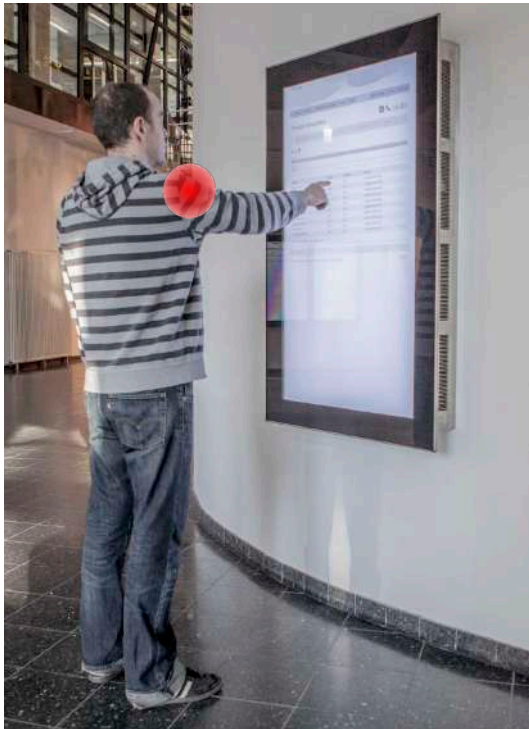


# Physical ergonomics for interactive digital signage and kiosk

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CHI 2019 Workshop on  
Mid-Air Haptic Interfaces for Interactive Digital Signage and Kiosk

