

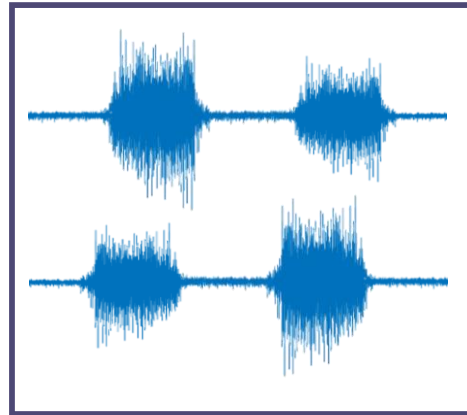
The background image shows a sunny day on a green lawn at Aalborg University. In the foreground, a young man in a dark blue t-shirt and shorts is walking towards the right. To his left, a group of students is sitting on the grass, some talking and some looking at their phones. Further back, more students are scattered across the field. In the background, a modern black building with large windows and the letters 'AAU' is visible under a clear blue sky. A young tree stands on the left side of the frame.

# Muscle patterns in High-Density EMG recorded during grasping in different arm positions

Luis Pelaez Murciego, Stine Bjerringgaard Rasmussen  
Erika Spaich, Strahinja Dosen



# Myocontrol: Pattern Recognition



Algorithm

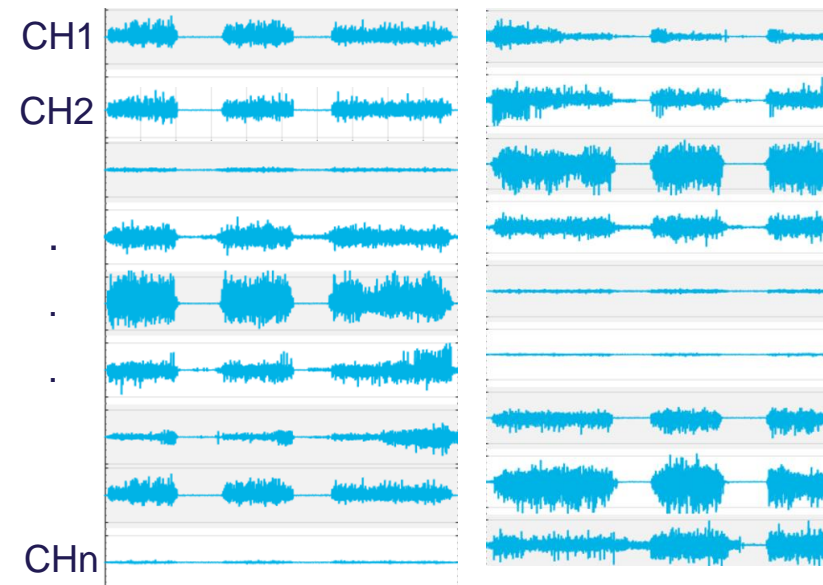


Hand Open



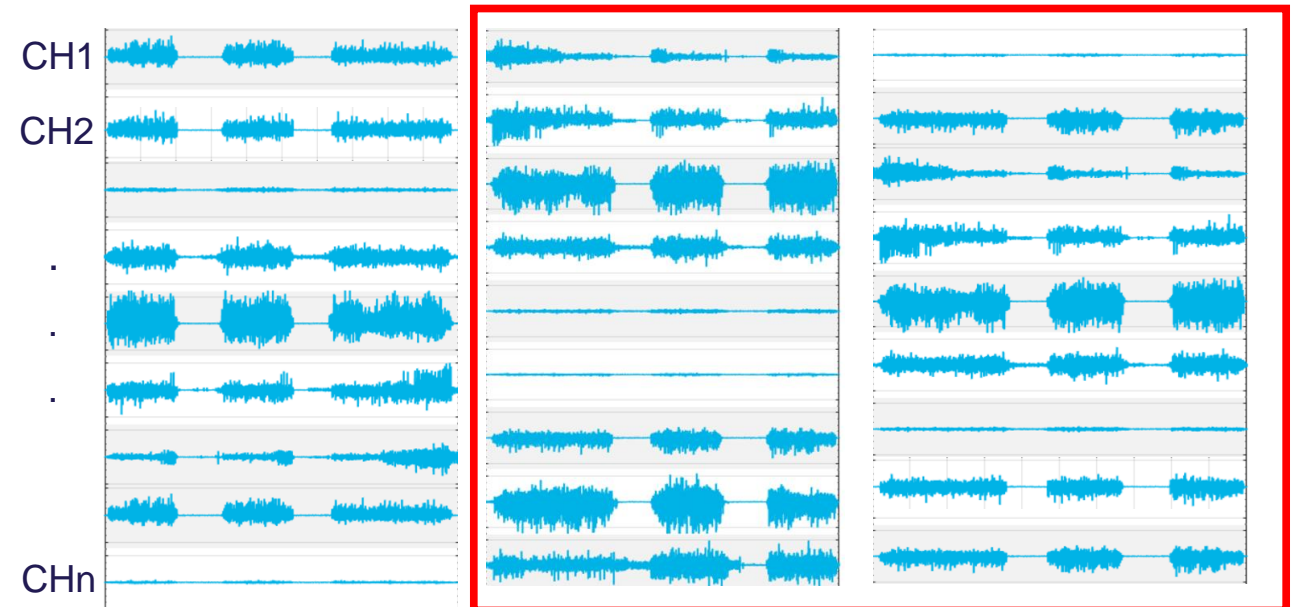
# Myocontrol: Pattern Recognition

- ▶ 8-16 channels
- ▶ To work properly, each gesture **MUST** generate an unique EMG pattern.



