



# Neuroprosthetics

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# Motivation



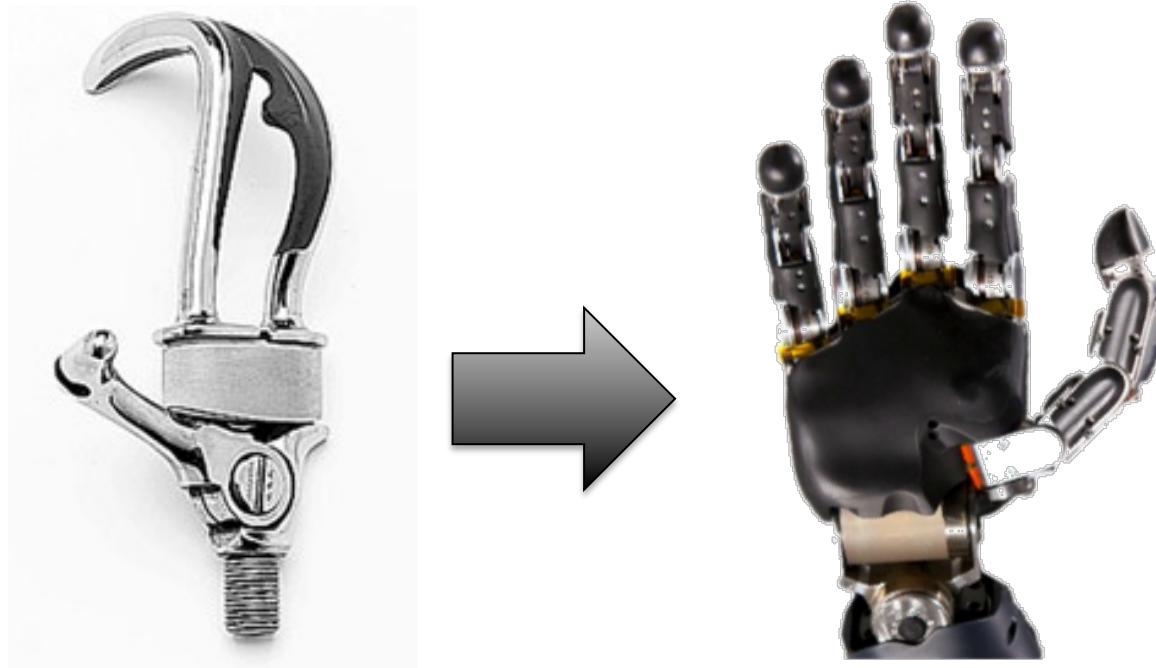
## State of the Practice



# Revolutionizing Prosthetics



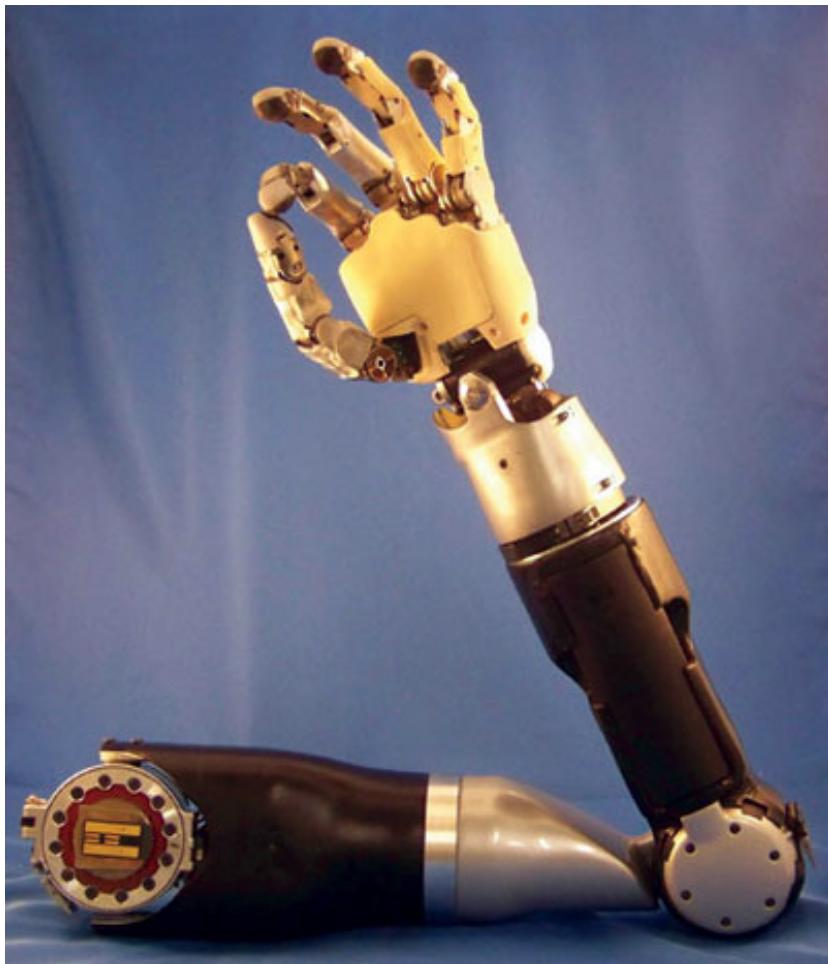
## From Hook to Hand: Critical Challenges



Control (human → prosthesis)

Feedback (prosthesis → human)

