
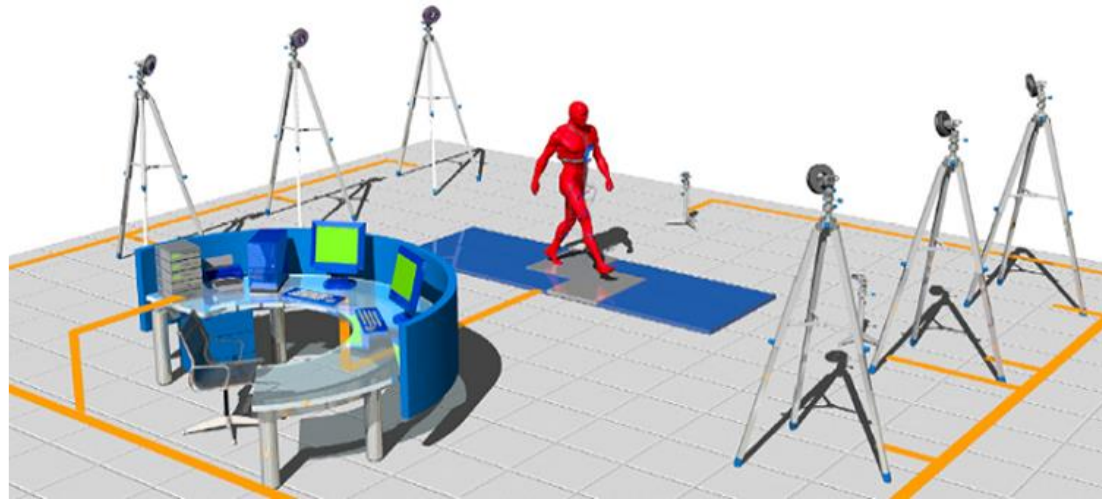


# Obiettivo del Laboratorio di Ergonomia e Fisiologia (LEF): Classificazione automatica delle attività di movimentazione manuale dei carichi

Revised NIOSH Lifting Equation (RNLE)

$$RWL = LC \times HM \times VM \times DM \times AM \times FM \times CM$$

$$LI = \frac{L}{RWL}$$




## Sollevamento simmetrico a basso rischio (LI=1)



## Sollevamento asimmetrico a basso rischio (LI=1)



## Sollevamento simmetrico a medio rischio (LI=2)



## Sollevamento asimmetrico a basso rischio (LI=2)



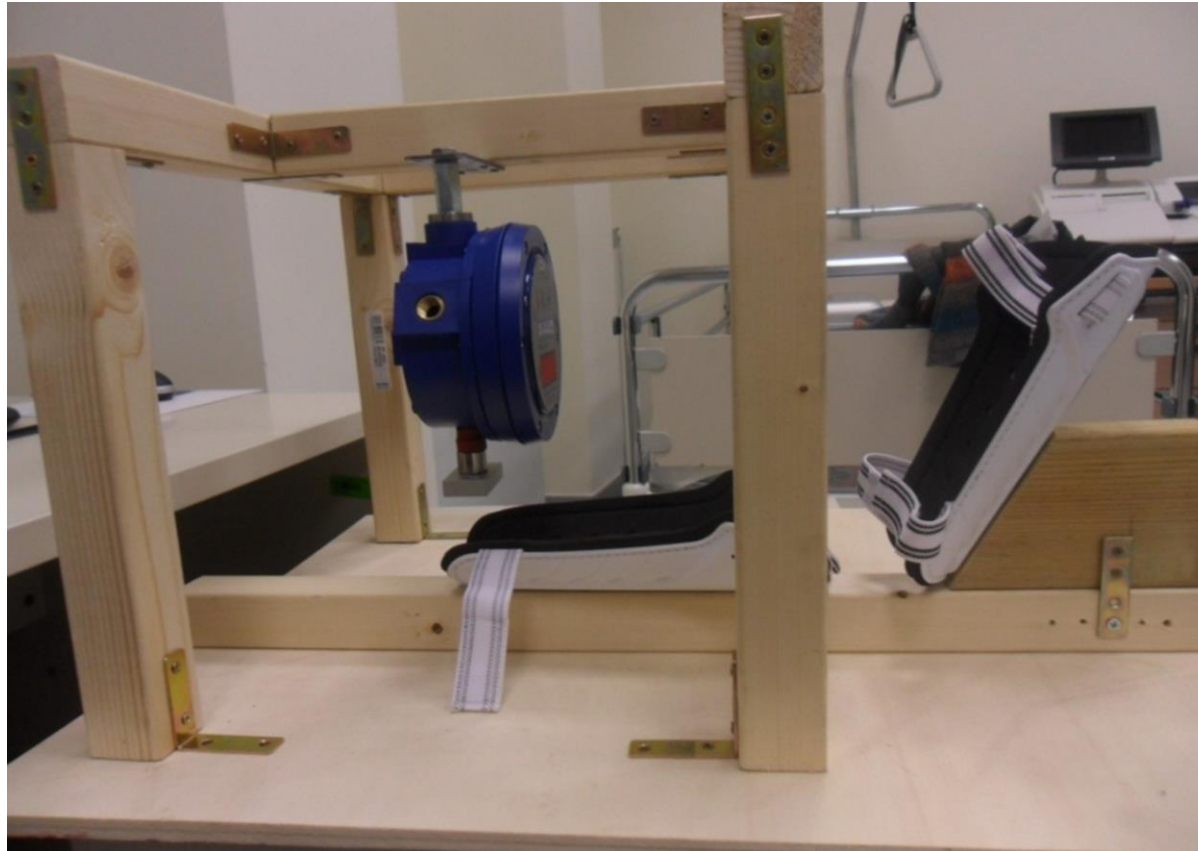
## Sollevamento simmetrico ad alto rischio (LI=3)



