**Assignment**

* Study the PIR sensors and algorithms for general recognition and classification.
* Design the theoretical system, using the PIR sensor data, scanning the situation, possibly the count of people.
  + Predefined fuzzy logic system
  + Artificial learning system
* Implement the described algorithm. Verify its functionality on real situation.
* Sum up the result.

**Design**

* **Hardware** part
  + Sensor device
    - PIR STD (*B+B Sensors*)
    - NodeMCU = MCU
  + Classification server = software
* **Software** part
  + Sensor device program (C++/Arduino)
    - Sensing, segmentation (homogenous)
  + Monitor (Python)
    - Feature extraction, classification
    - Presentation
    - (Fusion)

**Feature extraction**

* CWT = edge function
* Segment borders (extremes), segmentation
* Artefacts
  + Merging the segments using fuzzy system
* Features
  + Mean
  + Variance
  + Scale of interpolated line
  + Length of artefact
  + ...

**Classifier**

* Based on linear regression
  + Multiple classifiers, each determining one attribute
    - Distance
    - Orientation
    - Side
    - ...
* Spacial model of sensed area = matrix of fuzzy values
  + Formula for the index value from the classifier outputs
    - Index has unique vector of coefficients for each classifier
  + Indices do not separate the space homogenously

**Training**

* Manual labelling
  + Reference of synchronized video frame
* Rather inaccurate
* Definitely a room for improvement

**Postprocessing**

* **Localization** = cluster analysis
  + K-means **vs.** Partitioning around medoids
* **Counting the people** = minimal within-cluster sum of squares