Tasks for development of Sensor-C, Status: 01-11-2020

**Task Features 1** (SW Version 2):

Calculate features and log them over e.g. 100 measurements per class

F1: Mean difference between frequencies of neighbored measurements of center frequency  
 (max. peak), i.e. moving average over 10 frequency differences of neighbored center   
 frequency (diff\_sum)

F2: Center frequency (max. peak), which you might have already  
F3: Mean of F2 over 10 measurements  
F4: Variance of F2 over 10 measurements

F5: Number of peaks (within frequency range around ~~39.5 – 40.5 kHz~~ ±500 Hz of F2)  
F6: Mean of F5 over 10 measurements  
F7: Variance of F5 over 10 measurements

F8: Mean frequency distance of 3 peaks (left of center frequency, center frequency,  
 right of center frequency (max. peak)  
F9: Mean of F8 over 10 measurements  
F10: Variance of F8 over 10 measurements

**Task Box Classifier** (SW Version 3):

* Use a 2 feature box classifier:

If (F1 < t .AND. F5 < tF5)  
 class = hard\_object;  
 LED 1 = ON;  
 LED 2 = OFF  
Else  
 class = soft\_object (i.e. human).

LED 1 = OFF  
 LED 2 = ON

* For the beginning, pls set t to 1000 and tF5 to 100.
* Create 2 Versions (maybe more are necessary):  
  3.0: Version running with PC  
  3.1: Stand Alone Version:  
   Auto Start on Power Up  
   Output is LEDs 1 and 2 to indicate detected class  
   Additionally, LED 0 indicates whether any hard or soft object is within detection range  
   Setting of range as well as thresholds t and tF5 by means of UDP

**Task Features 2** (SW Version ?):

* Search for libraries which extract moments from distributions, especially from Gaussian distributions, e.g. mean, variance, skewness, …
* Implement these features and and log them over e.g. 100 measurements