## Sollevamento asimmetrico ad alto rischio (LI=3)

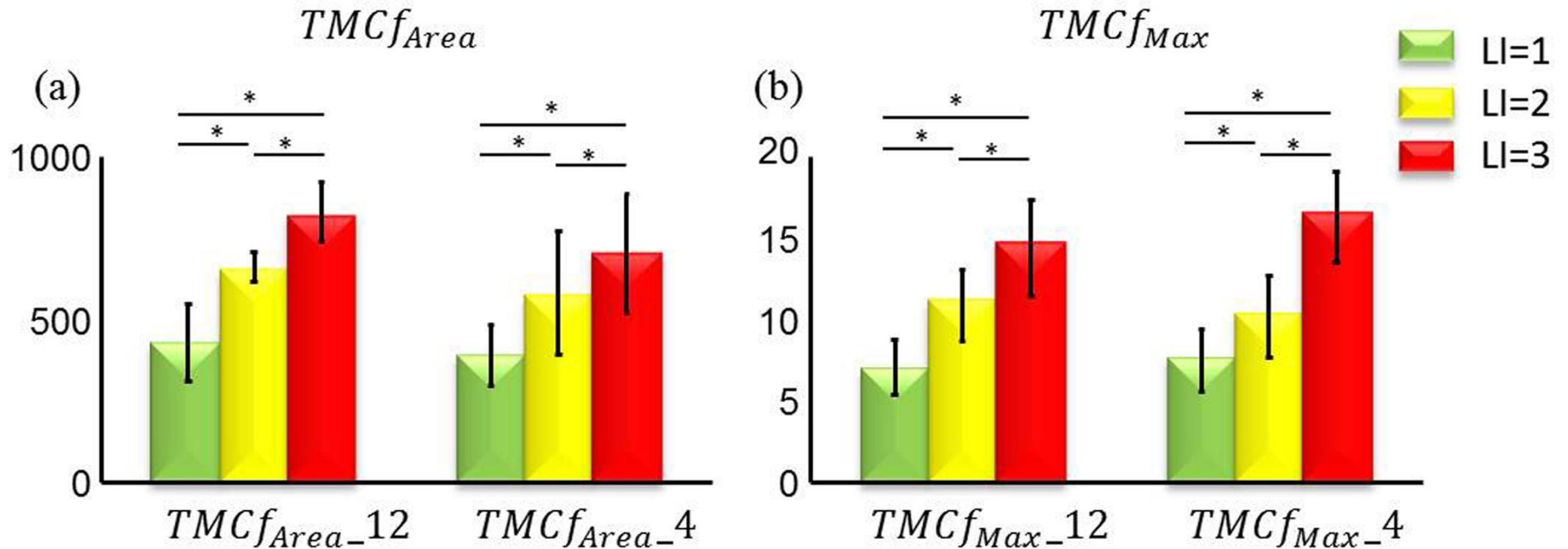


# Stima della manifestazione mioelettrica della fatica muscolare

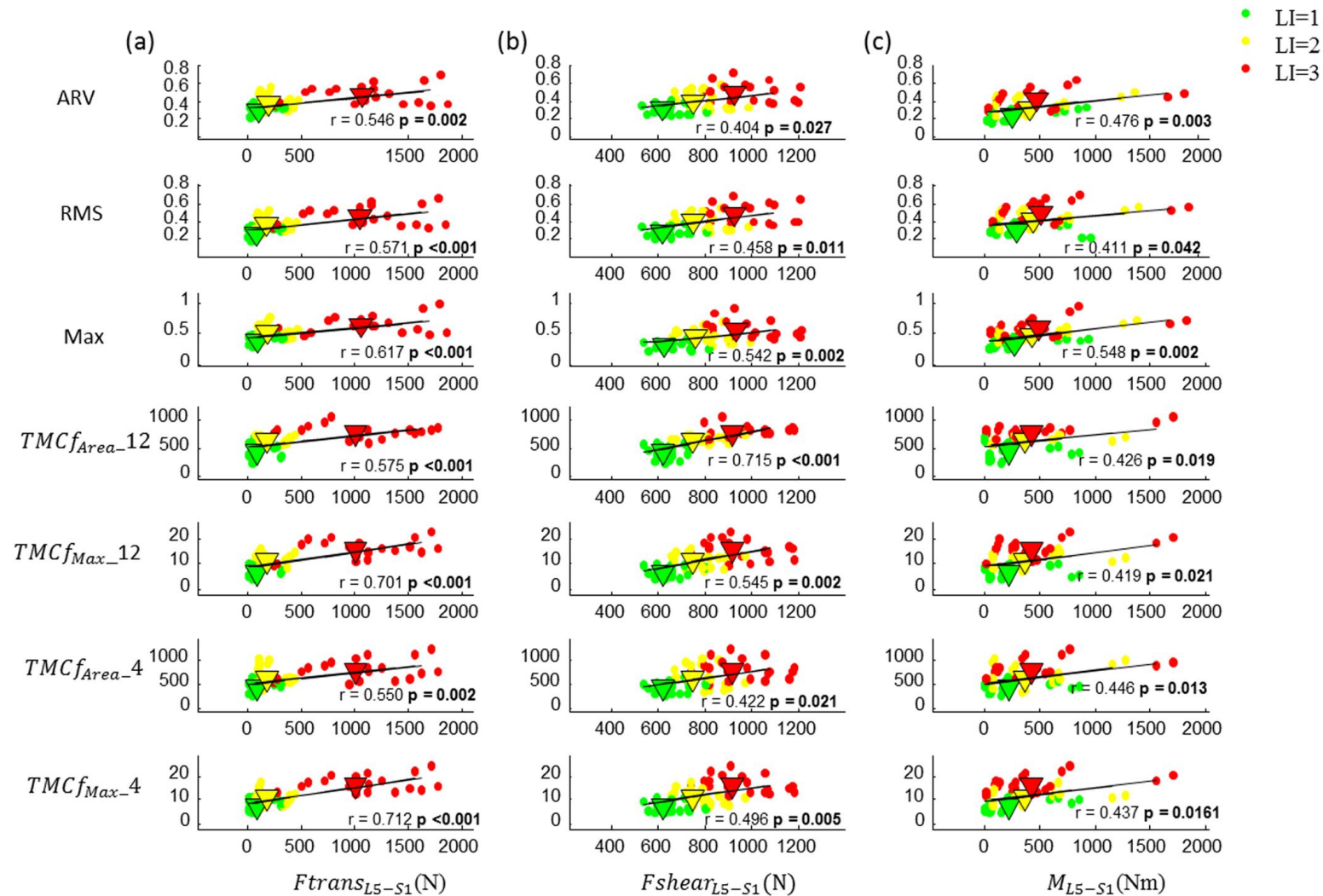