# Physical ergonomics is critical for the success of interfaces beyond desktop



Gorilla arm



Trapezius fatigue

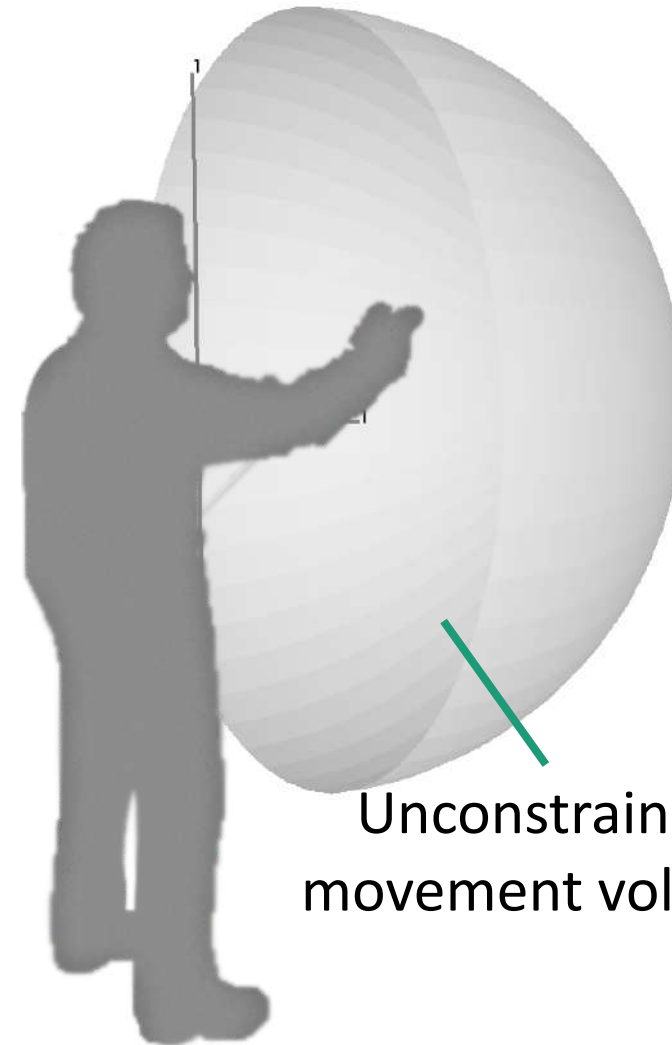


Joint stress

# The movement volume is ergonomically non-uniform with no hard