Fall Detection and Prediction

University of California, Irvine March 2020

1 Project Description:

There has been a growing trend in recognizing human activity in healthcare community because of its application in surveillance and health monitoring. A type of human activities which can be considered as a set of complex activities is called ADL which stands for activities of daily living. To detect such activities, there are different approaches ranging from vision sensors, inertial sensors or a combination of both approaches.

In this project, the goal is to develope a framework which can detect falls from the input signal and try to predict future falls based on the observed history of falls. You can start by analysis some state-of-the-art datasets like Tfall[1] which consist of records of 10 participants who perform ADLs and Fall. The goal is to develope your own features/classifiers to detect falls based on different signal source (e.g. Accelerometer and Gyroscope). Later, you can generate your own dataset using Mbient sensors[2] (Fig. 1).

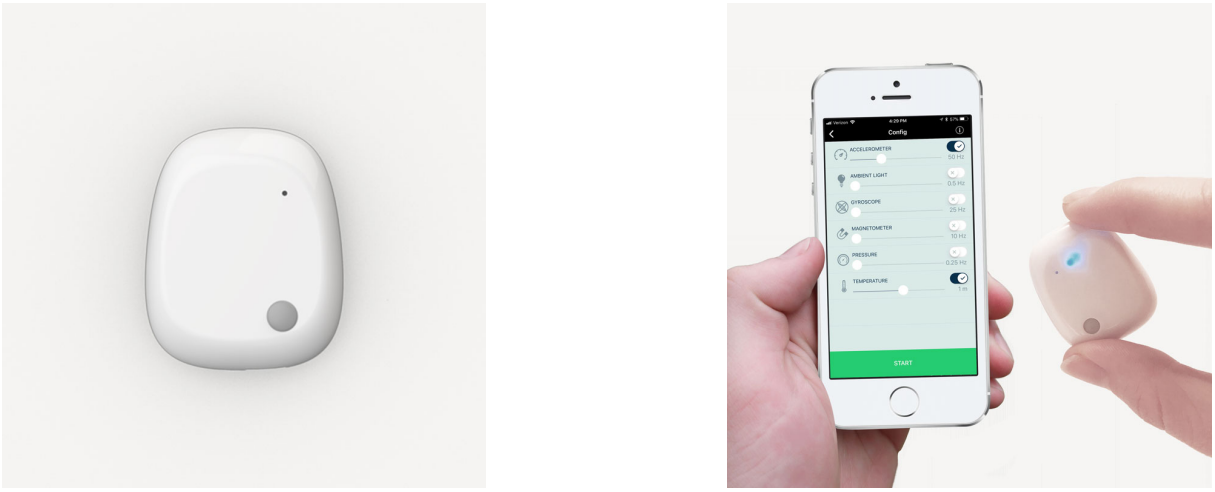
2 Learning Objectives:

1. Study:
    - Feature engineering
    - Developing a learning Model
    - Privacy-preserving learning
2. Analysis:
    - Signal processing
    - Fall detection techniques and feature extraction
3. Implementation:
    - Implementation of a pipeline from extracting the raw data to visualization (for detection and prediction) of falls
    - Implementation of learning model in privacy-preserving way

3 Design tool used (include but are not limited to):

- Python
- Any web server (NodeJs, Django, ...)

[1] http://eduqtech.unizar.es/fall-adl-data/
[2] https://mbientlab.com/



(a) Mbient Sensor

(b) Mbient App

Figure 1: Mbient sensor and app