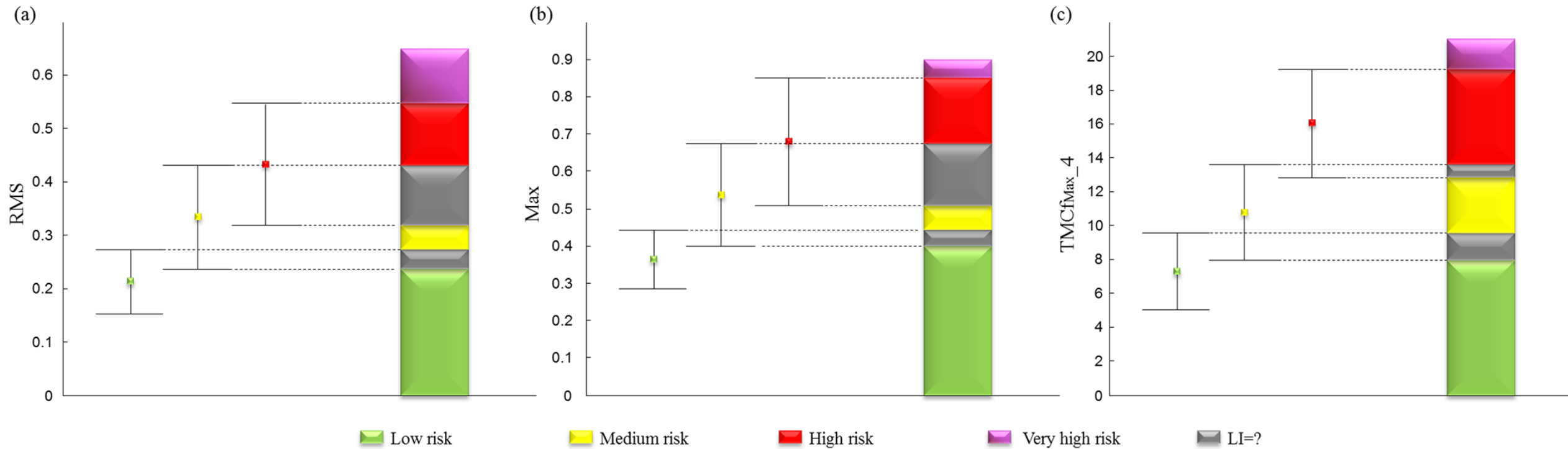
# Le variabili cinematiche, cinetiche ed elettromiografiche discriminano il rischio nelle attività di sollevamento carichi