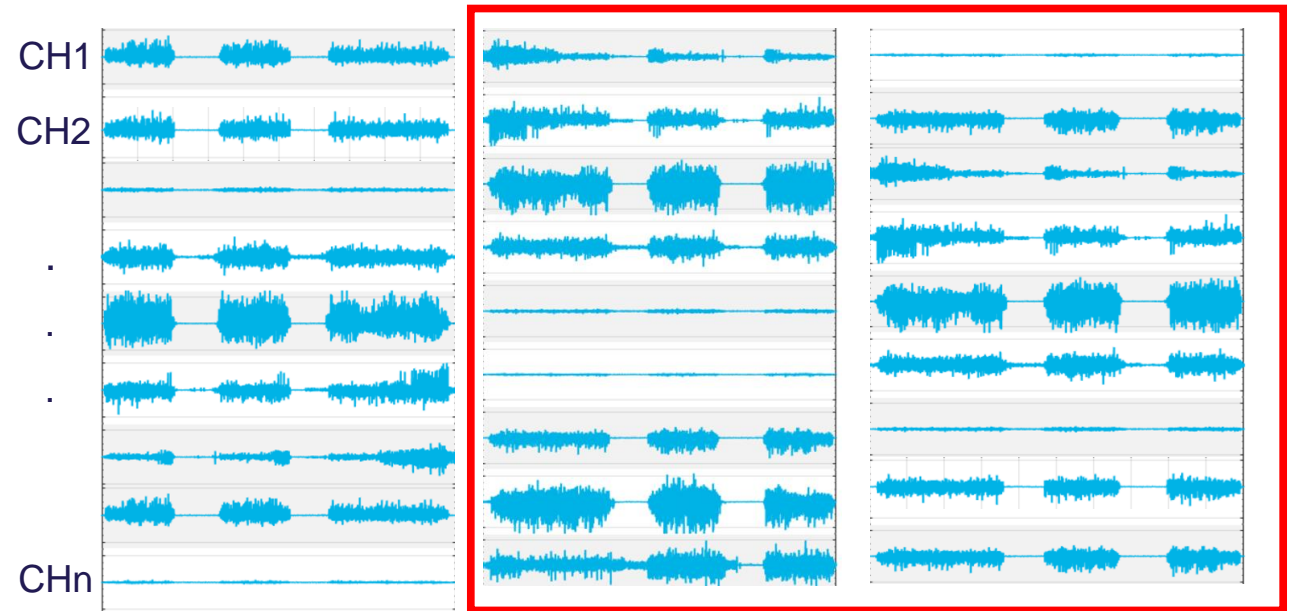
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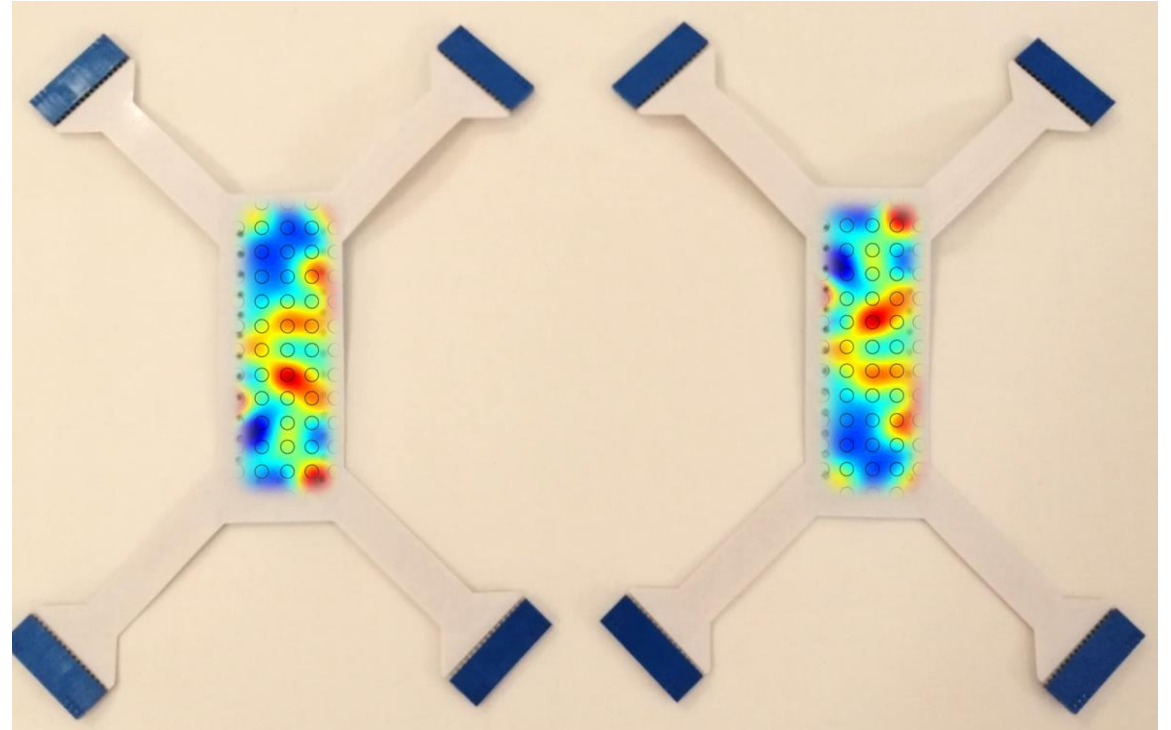
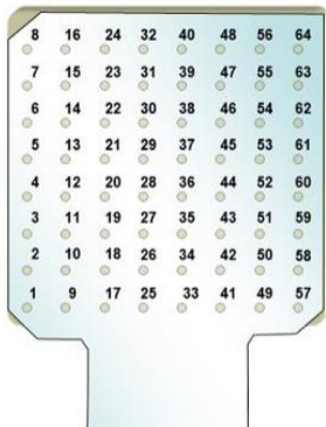
# Myocontrol: Pattern Recognition

- ▶ 8-16 channels.
- ▶ To work properly, each gesture MUST generate an unique EMG pattern.
- ▶ We need more data → HD-EMG.



