

Neuroprosthetics

R. Jacob Vogelstein, PhD

Program Manager, Applied Neuroscience

Motivation



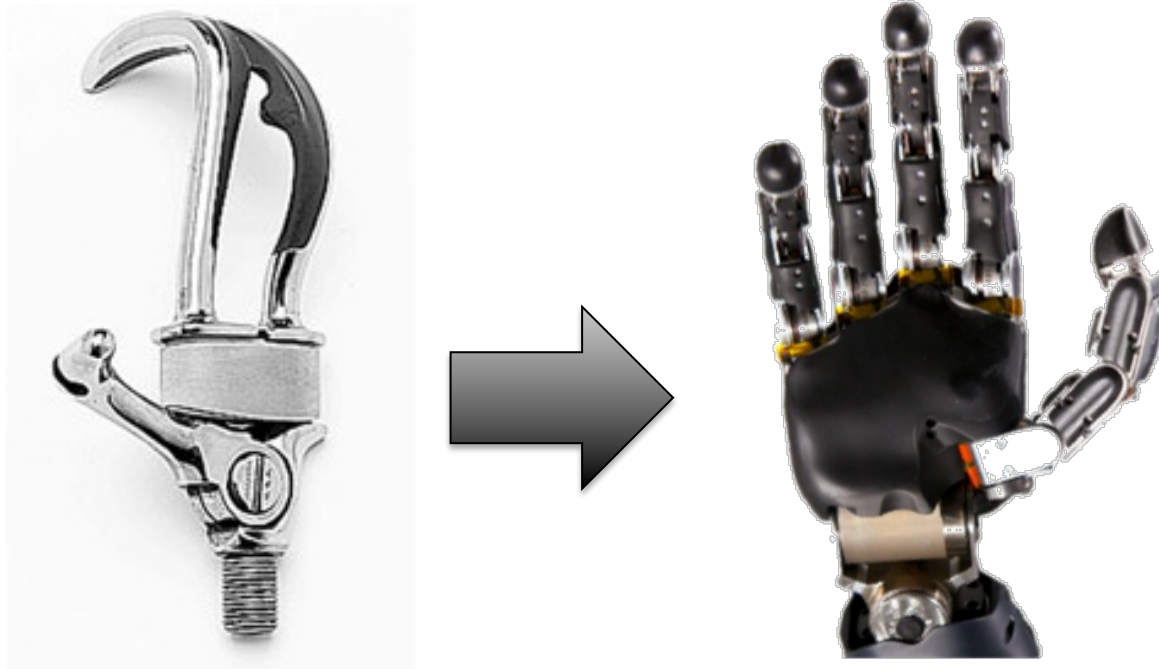
State of the Practice



Revolutionizing Prosthetics



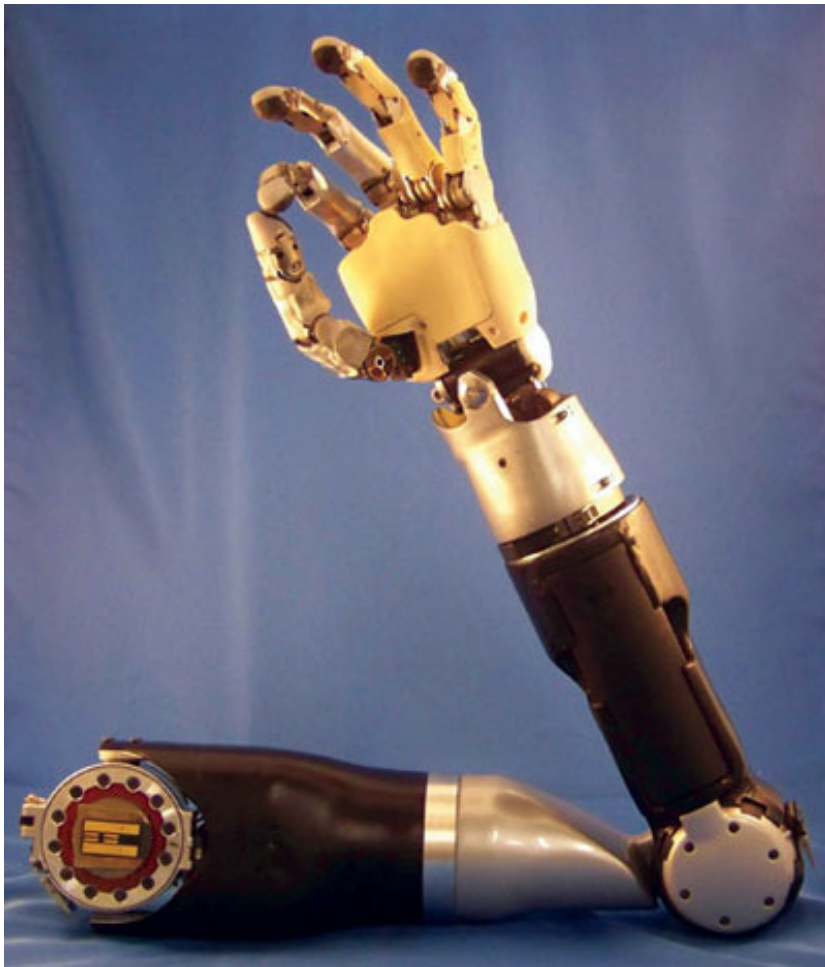
From Hook to Hand: Critical Challenges