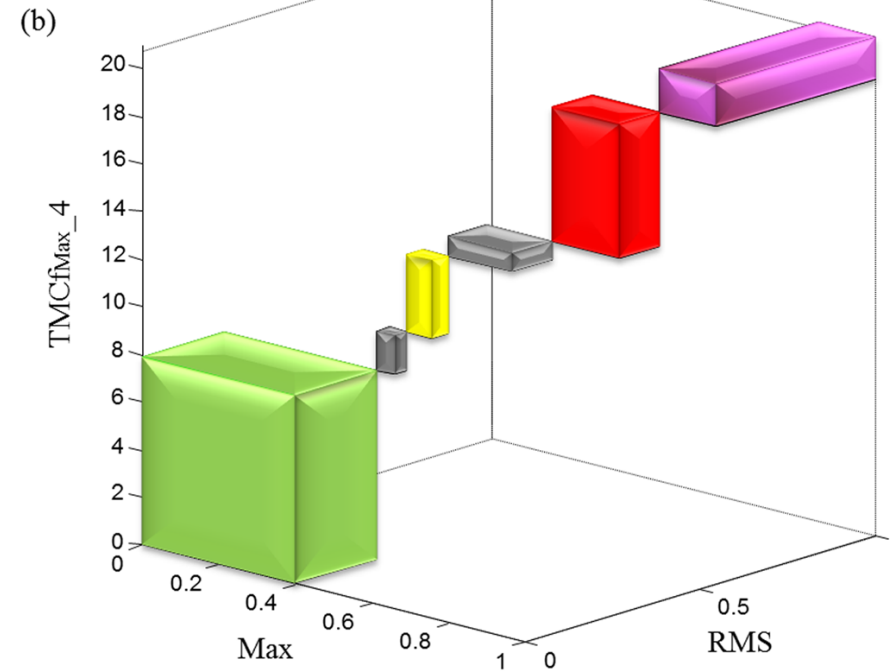
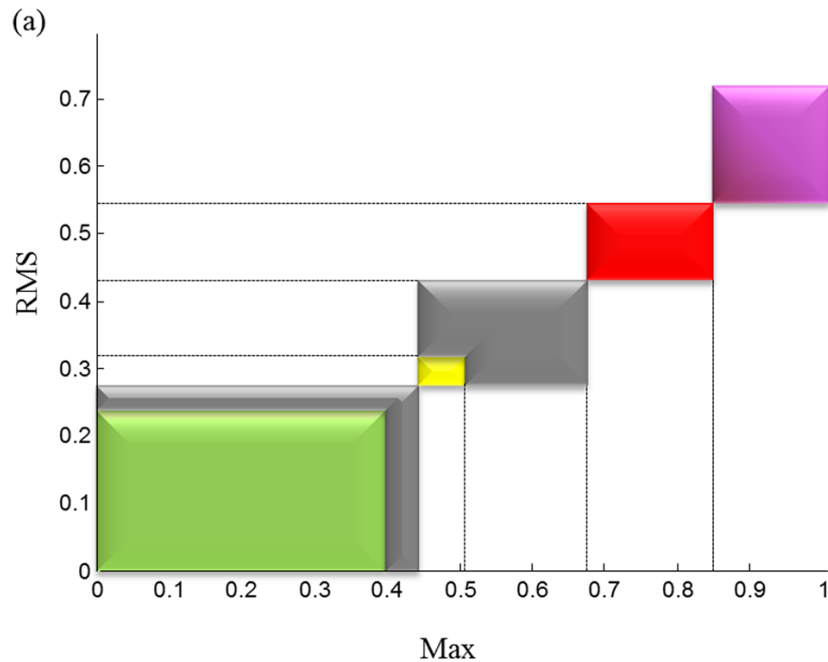
# Le variabili cinematiche, cinetiche ed elettromiografiche correlano con le variabili che generano il danno su L5-S1



# Le variabili cinematiche, cinetiche ed elettromiografiche permettono la definizione di classi di rischio



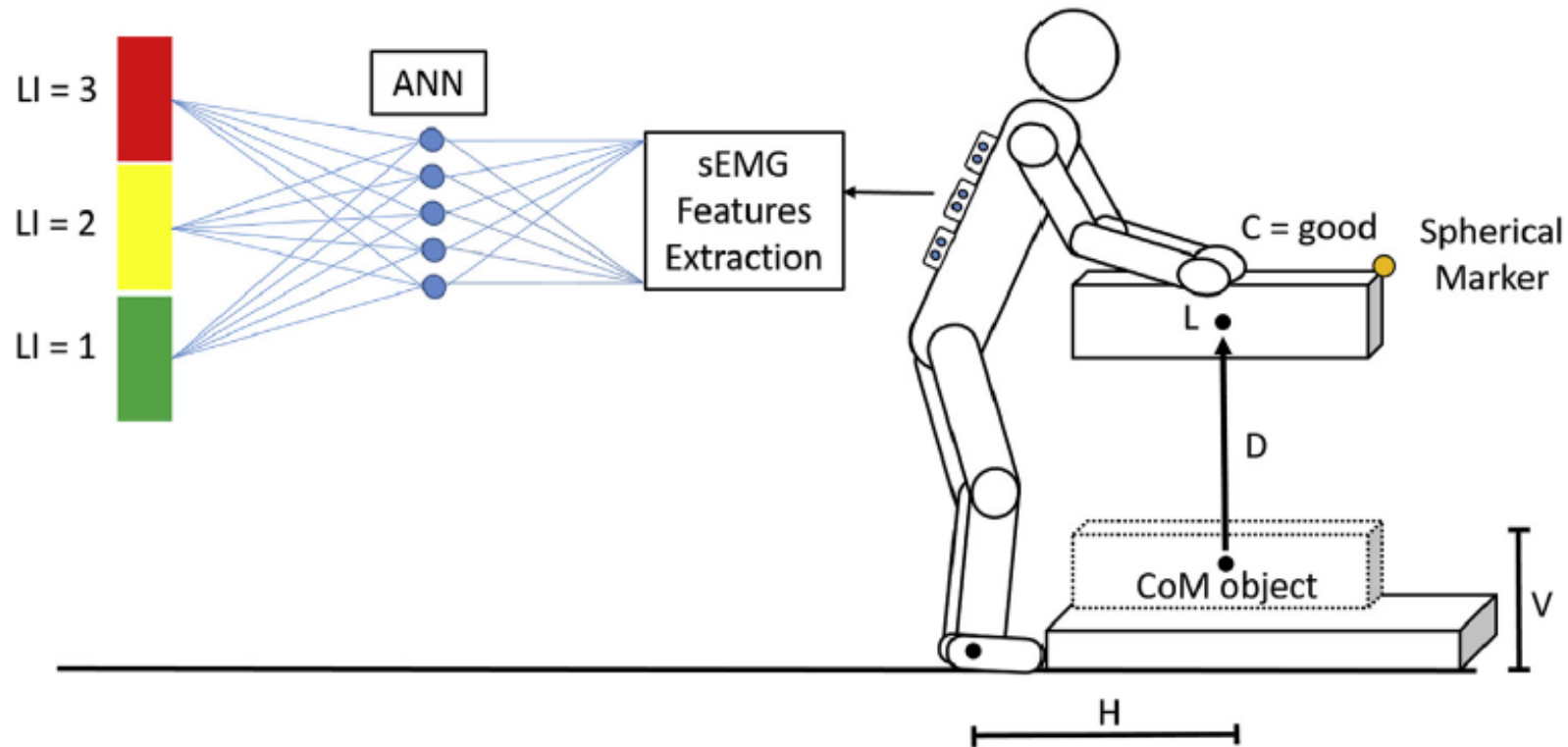
# Le variabili cinematiche, cinetiche ed elettromiografiche permettono la definizione di classi di rischio