# High-Density EMG

- ▶ Up to hundreds of channels
- ▶ Generates *High-Definition* maps of muscle activity
- ▶ Allows to study the changes in muscle patterns



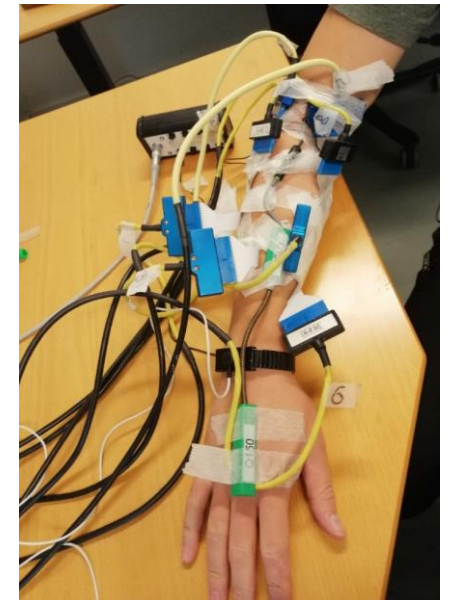
# Purpose of the study

- ▶ Investigate how muscle patterns change in different arm positions.



# Experimental Setup

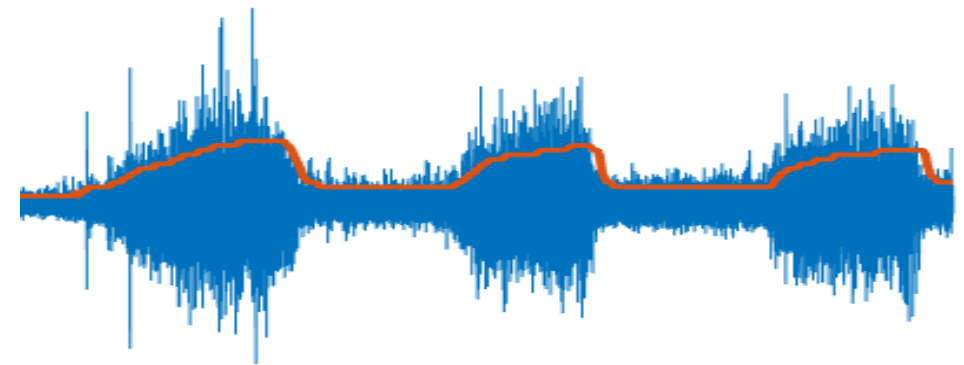
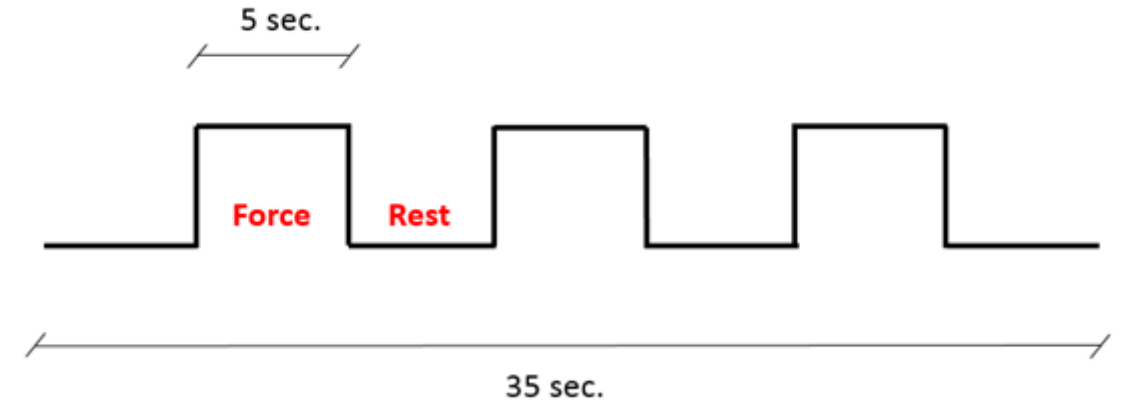
- ▶ 2 x 64 channels. EMG-USB amplifier (*OT Bioelettronica*)
- ▶ Torsiometer to measure wrist rotation
- ▶ Goniometer to measure elbow angle.