## Problem Statement – Control



**Modular Prosthetic Limb v2.0 Tele-operation**

## Problem Statement – Feedback



# Modular Prosthetic Limb v2.0 Tele-operation

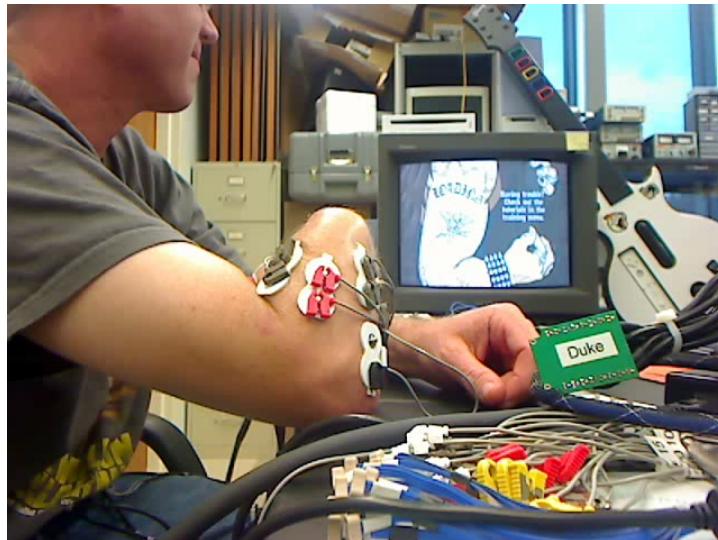