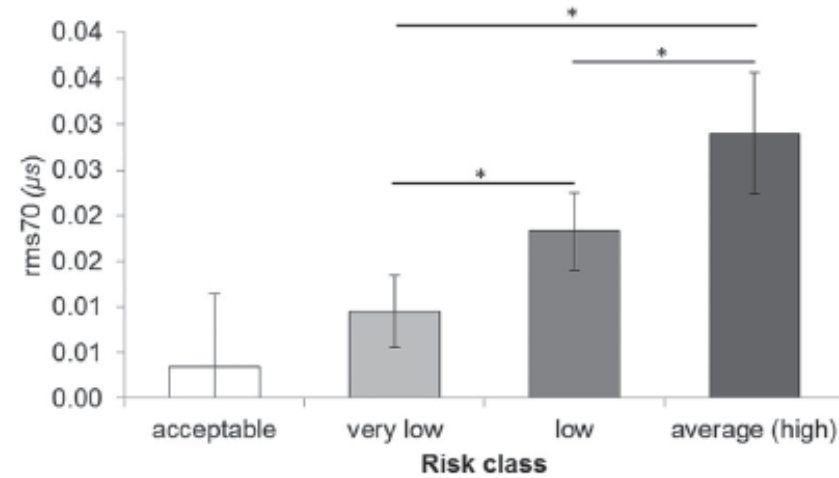
Low risk      Medium risk      High risk      Very high risk      LI=?

# Le variabili cinematiche, cinetiche ed elettromiografiche permettono la classificazione automatica del rischio

*T. Varrecchia et al. / International Journal of Industrial Ergonomics 66 (2018) 1–9*



# Indici di fatica muscolare per la classificazione automatica del rischio nei movimenti ripetuti dell'arto superiore



Record: TEST 8-2 | Subject: v, t •

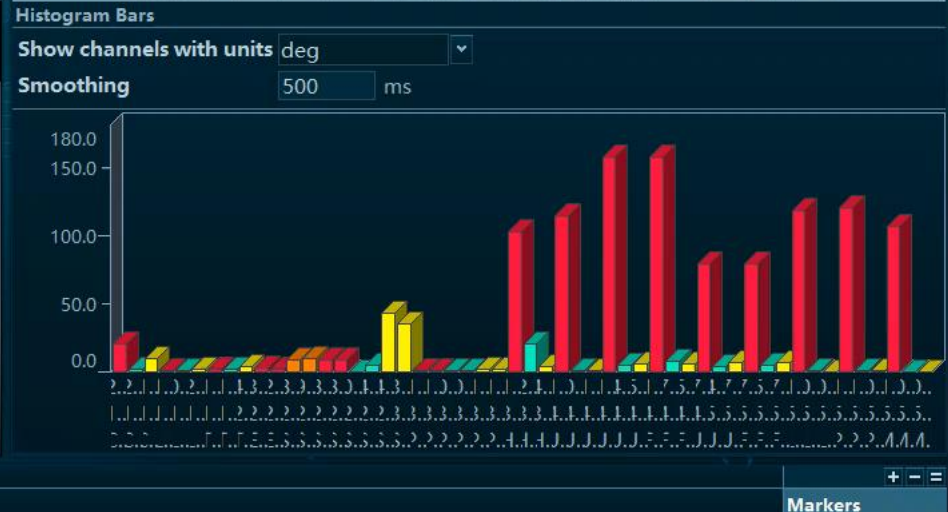
All	Anatomic angles	Orientation angles	Acceleration	Noraxon Ultium 2	
■ Elbow Flexion... 2.7	deg	■ Elbow Flexion... 1.8	deg	■ Shoulder Tot... 8.1	deg
■ Shoulder Tot... 9.8	deg	■ Shoulder Flex... 8.1	deg	■ Shoulder Flex... 8.7	deg
■ Shoulder Abd... -0.8	deg	■ Shoulder Abd... 4.7	deg	■ Shoulder Rot... -42.1	deg
■ Shoulder Rot... -35.3	deg	■ Pelvic Tilt LT -0.9	deg	■ Pelvic Tilt RT -0.9	deg
■ Pelvic Obliqui... -0.8	deg	■ Pelvic Obliqui... 0.8	deg	■ Pelvic Rotatio... -1.7	deg
■ Pelvic Rotatio... 1.7	deg	■ Lumbar Flexi... 0.1	deg	■ Lumbar Later... 0.8	deg
■ Lumbar Axial ... -2.0	deg	■ Thoracic Flexi... 1.3	deg	■ Thoracic Late... 1.5	deg
■ Thoracic Axia... -4.1	deg	■ Cervical Flexi... 20.6	deg	■ Cervical Later... 2.6	deg
■ Cervical Axial... -9.9	deg	■ Noraxon My... 0.0	On	■ Noraxon My... 0.0	On
■ 114... -0.5	deg	■ 157... 5.2	deg	■ 157... 7.9	deg
■ 79.2	deg	■ 78.9	deg	■ 118... 0.8	deg
■ 120... 0.9	deg	■ 103... -20...	deg	■ 106... 0.0	deg
■ 12	mG	■ 20	mG	■ 1	mG
■ -29	mG	■ -47	mG	■ -14	mG
■ -27	mG	■ 19	mG	■ 7	mG
■ Noraxon Ulti... -644	uV	■ Noraxon Ulti... -375	uV	■ Noraxon Ulti... -80	uV
■ Noraxon Ulti... 313	uV	■ Noraxon Ulti... 0.0	On	■ Noraxon Ulti... -1868	uV
■ Noraxon Ulti... 206	uV	■ Noraxon Ulti... -367	uV		