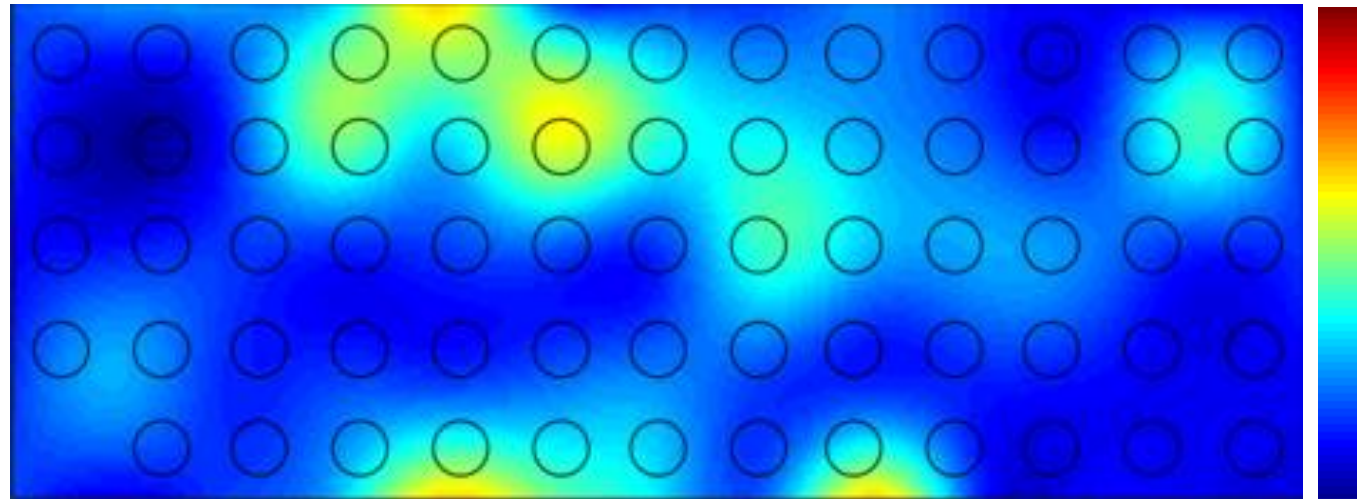
# Experimental Protocol

- ▶ 4 Gestures: Full Pronation and Full Supination.
- ▶ Constant and comfortable force.
- ▶ RMS envelope: 150ms windowing - no overlap.



