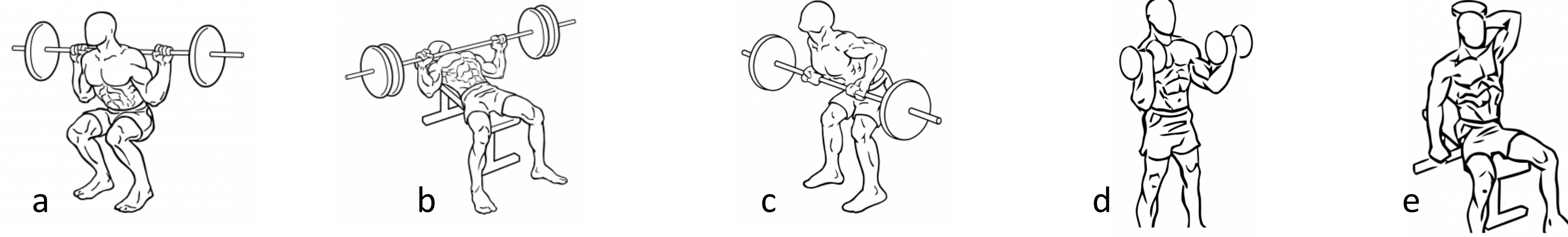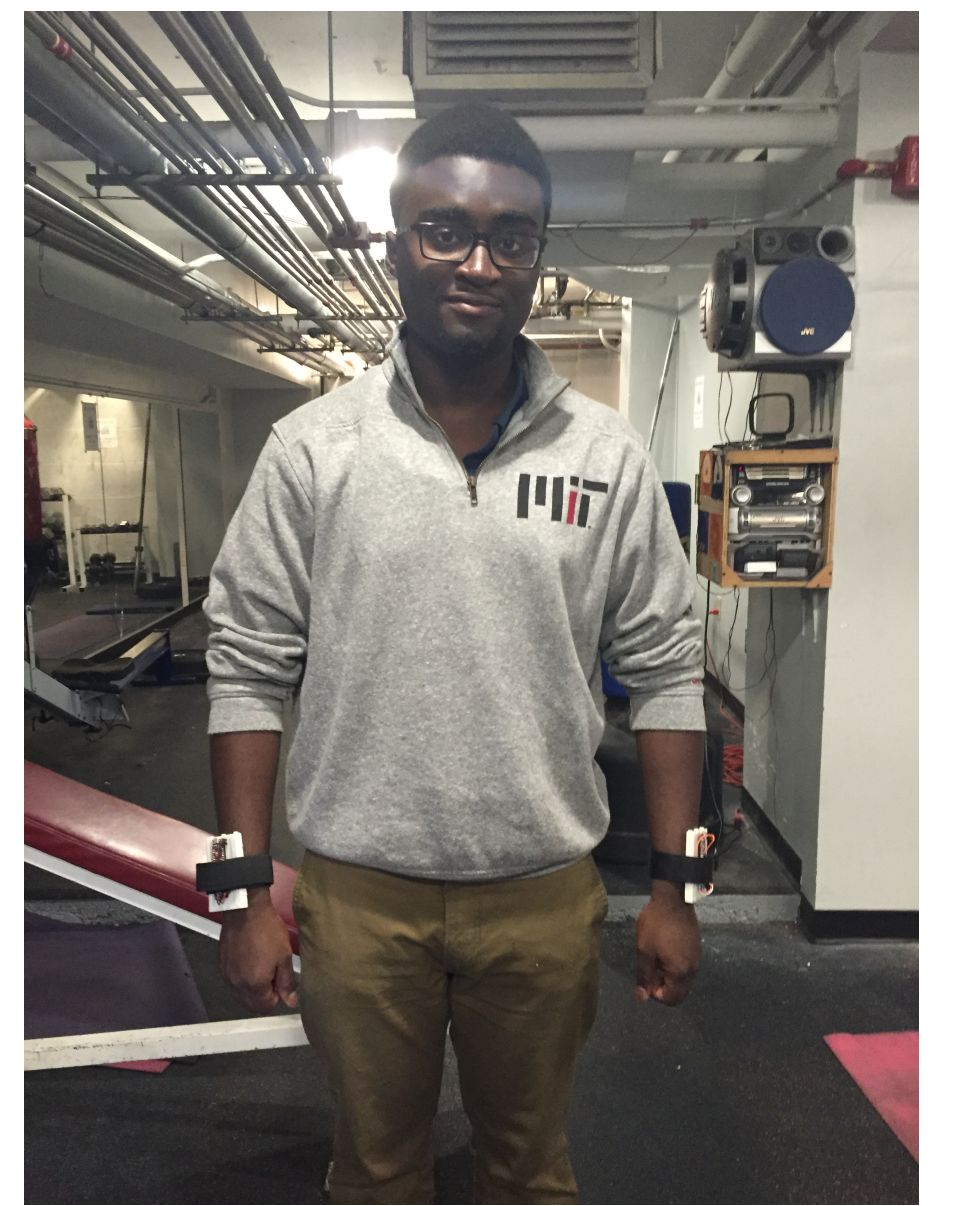# Activity Recognition for Weight Lifting

