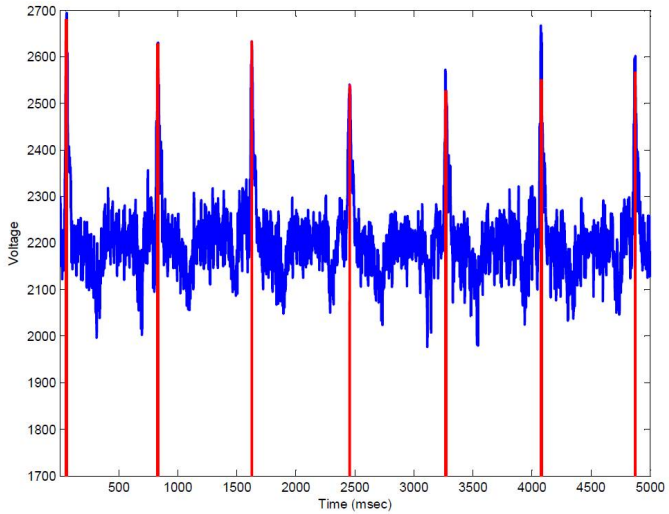
Exercise: Listen to Your Heart



- Real-time heartbeat monitoring:
  - Receiving ECG data (reads it from a file)
  - Filtering received data
  - Detecting the peak in heart waveform
  - Presentation of the data to the user:
    - Visualization of ECG data with detected heartbeats
    - Playing the sound

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- Read the filtered ECG data from a text file (filtere_ecg.txt)
- Write a function that detects the R-peak in ECG data:
  - Input arguments: signal, sampling rate (1000)
  - Output arguments: a vector containing values representing the peaks
  - Filter the data using a second-order butterworth band-pass filter with cut-off frequencies of 0.5 and 40*
  - Calculate the signal energy (signal.^2) *
  - Set the threshold used in detection algorithm
  - Perform the loop for the values of the signal energy that are over the threshold
  - Make sure that there won't be a peak in a certain amount of time
- Visualize the data along with the peaks using the functions you wrote

* Plot and compare it with the original data

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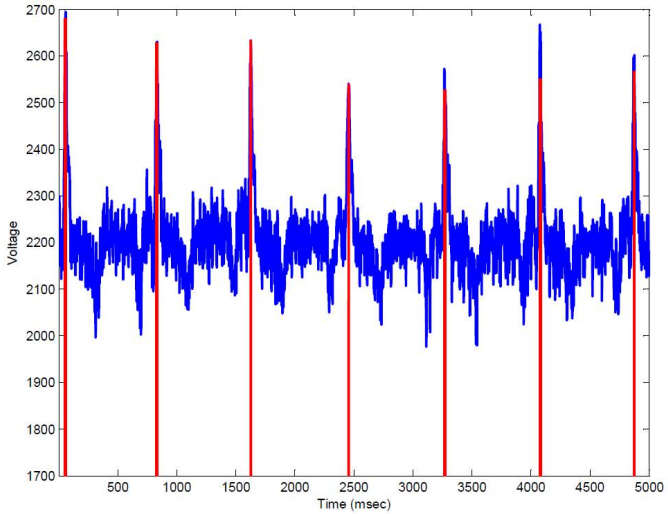

- Use the implemented function to create the real-time setup:
  - Run this function each 100 ms on a segment of data to detect the peaks of respective time-window
  - Visualize each segment of the data, with the peak
  - Play a beap if there is peak in this segment of data