physical constraints

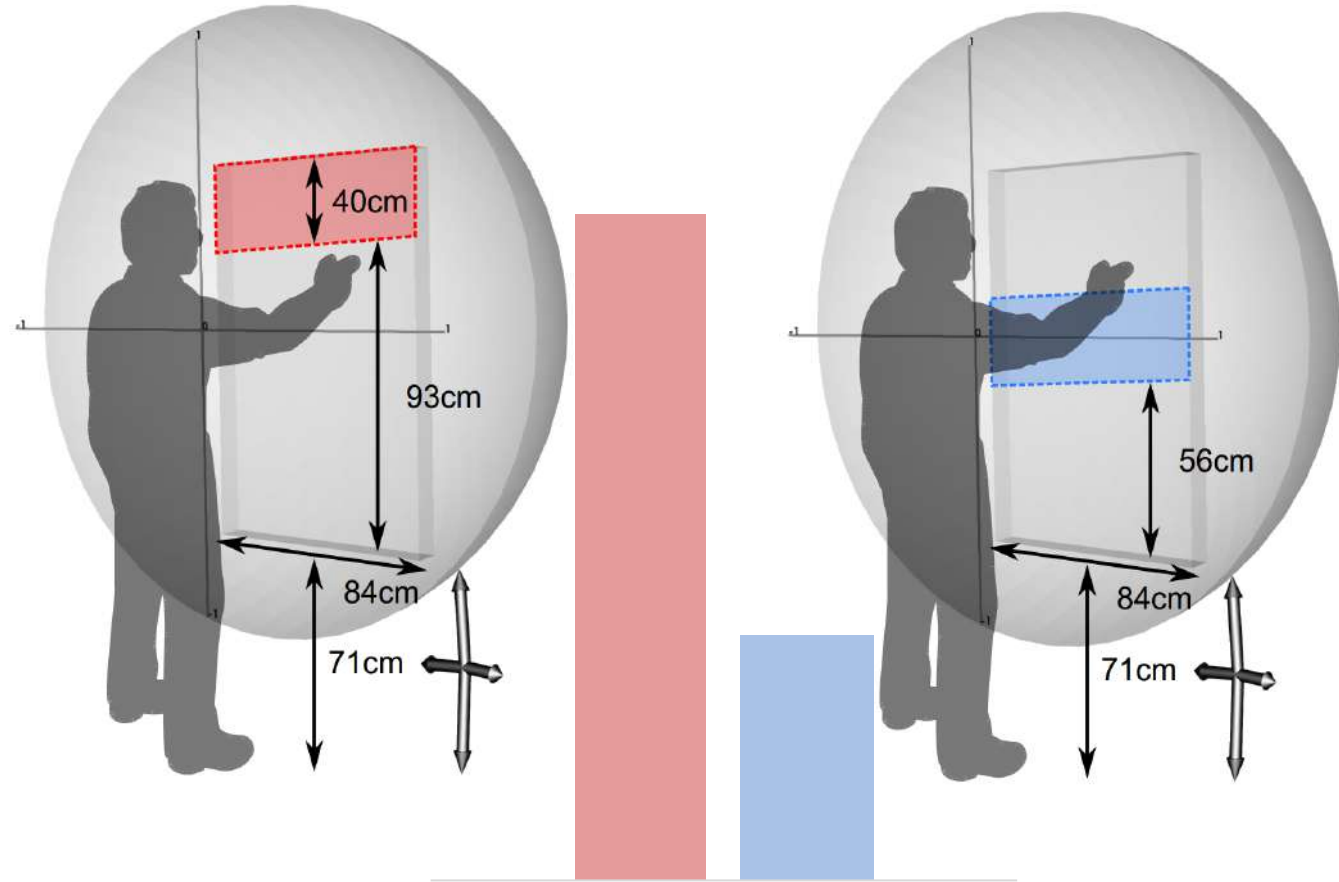


Constrained movement volume



Unconstrained movement volume

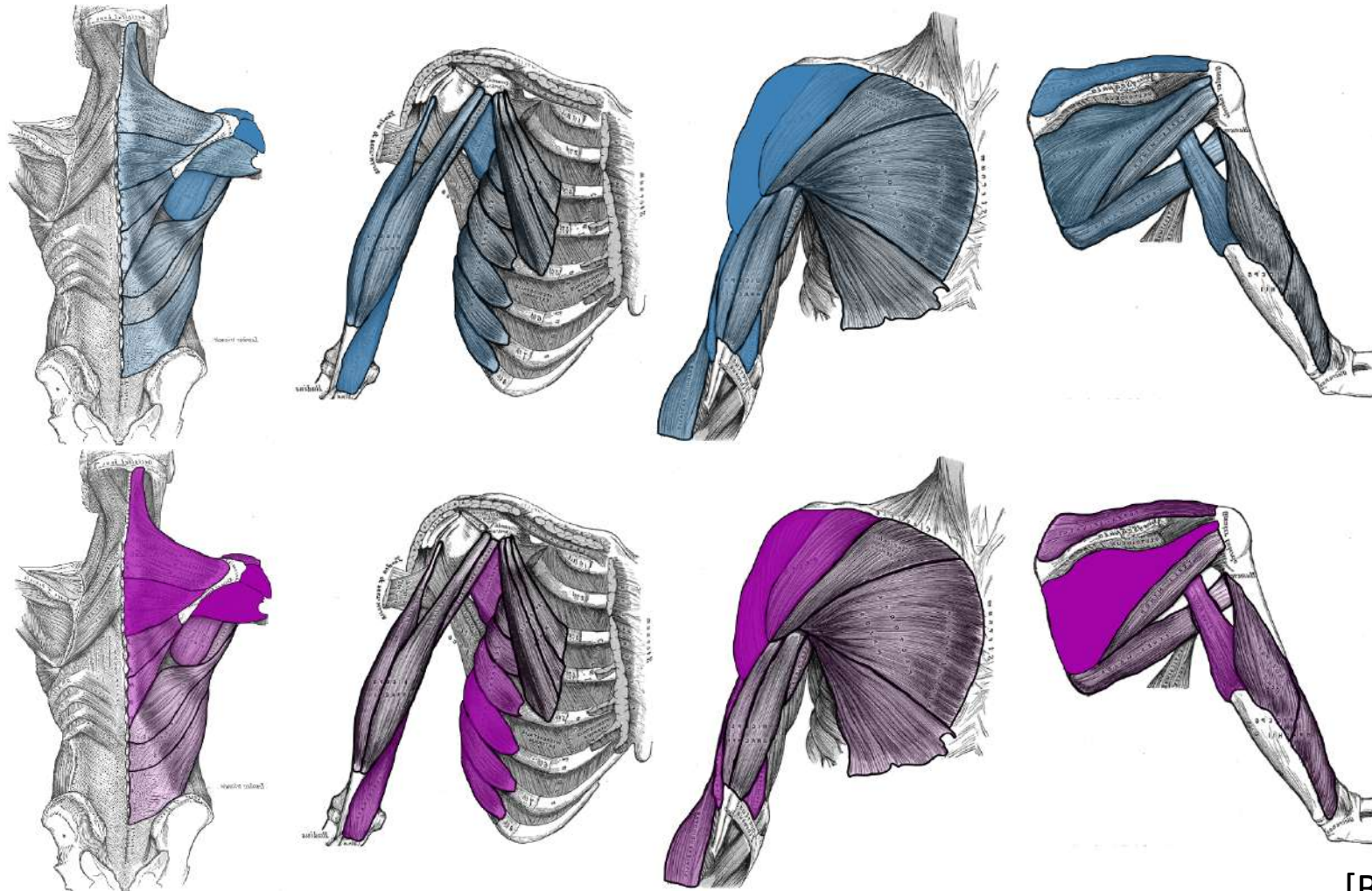
# Small changes in the interface lead to large ergonomic effects



