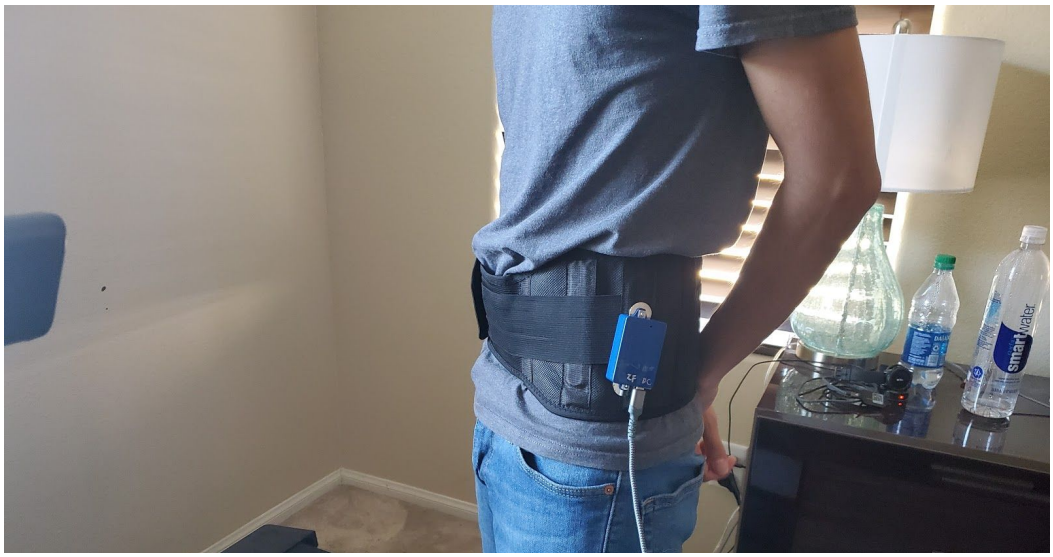
Activity Recognition SensorTile.box

Setup:
Sensor is placed near the waist with magnets.



Data Capture:
Using Algo-builder I built an algorithm that collects and graphs data from the accelerometer and gyroscope. After uploading to the board I open unicleo gui and proceed to log that data. The sample rate was 26 hz and I recorded about 30 seconds of each activity.

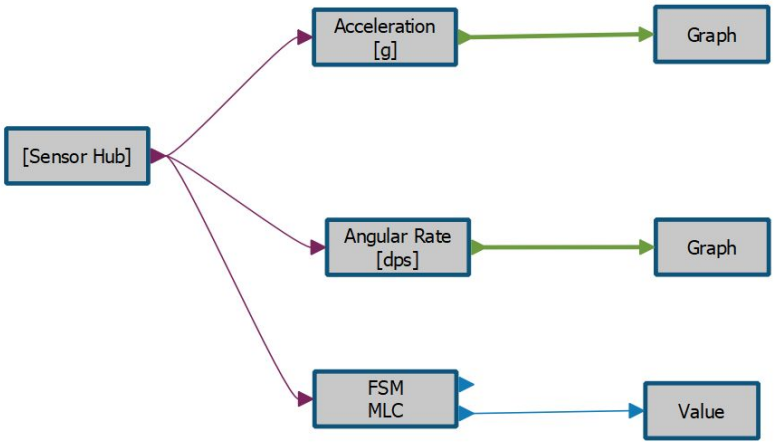
Data rate: 26 hz
Acceleration Scale: 4g
Gyroscope Scale: 500 dps

The activities were:
Walking
Jogging
Upstairs
Downstairs

The data was saved to a csv file.

Creating Decision Tree:

Using Unico-GUI I load by csv files for each activity. I set the window length to be equal to the data rate (26hz). For the features I add acceleration variance and gyroscope variance. I have not explored other features such as mean, peak to peak, zero crossing max/min. I generate the ucf file and load it into AlgoBuilder for the MLC module.



Results:

I performed each activity and recorded the results below:

```
# 0: downstairs
# 1: jogging
# 2: upstairs
# 3: walking
predictions = [0,0,0,0,0,0,0,0,0,0,  1,1,1,1,1,1,1,1,1,1,
               2,2,2,2,2,2,2,2,2,2,  3,3,3,3,3,3,3,3,3,3]
actual      = [0,0,0,0,0,0,0,0,0,0,  1,1,1,1,1,1,1,1,1,1,
               2,0,2,2,2,2,2,2,2,2,  3,3,3,3,3,2,3,3,3,3]
```

```
[5] print(confusion_matrix(actual,predictions))
    print(classification_report(actual,predictions))
```

```
[[10  0  1  0]
 [ 0 10  0  0]
 [ 0  0  9  1]
 [ 0  0  0  9]]
              precision    recall  f1-score   support

           0       1.00      0.91      0.95        11
           1       1.00      1.00      1.00        10
           2       0.90      0.90      0.90        10
           3       0.90      1.00      0.95         9

    accuracy                           0.95        40
   macro avg       0.95      0.95      0.95        40
weighted avg       0.95      0.95      0.95        40
```