### Video/Animation

Noraxon MyoMotion Tools



Tools: [Icons for zoom, pan, rotate, and other navigation functions]



Play Mode Marker Menu

Signal Processing Edit Menu

Quick Analysis

### Signal Bars

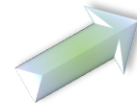
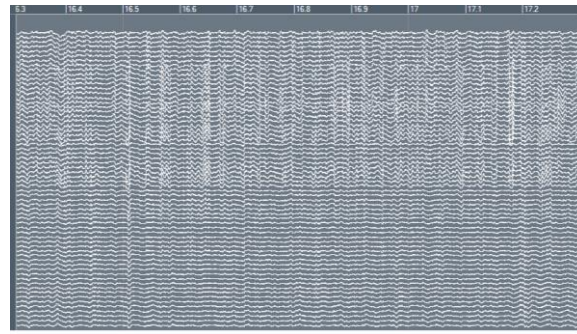
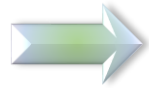
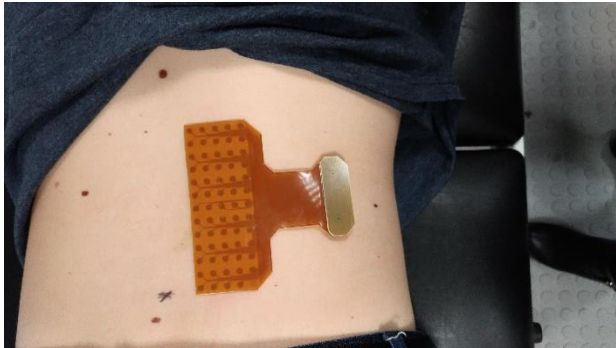
### Screen Layout

All in one tab	Copy
Group by device	Paste
Group by location	Save
Group by pair	Load

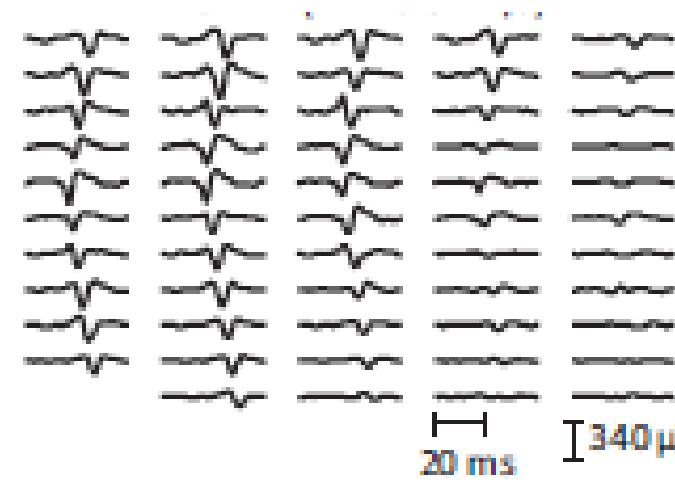
Stop 1 x1/10 x1/5 x1/2 x1 x2 x5 x10 [Navigation icons]