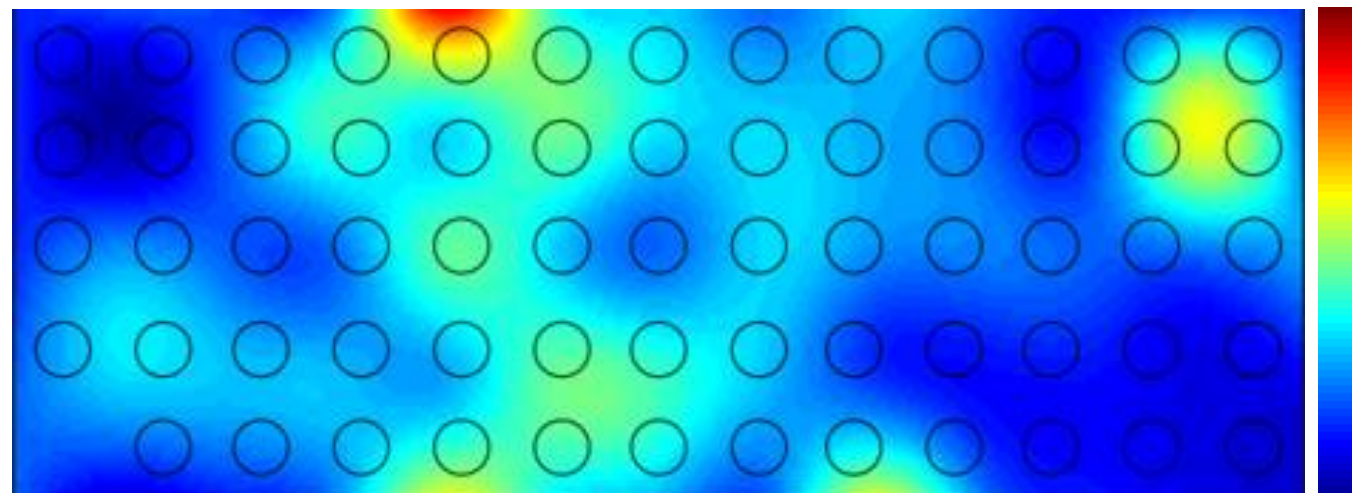


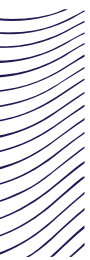
# Preliminary results: Full Supination





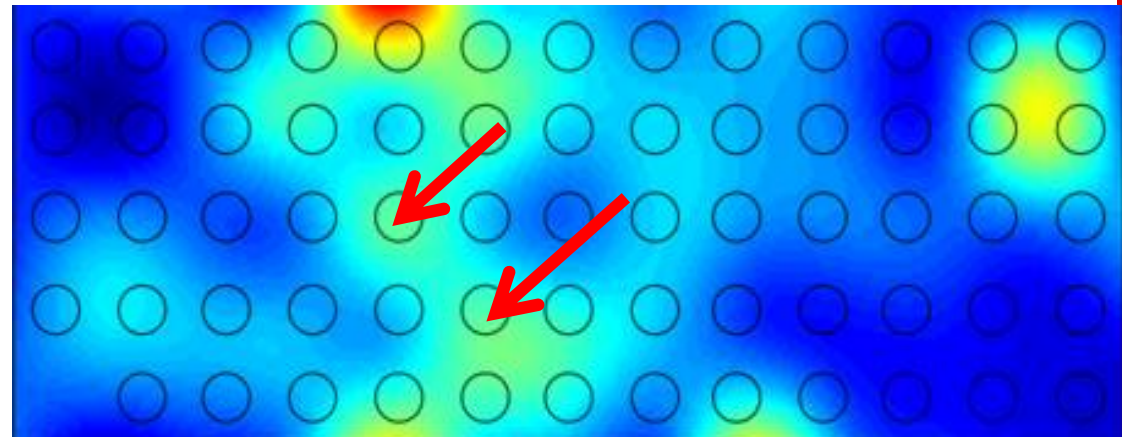
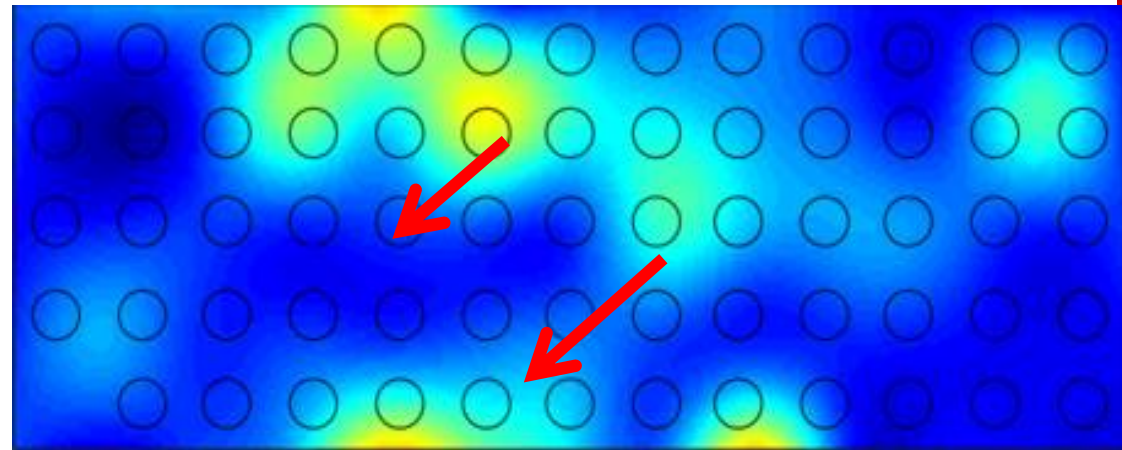
# Preliminary results: Full Pronation





