# Decomposition of surface EMG signals from cyclic dynamic contractions

*File name = Decomposition of surface EMG signals from cyclic dynamic contractions*

Decomposition of EMG into MUAPS

* <https://pubmed.ncbi.nlm.nih.gov/15298438/>

MUAPTs = motor unit action potential trains

* <http://www.bu.edu/nmrc/files/2010/04/002.pdf>
* <https://www.youtube.com/watch?v=vXb0ZvkFkS8&ab_channel=khanacademymedicine>

Issue with sEMG decomposition:

* During the contraction of the muscle, the shape and the amplitude of the MUAPs changes (the space between the electrode changes) which has influence on the measure

Not finished

# Detecting the unique representation of motor-unit action potentials in the surface electromyogram

*File name = farina2008.pdf*

Need multi-channel system to identify action potential using surface EMG because of the low-pass filtering induced by the tissues interposed between the fibers and the electrode

Needs to identify single motor unit from sEMG

Uses a grid of 11x11 emg sensor

* 1 Laplacian channel is composed of 5 electrodes (one and its 4 neighbours)
* Channels can be grouped

Test the capacity of selected recording configurations to discriminate the action potentials of single motor units in sEMG recordings

* Relation between # of motor unit identified and # of channels (more channel = more action unit identified)
* Low pass filtering of tissues (skin…) makes the signal almost indistiguishable for sEMG under som conditions (this study aims to find these conditions)

Result : need larger sEMG grid

# The effective neural drive to muscles is the common synaptic input to motor neurons

*File name = farina2014*

Analyse the transformation of common oscillatory input signals to the pool of motor neurons innervating a muscle, with the aim of explaining the relation between common oscillatory components sent to motor neurons and the motor neuron output

PIF neuron model

Hypotheses that the synaptic input to motor neurons in not distorded in the low-frequency band width.

* Hypothese proved by the study

Mathematical representation of the input of motor neurons

The common input to motor neurons is mirrored in the low-pass bandwidth of the cummed motor neuron outputs, up to frquencies corresponding to the motor neuron sidcharge rates and for a sufficient number of motor neurons

# Man/machine interface based on the discharge timing of spinal neurons after targeted muscle reinnervation

*File name = farina2017*

TMR = targeted muscle reinnervation

* When someone has a missing limb, deinnerve a remaining muscle and reinnerve it with neurons that used to control the missing muscles. Then, use EMG on the reinnervated muscle to control a prosthesis
* Why not use ENG ?

Decoded motor-neuron discharge timing

* Method for EMG classification
* Almost perfect result (97% classification accuracy), where the classic approach gets 70%