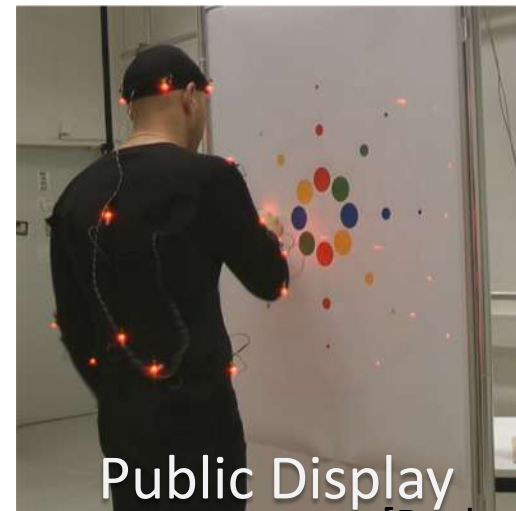
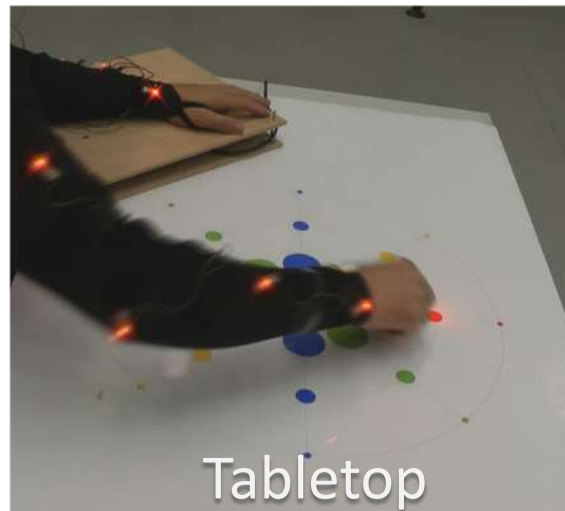
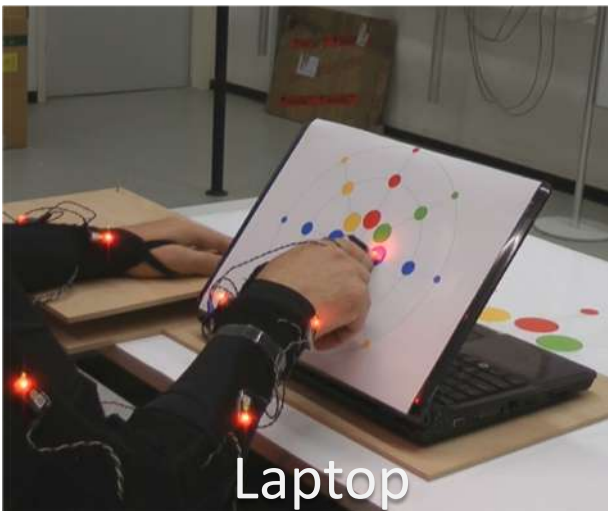
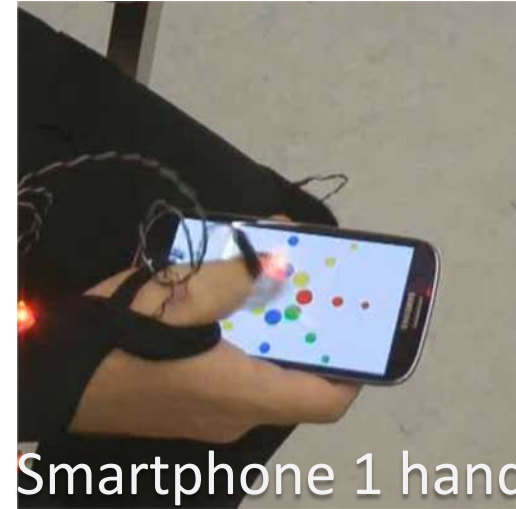
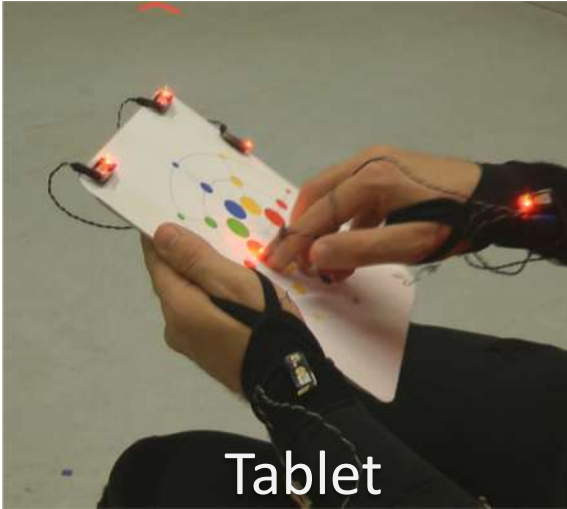
Total muscle activation