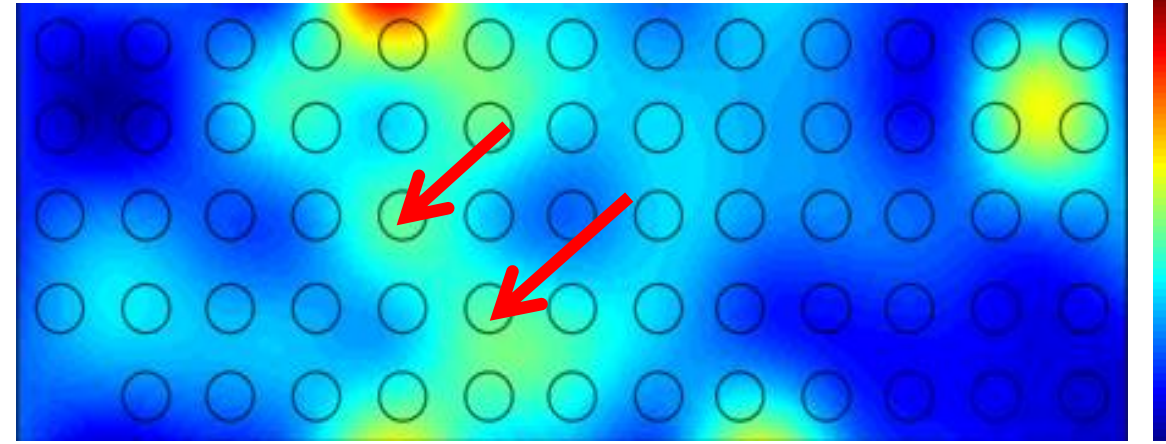
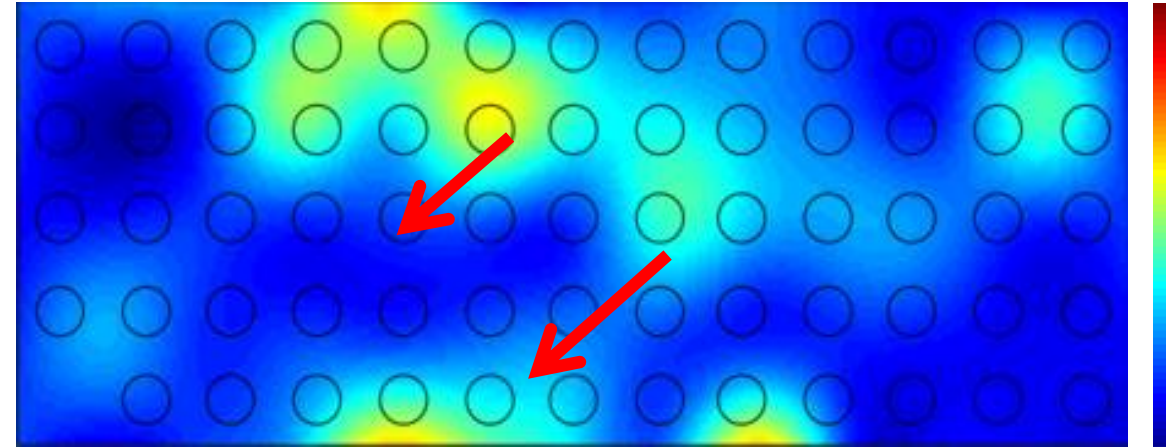
# Spatial displacement

- ▶ Displacement of activity *hotspots* due to the muscles twisting around the forearm.



