Heart Rate Sample Discussion

**What is an ECG signal and how can it be used to measure heart rate?**

An ECG signal is generated by the heart whenever it beats. The generation of an ECG signal comes from the action potential generated by the neurons in the heart to control heart rate. The components of an ECG signal, or any action potential based signal, is the depolarization, repolarization, and refractory period. The depolarization stage increases the voltage in the heart, allowing muscles to contract which effectively causes the heart to pulse. The repolarization stage comes after, which reduces the voltage of the neuron. Once the voltage drops, the refractory period is in effect for the voltage to return back to what it was before the depolarization occurred.

**What is the “MinPeakProminance” option in Matlab used for?**

The MinPeakProminance option in the findpeaks function essentially tells the function how high the threshold is before marking something a peak. If the MinPeakProminance is really high, the amplitude of the wave must reach at least that value to be considered for finding a peak. If the value is too low, findpeaks will mark those with smaller amplitudes. Specifically for ECGs, the heart beat amplitude slightly varies every sample. This means that a full analysis of all 12 samples is needed to find what the best MinPeakProminance is for accurate heart beat detection. For the recordings, I found that a MinPeakProminance of 0.5 works best since any value higher runs the risk of not detecting some heart beats, while a lower value runs the risk of misclassifying heart beats.