Play to Video File Add To Report

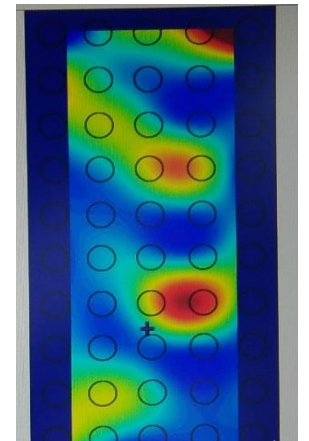
Markers: 11.5 Pos 3.1750 s



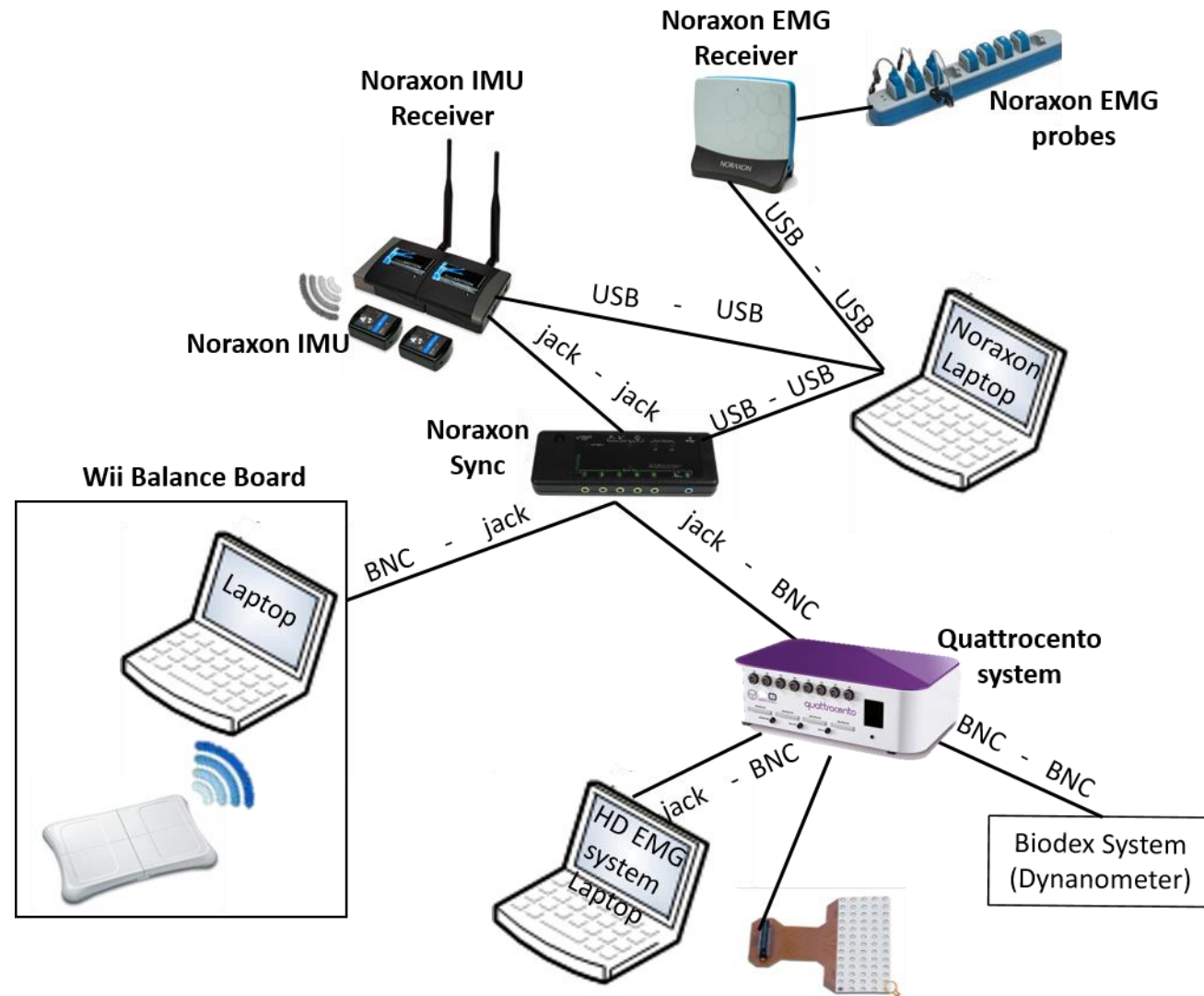
Potenziali di Azione di una UM



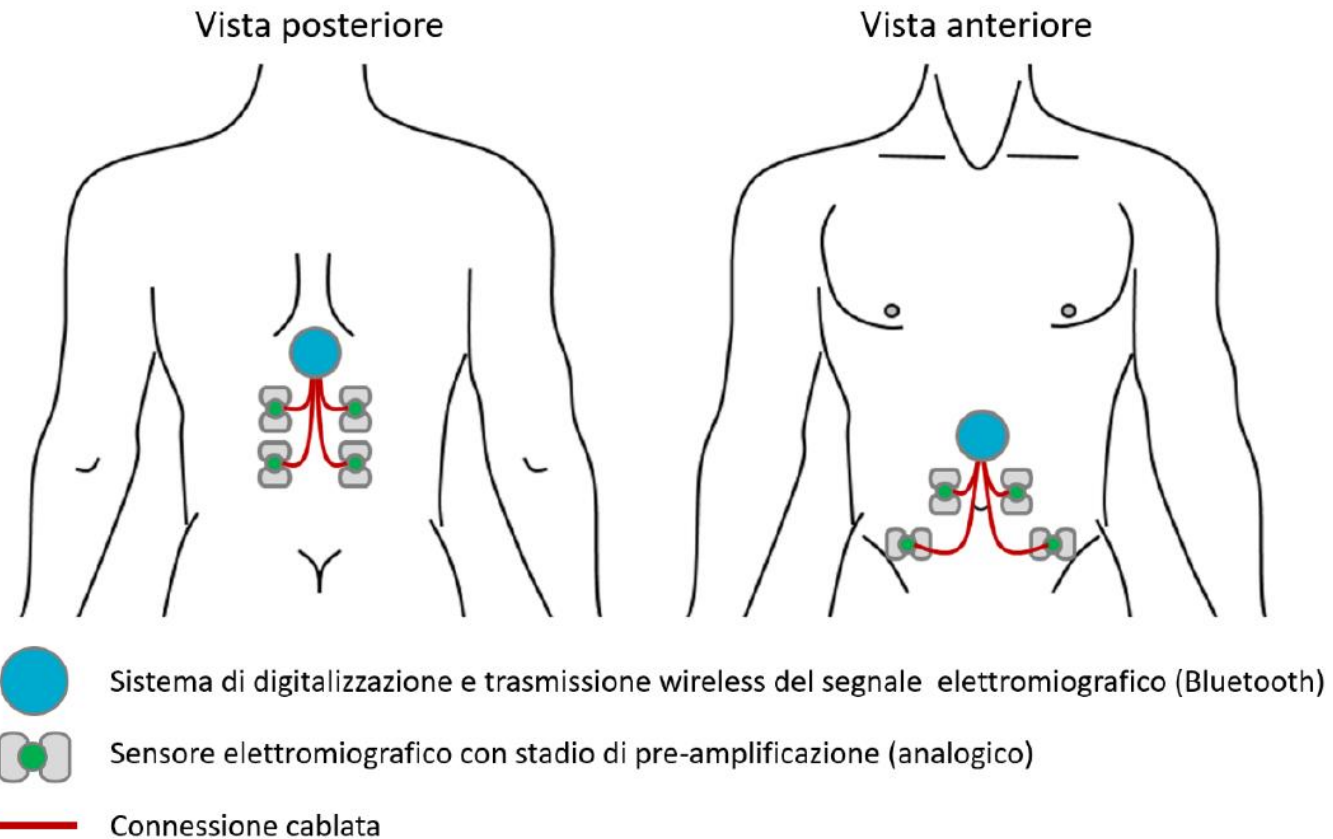
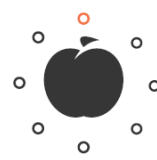
Mapa di Attivazione



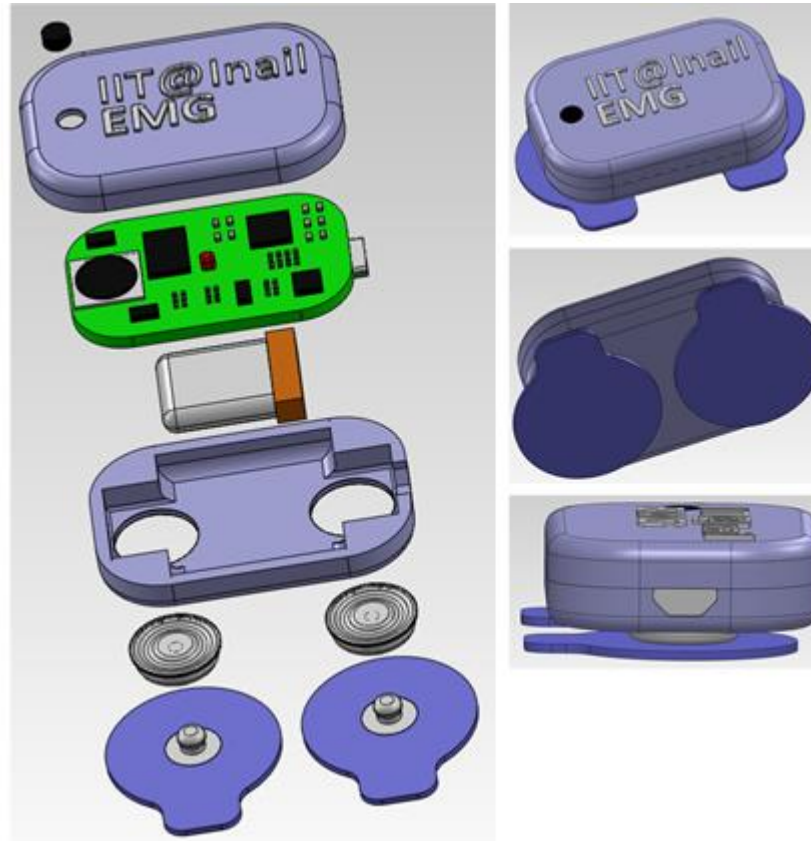
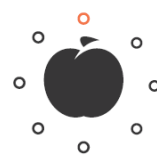




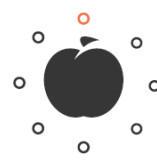
# MELA: Miniaturized sEmg for Lifting Activities



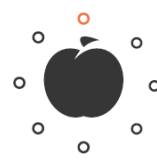
# MELA: Miniaturized sEMg for Lifting Activities



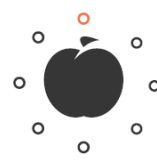
# MELA: Miniaturized sEmg for Lifting Activities



# MELA: Miniaturized sEmg for Lifting Activities



# MELA: Miniaturized sEmg for Lifting Activities



# An.Dy: Advancing **A**nticipatory Behaviors in **D**yadic Human-Robot Collaboration