[Bachynskyi et al. ToCHI'15]

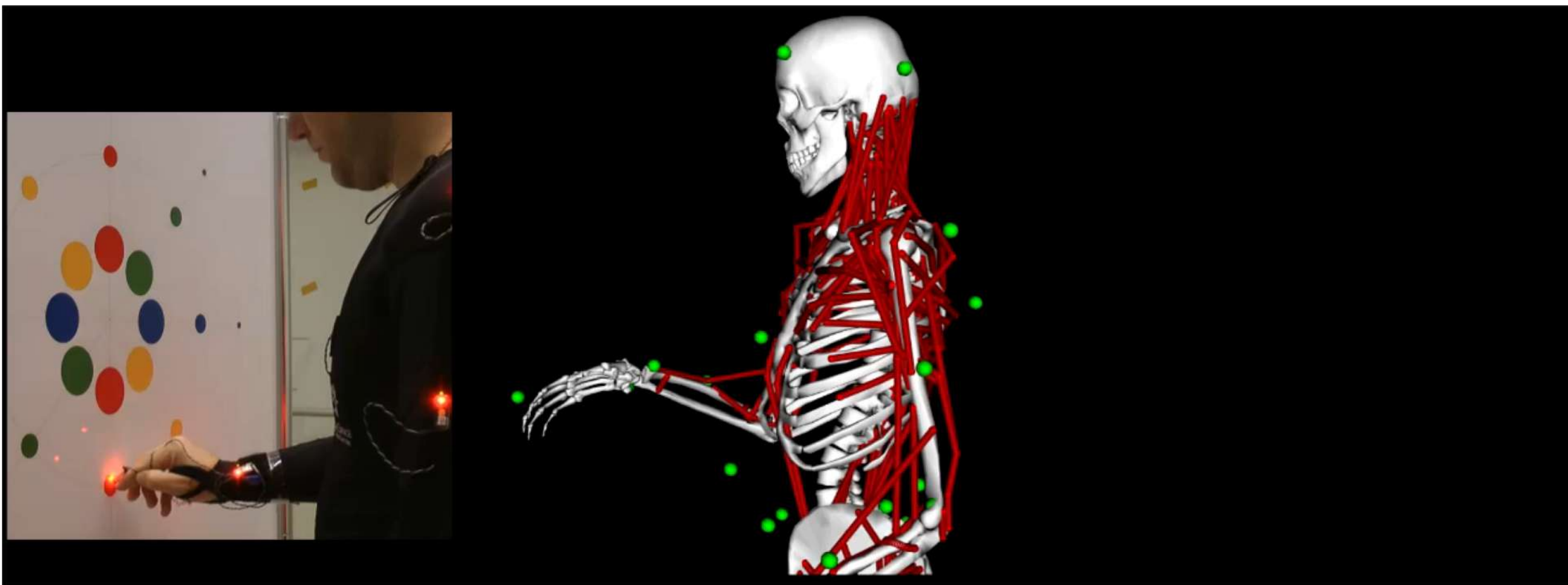
# Depending on the movement region different muscle groups are recruited



