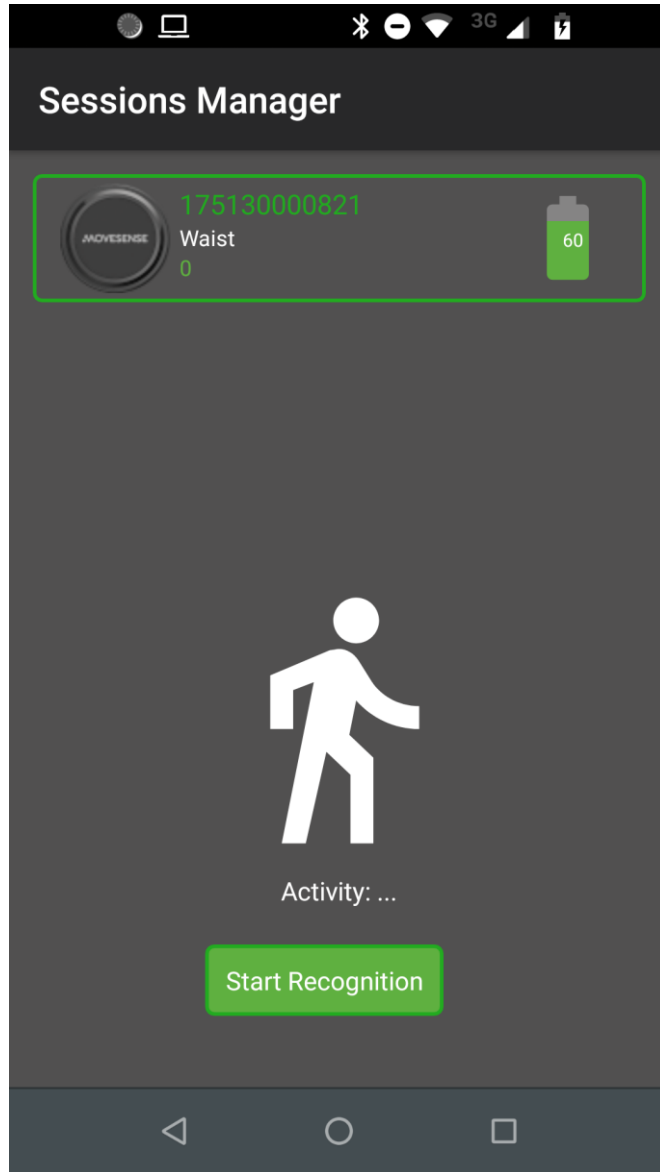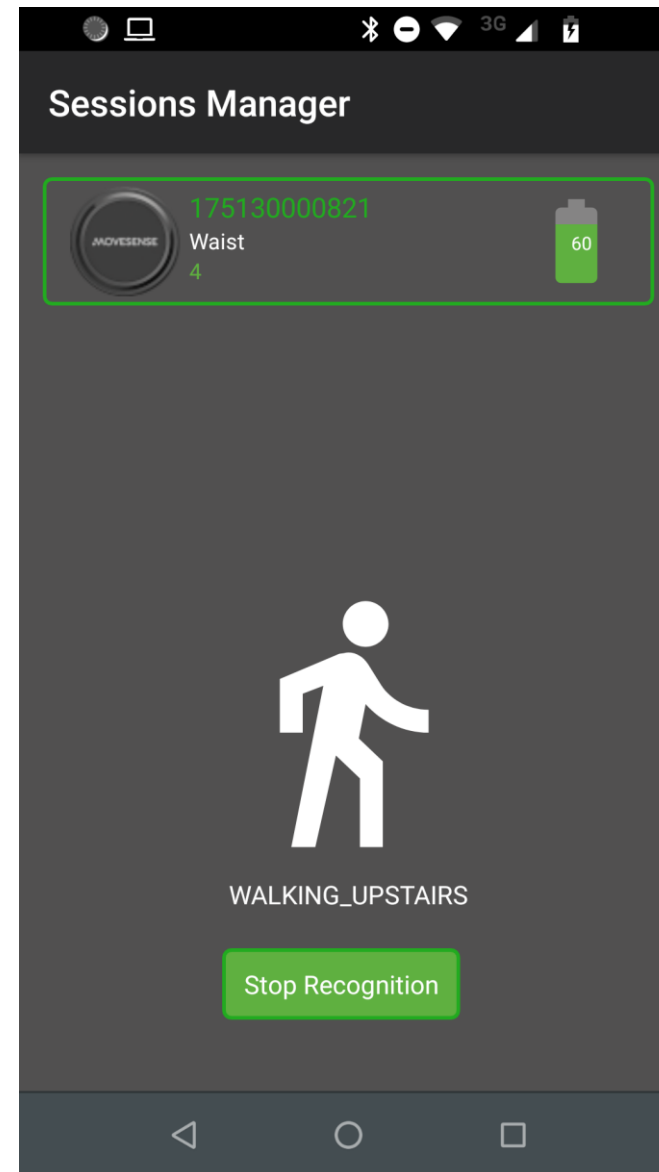# Mobile Collector App
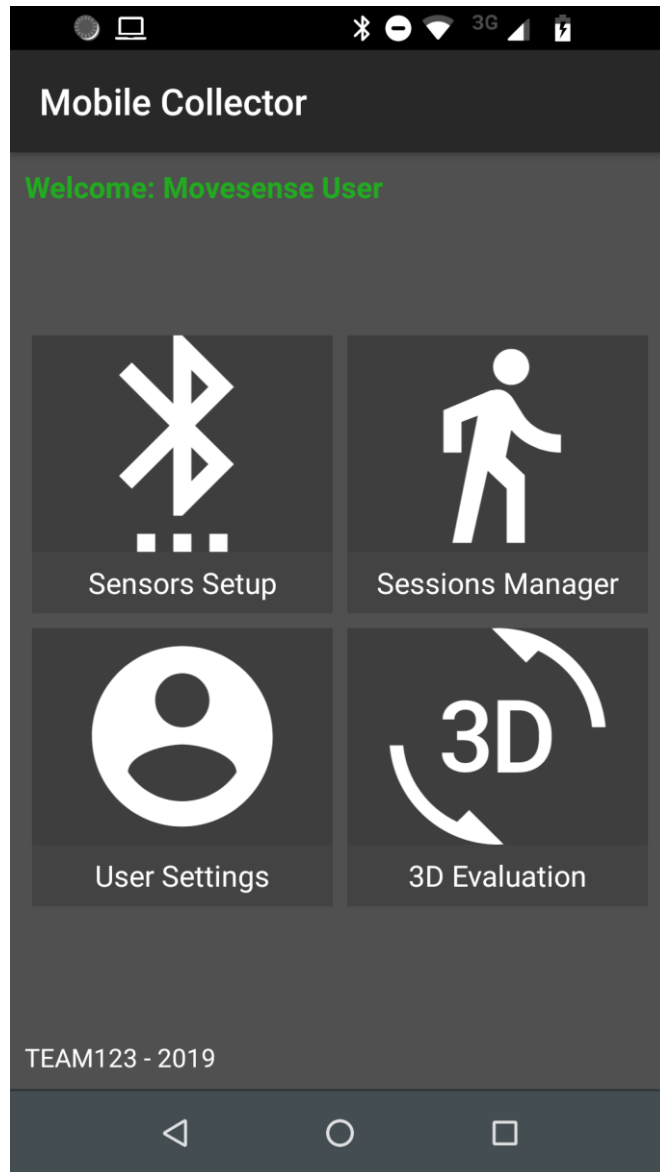
Main Screen
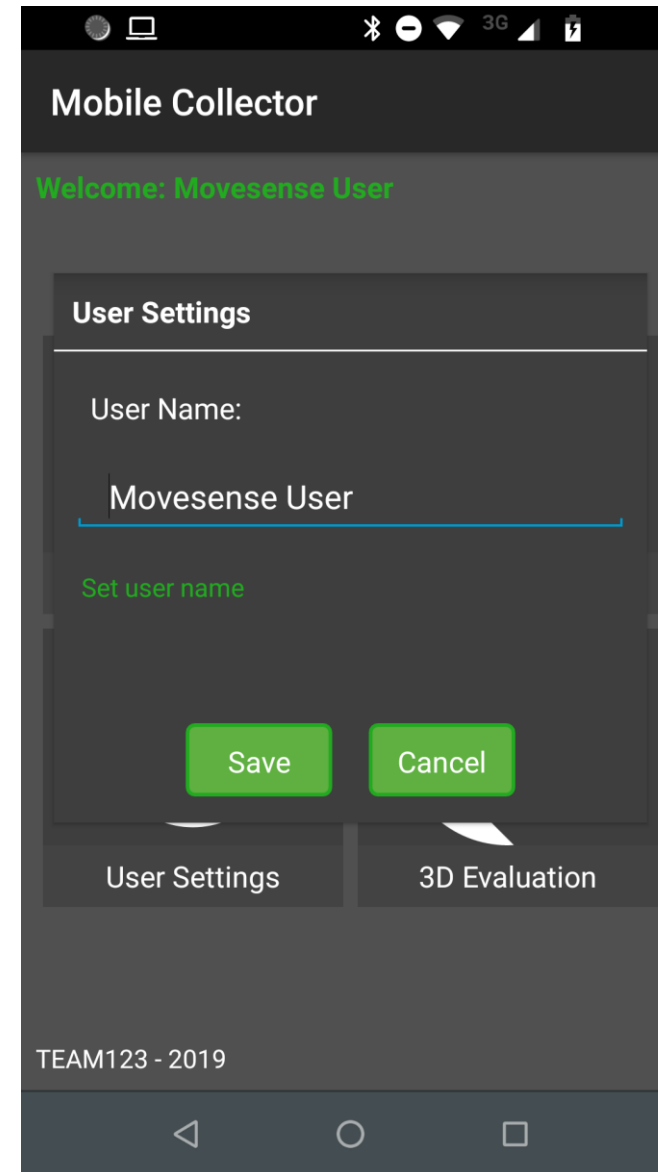
User Settings Settings screen

Live Activity Recognition

Step 1

Step 2

Demo

Extra Feature

Jump detector and counter. Unity Animation

- 104 Hz
- Jump counter
- Last Jump Height

Future Steps

- Doing data processing on the sensor

- Finish the training capability

- Data Acquisition from other Tinetti Test exercises that already includes, walking and sitting.

- Optimization of the machine learning algorithm.

- Optimization of the features.

- Try to expand the application to different sports or exercises to help in the improvement of athletes or patients.