Katie Bartel
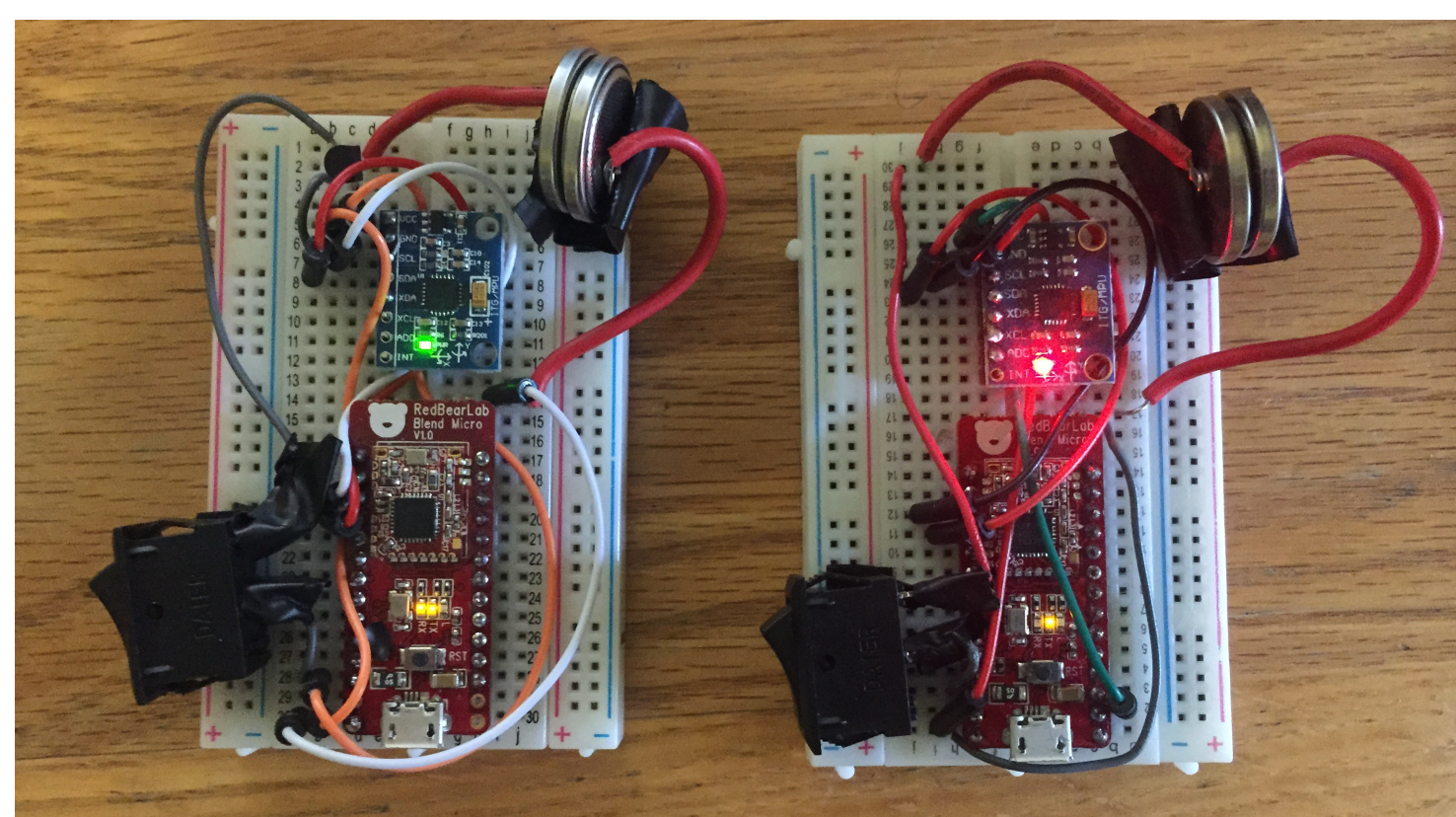
Kwame Efah

a   b   c   d   e

Determines what exercise is being performed with F1 Score 0.99, Accuracy 0.95

Counts repetitions correctly 92% of the time

Data Collection