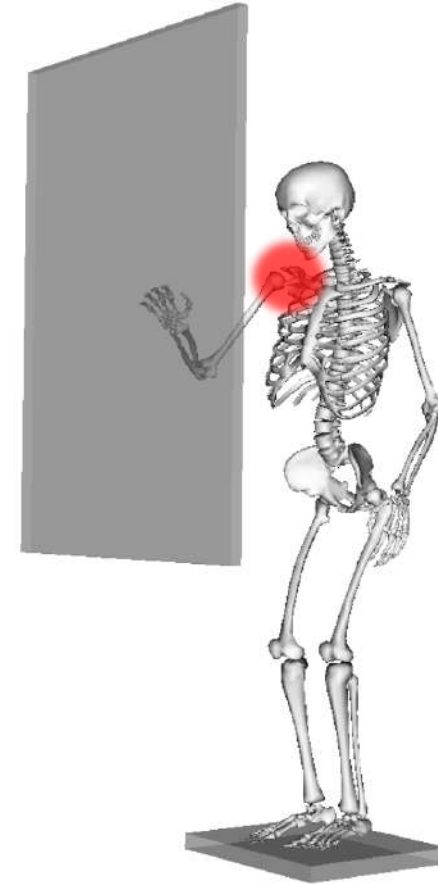
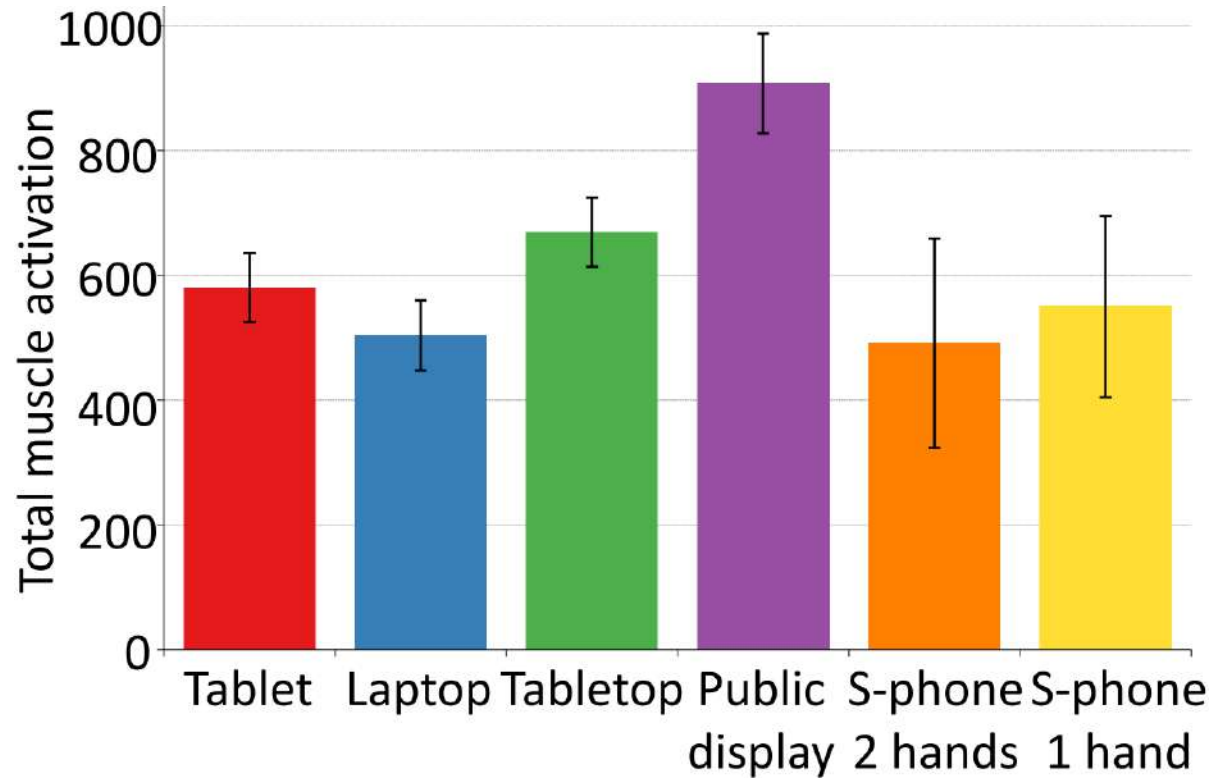
# Comparative study of interaction with various touch surfaces



# Biomechanical simulation extracts multiple physical ergonomics indices



# Up to 80% differences in Total muscle usage, concentrated in shoulder muscles





Thank you