Neural engineering – Exam simulation 07/06/2022

Exercise 1:

Load the `Neural Signal Processing – Signal 4` signal. Knowing that the signal has been sampled at 10 kHz:

- Detect all the spikes with a threshold-based approach
- Identify at least the spikes coming from one neuron using a template-based approach (using either existing templates, or extracting one from the signal itself)

Exercise 2:

Load the `Muscle Synergies – Reaching 1` signal. Knowing that its sampling frequency is 1 kHz:

- Extract the envelope with a cut-off frequency of 15 Hz
- Determine the number of muscle synergies underlying movement generation

The maximum time allowed for the solution of the exercises is **3 hours**. Please note that your solution has to be provided in the form of a Jupyter Notebook (.ipynb). Evaluation will be focused on the interpretation of the results and on the thorough explanation of the processing choices. Your notebook will be executed before evaluation, so all the code cells should run without errors and the logical order of its instructions should be ensured. If you use interactive plots (such as the ones built with the `plotly` package), remember that you have to explain how to interpret and correctly visualize that plot, considering that the figures are re-built from scratch at each run.