# Neural Integration



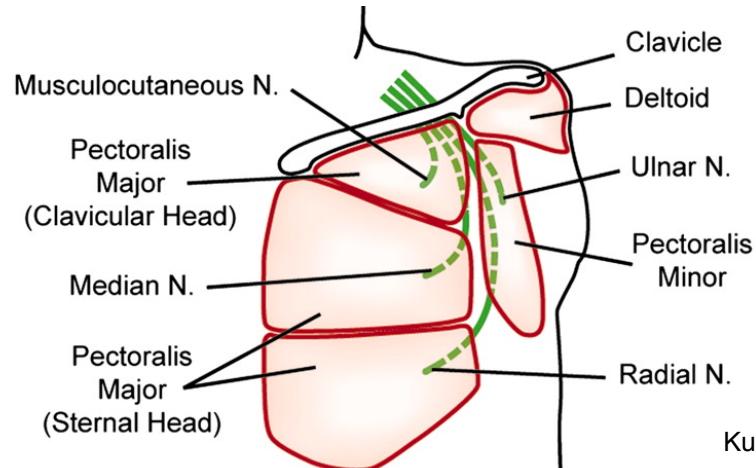
## Use Case – Transradial Amputee



# Transradial Electromyography



# Use Case – Shoulder Disarticulation Amputee

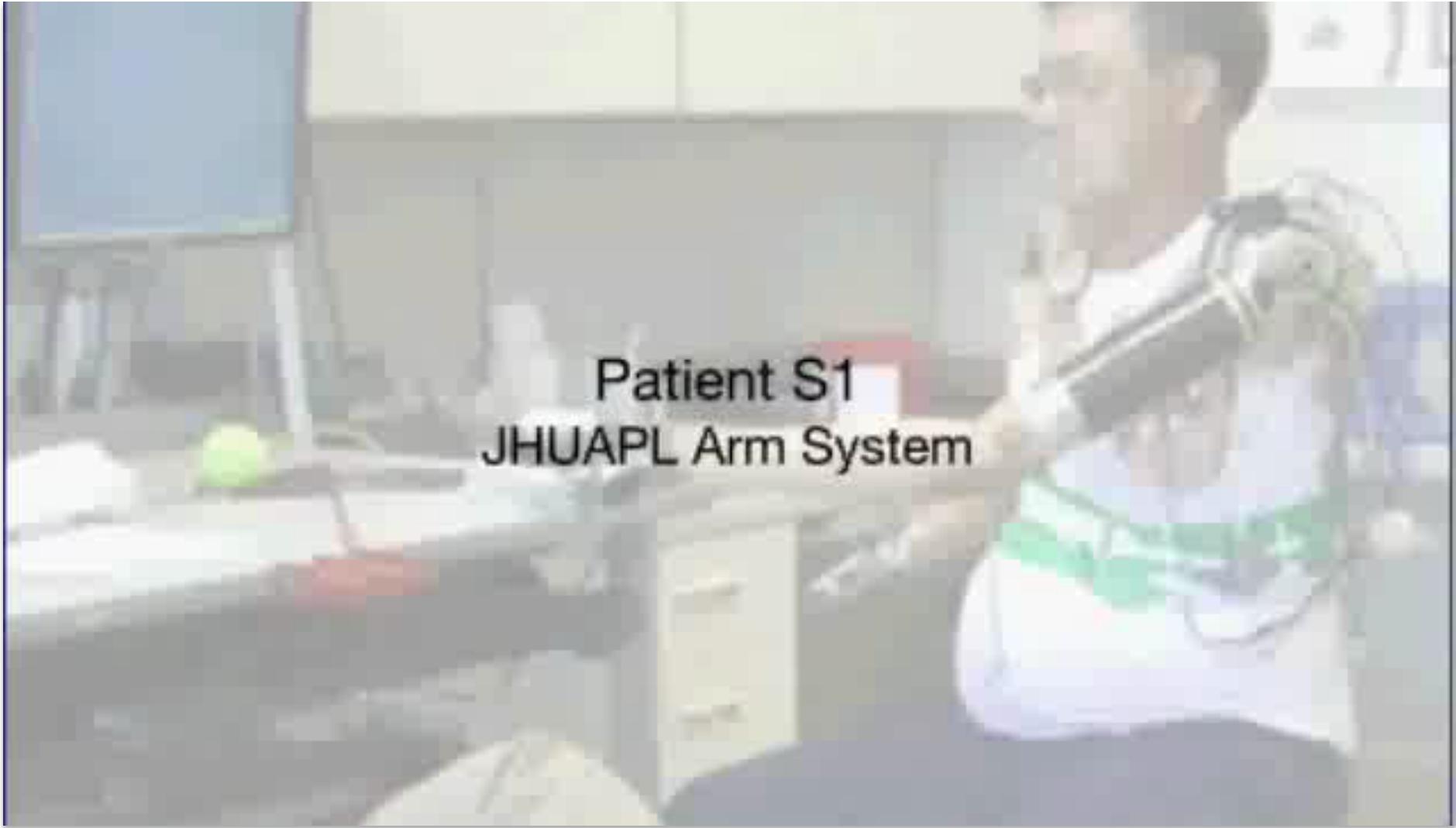
**A**

Kuiken et al., PNAS, 2007



VOA News