Collected data from 11 individuals.
Each subject performed the same lifting regiment: 3 sets of 5 repetitions of each exercise: squats (a), bench press (b), rows (c), bicep curls (d), tricep extensions (e)
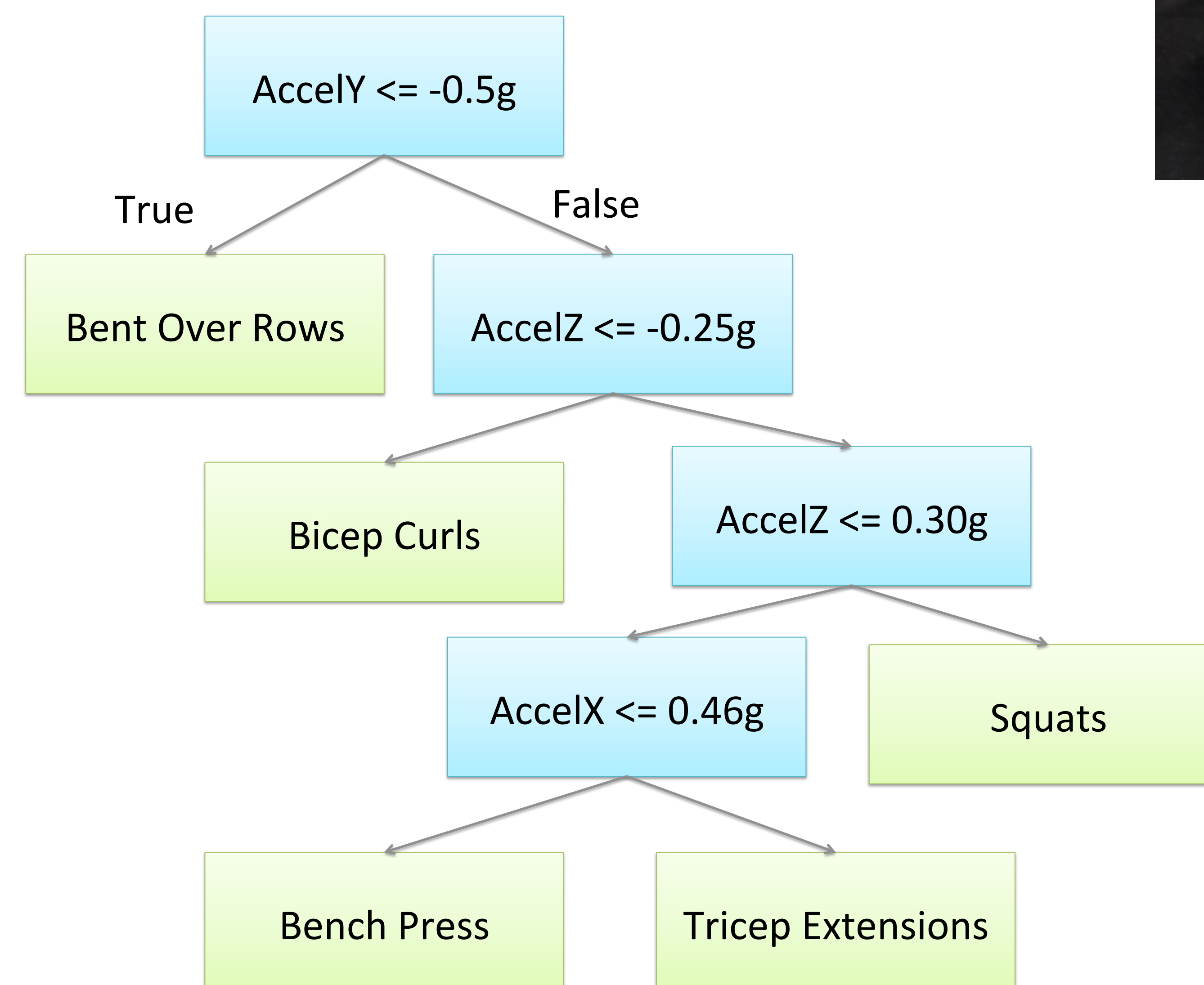