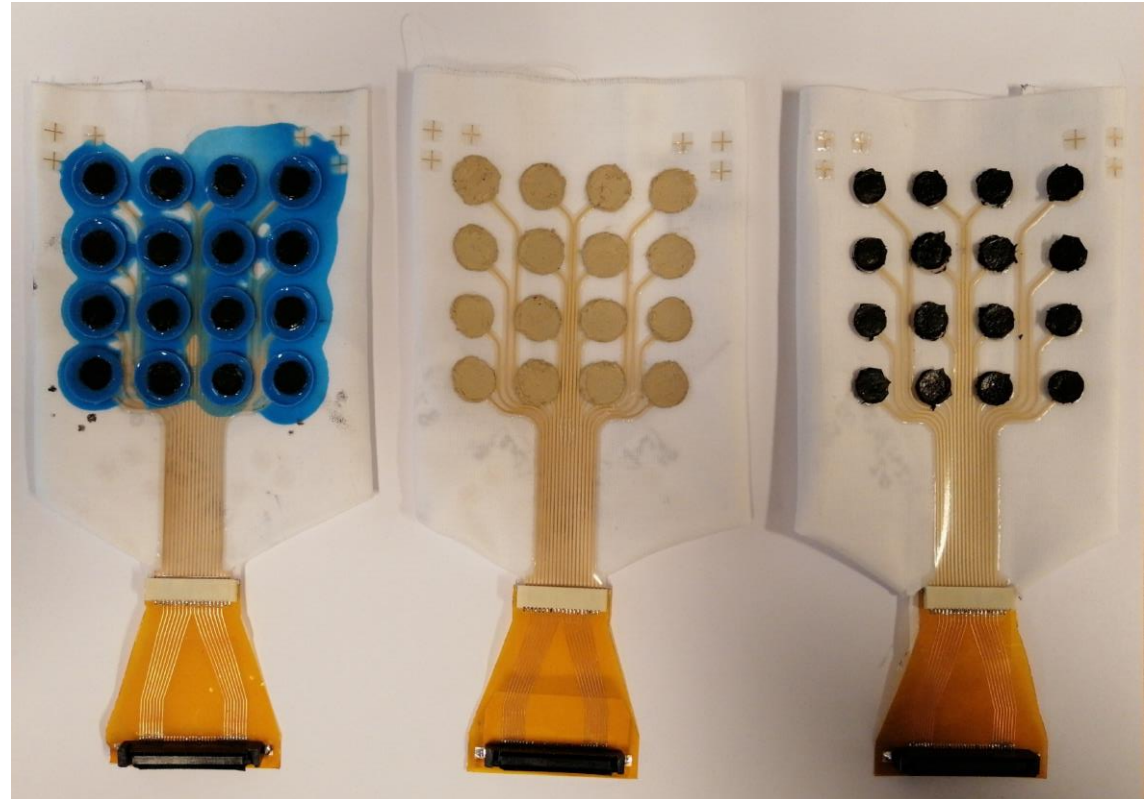
# Spatial displacement

- ▶ Displacement of activity *hotspots* due to the muscles twisting around the forearm.
- ▶ Investigate displacement of *hotspots*
- ▶ Improve EMG driven control of FES in stroke subjects



# WEARPLEX

- ▶ Textile electrodes
- ▶ Integrated electronics
- ▶ Smart electrode configuration
- ▶ Quick setup
- ▶ Visit our stand at the post-conference workshop



**THANK YOU**