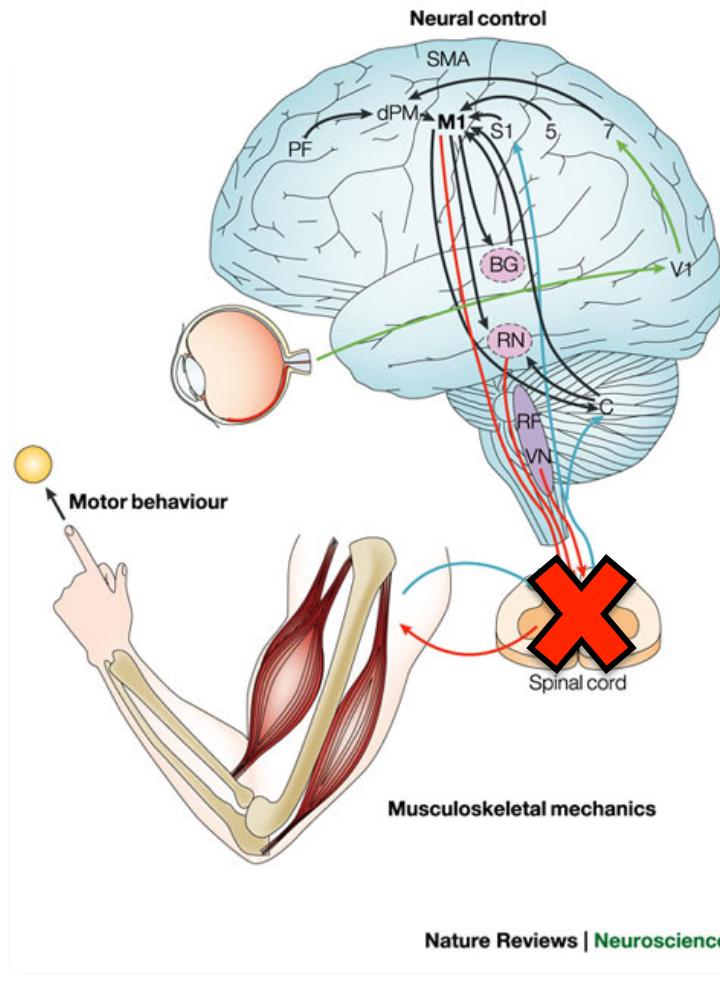
## TMR Electromyography



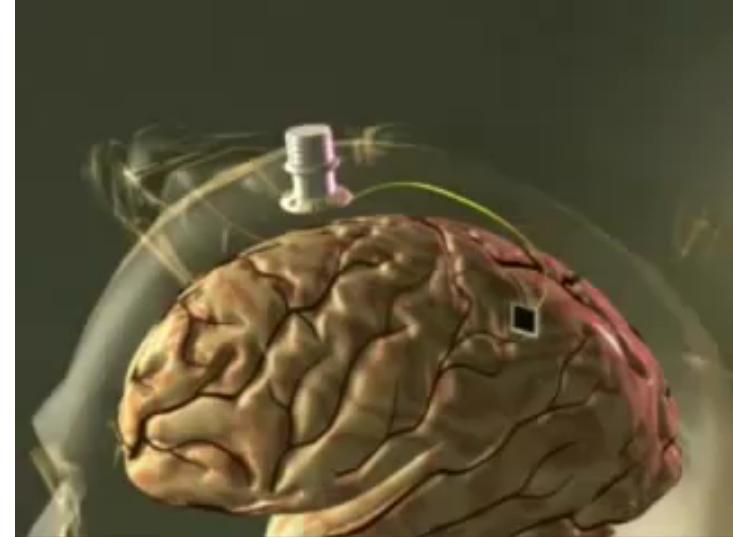
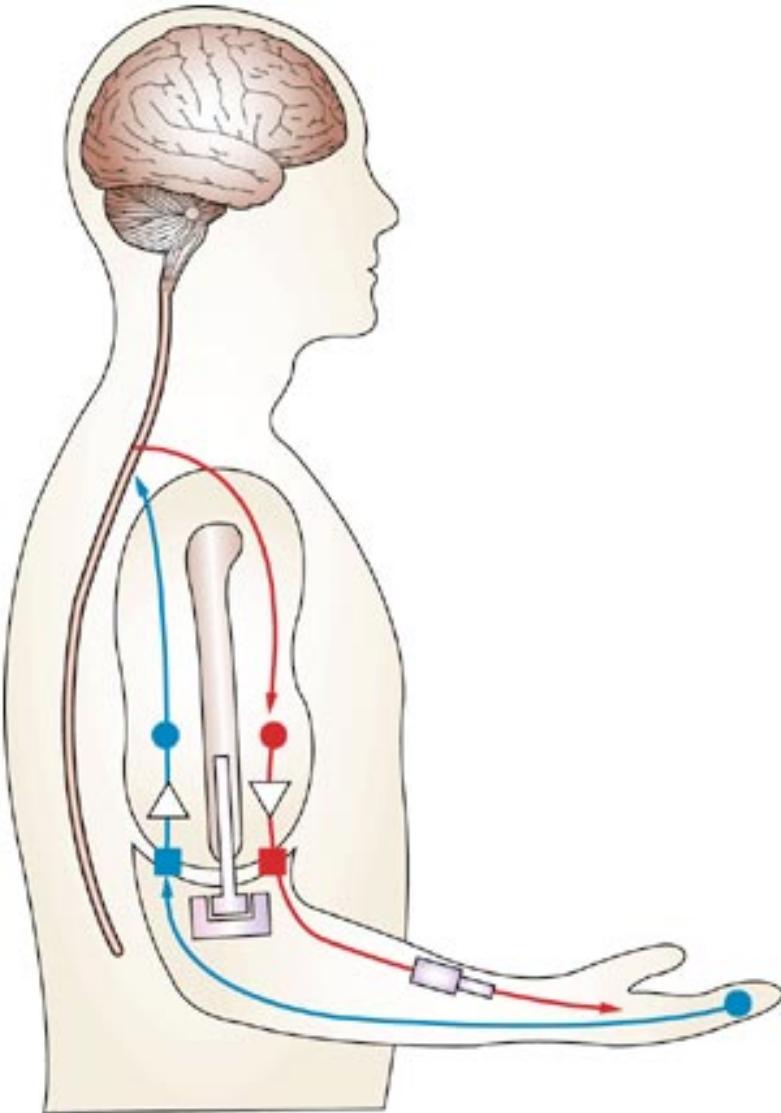
Patient S1  
JHUAPL Arm System

A photograph of a man wearing a robotic arm. The arm is attached to his right shoulder and elbow, with a green and white harness system around his upper arm. He is wearing a light-colored t-shirt. In the background, there is a blurred view of what appears to be a medical or laboratory setting.