Hardware

Each wearable sensor module consists of a MPU6050 and a RedBearLab Blend Micro (with bluetooth). Powered by two 3 volt coin cell batteries. Collects data at 10 Hz. Data includes 3 axes of accelerometer and gyroscope.

iOS Software

We created an iOS app which performs the classification and repetition counting algorithms on the collected data.
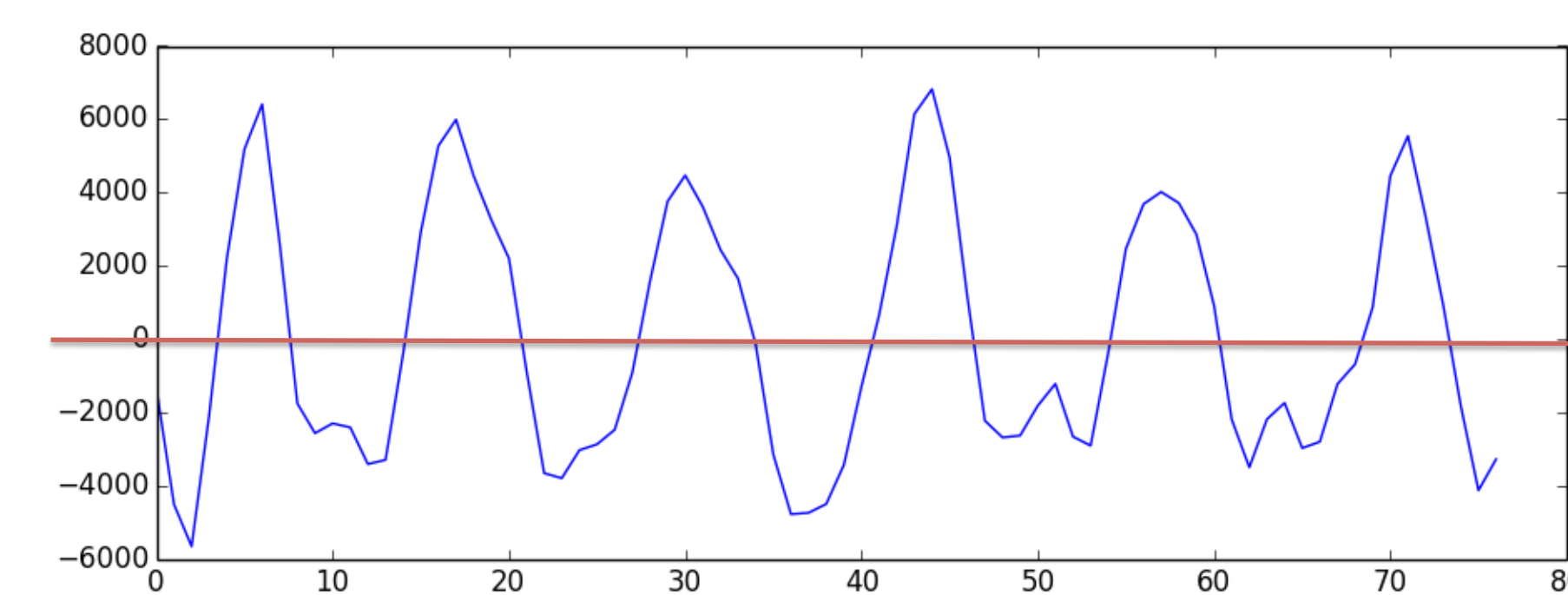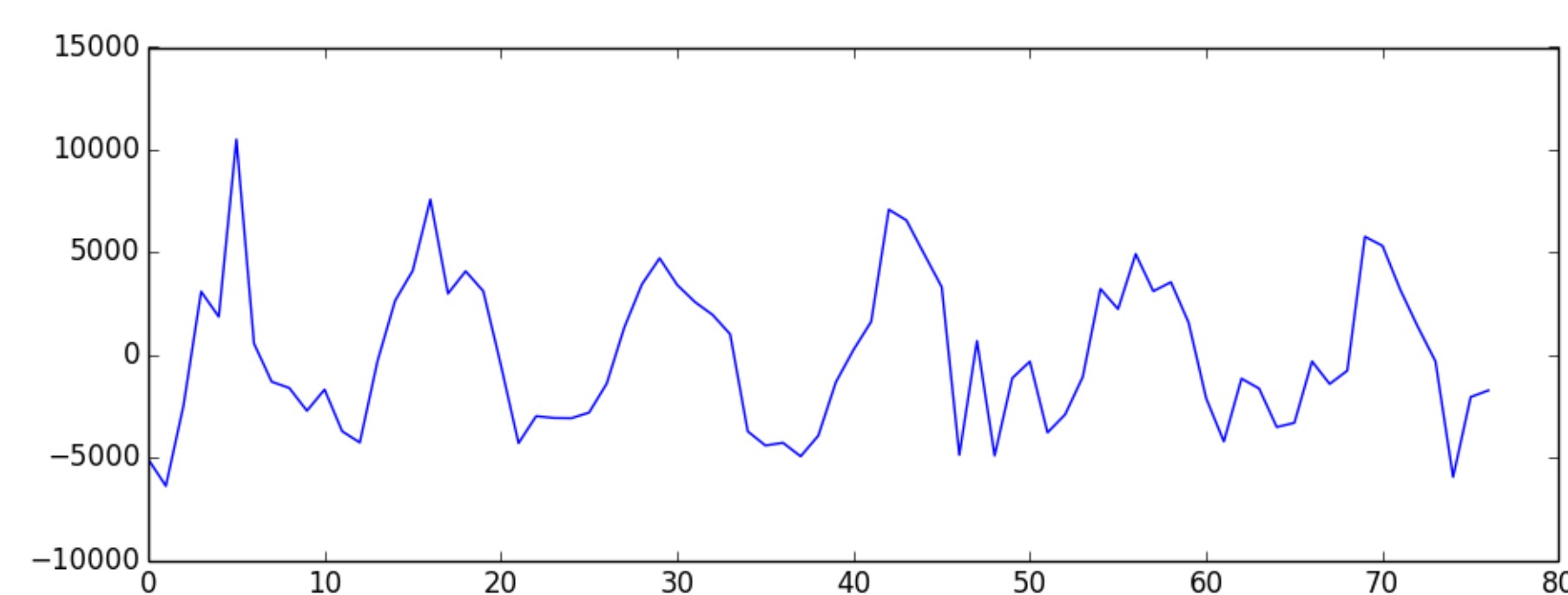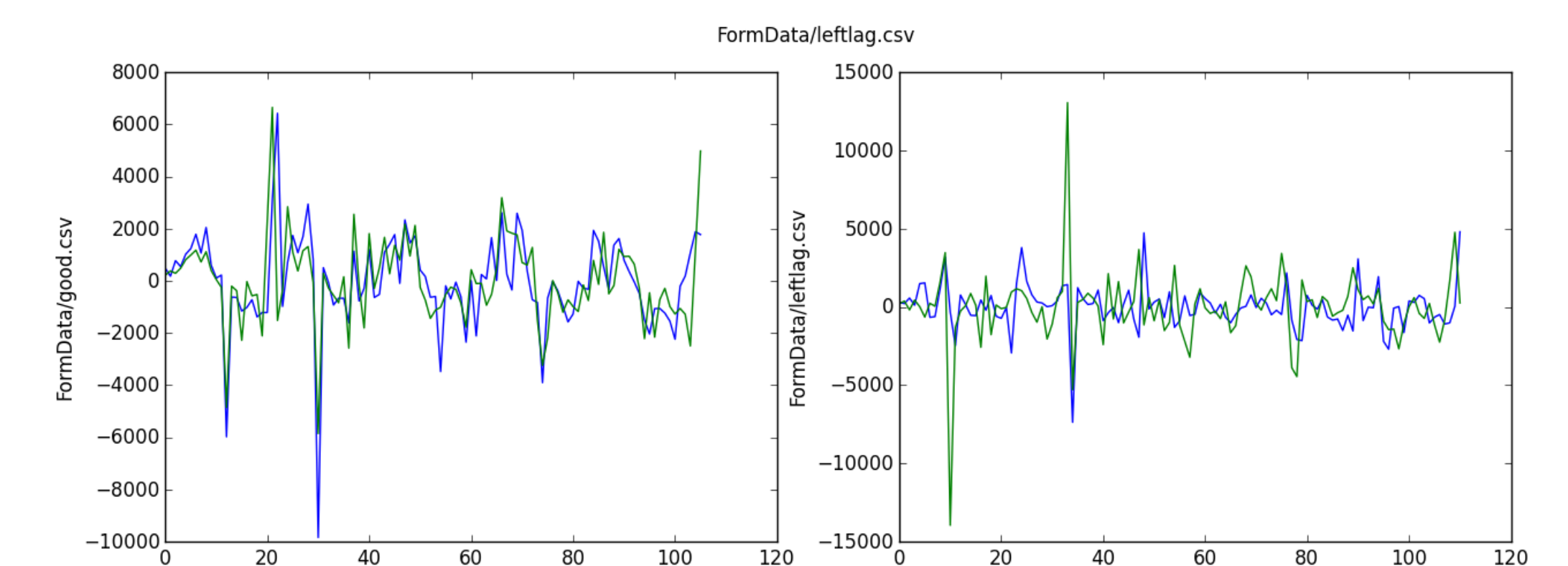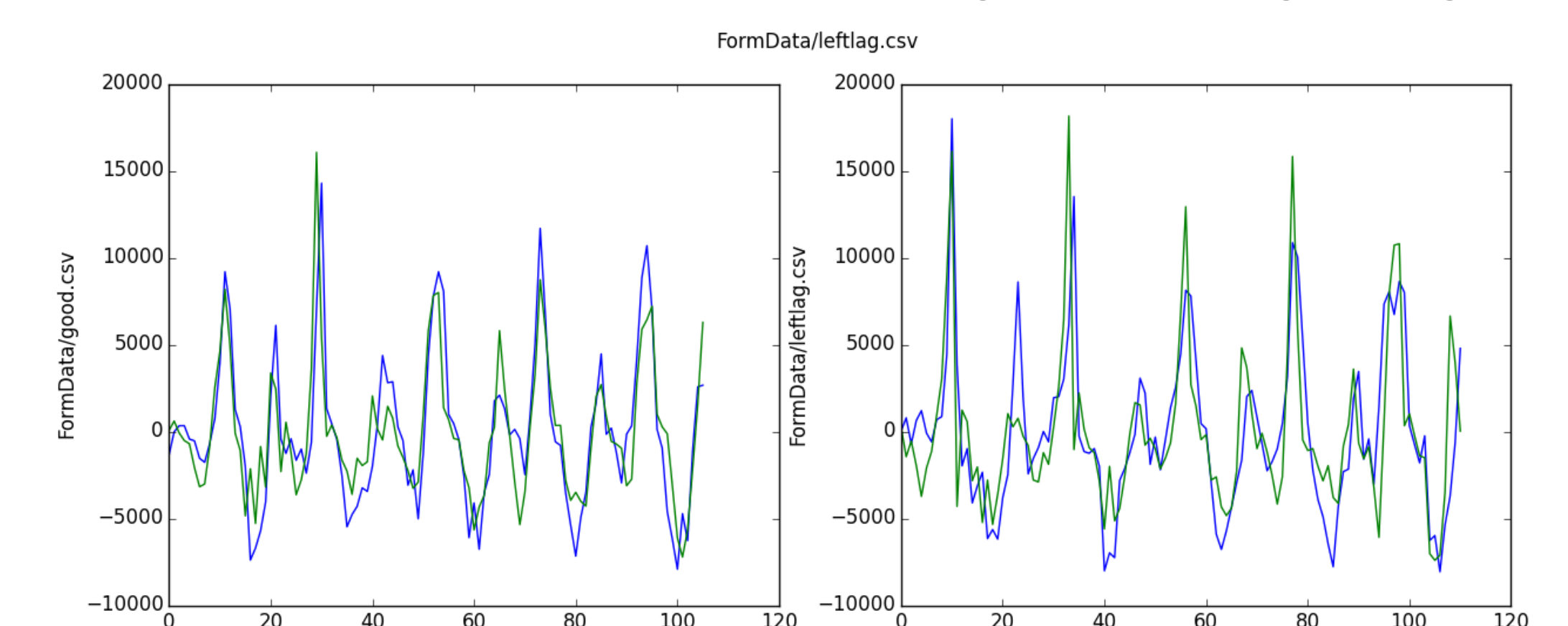

Rep Counting

Low pass filter removes noise; then count zero crossings
Fc = 3.5 Hz, Q = 0.7, Gain = 6 dB (chosen experimentally)

Activity Recognition

Trained CLF Tree uses mean values of accelerometer X, Y, Z axes to recognize activity

Form Correction: Bench Press

Accelerometer Y: Cross correlation on average 10 times higher in good form

Gyroscope Z: Larger spikes in poor form