

**Project Number:** 25

**Project Title:** Developing software application for decomposing and editing high-density EMG experimental data into motor unit firing patterns

**Project Clients:** Luca Modenese / Andrea Sgarzi

**Project specializations:** Software Development;Bioinformatics/Biomedical;Computer Science and Algorithms;

**Number of groups:** 2 group

**Main contact:** Luca Modenese / Andrea Sgarzi

### **Background:**

High-density electromyography (HDEMG) is an experimental techniques used to non-invasively record the electric potential generated by contracting muscles. The experimental signals, once processed through a step of decomposition and usually some manual editing/checks, provide information about individual motor unit and their signal to the muscle.

There are currently no high-quality (and ideally open-source) software tool to process these measurements, but only MATLAB toolboxes like DEMUSE (<https://demuse.feri.um.si>) or MUEdit (<https://github.com/simonavrillon/MUEdit>). The former option is closed-source and commercial.

### **Requirements and Scope:**

The project scope consists in developing a software with equivalent functionality to DEMUSE and MUEdit for decomposing, editing and exporting the motor unit firing patterns detected from HDEMG measurements. All the required operations to implement are available on public github repository, so there will be no research development to perform, but just porting from MATLAB, connecting from existing Python modules and graphical user interface development.

### **Required Knowledge and skills:**

- The software should consist of a graphical user interface similar to MUEdit or DEMUSE (see links in background).
- the software should allow the choice between the decomposition algorithm implemented in MUEdit ([https://github.com/ciaragibbs/MUEdit\\_Python](https://github.com/ciaragibbs/MUEdit_Python)) and more recent approaches like SCD (<https://github.com/AgneGris/swarm-contrastive-decomposition>)

### **Expected outcomes/deliverables:**

Outcome of the project is a GUI from which the user can:

- \* visualise/inspect the collected experimental data
- \* decompose the HDEMG in motor unit spike trains choosing the algorithm between those currently available in public repositories
- \* manually edit the spike trains if required
- \* saving the results of the processing in a format convenient for further analysis in Python