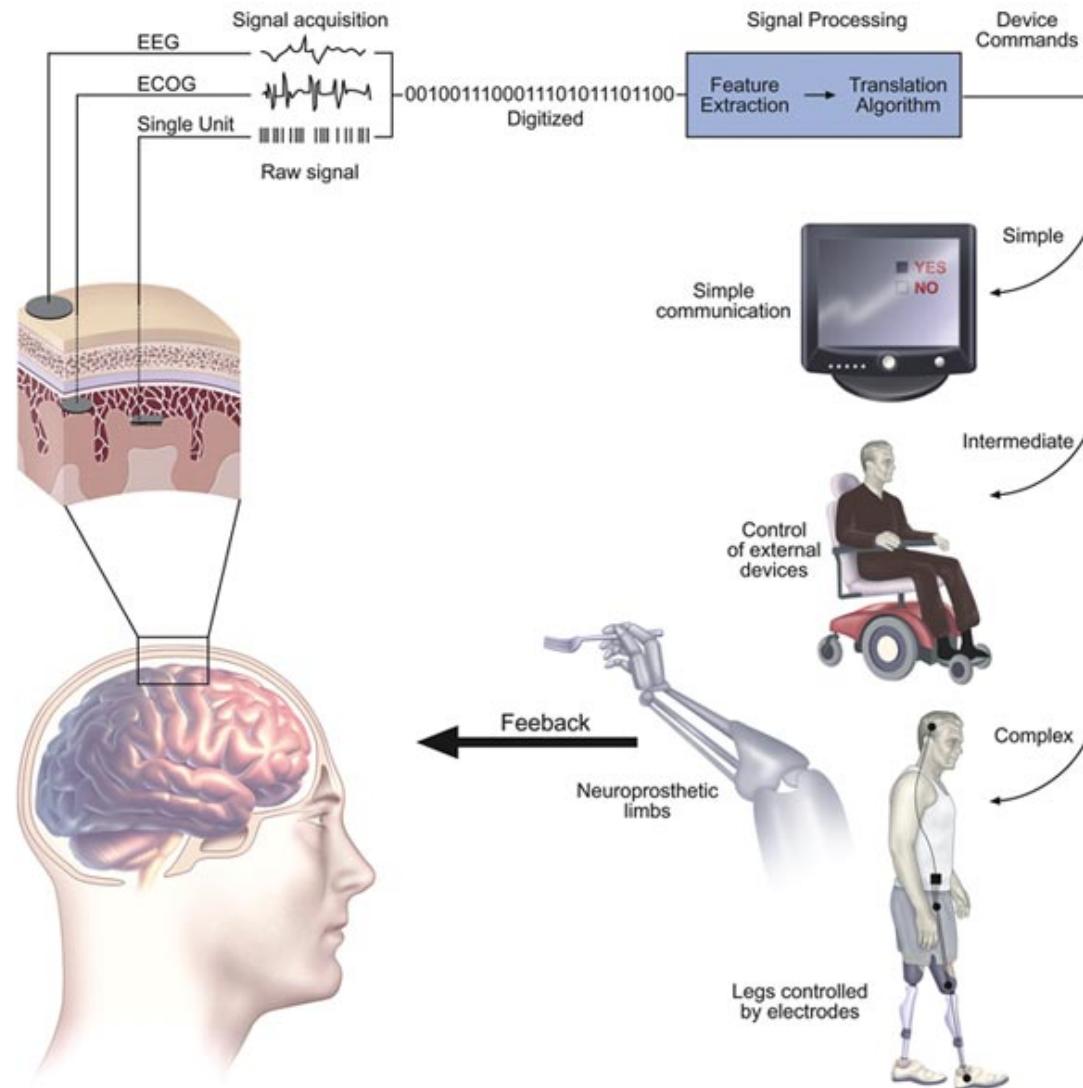
# Use Case – Paralysis



# Closed-Loop Cortical Control



# Next steps in Brain-Computer Interfaces



## Acknowledgements



CALTECH



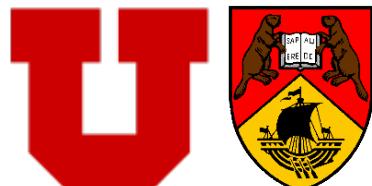
University of Pittsburgh



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Sigenics

# Thank You!