Control (human \rightarrow prosthesis)

Feedback (prosthesis \rightarrow human)

Problem Statement – Control



Problem Statement – Feedback

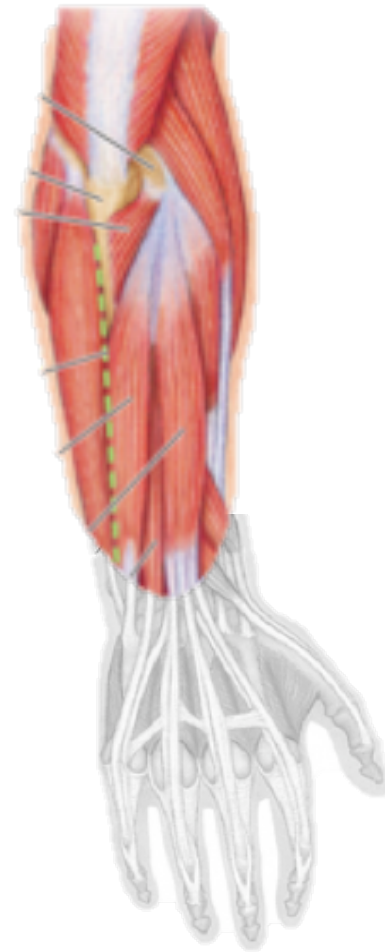


Modular Prosthetic Limb v2.0 Tele-operation

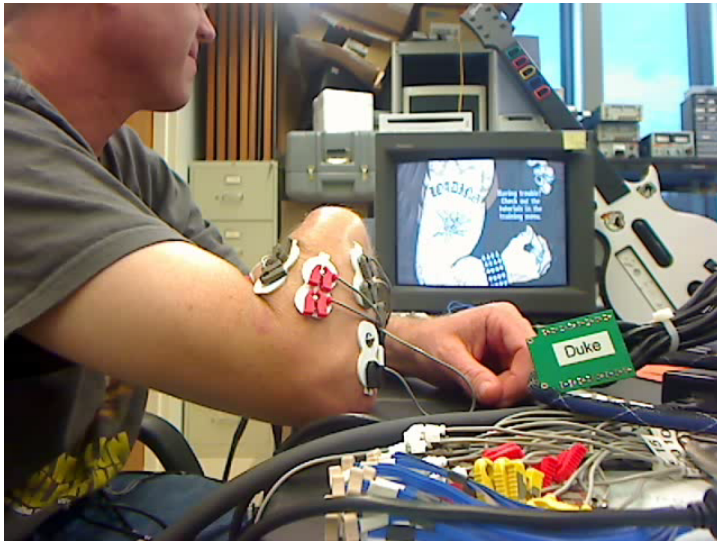
Neural Integration



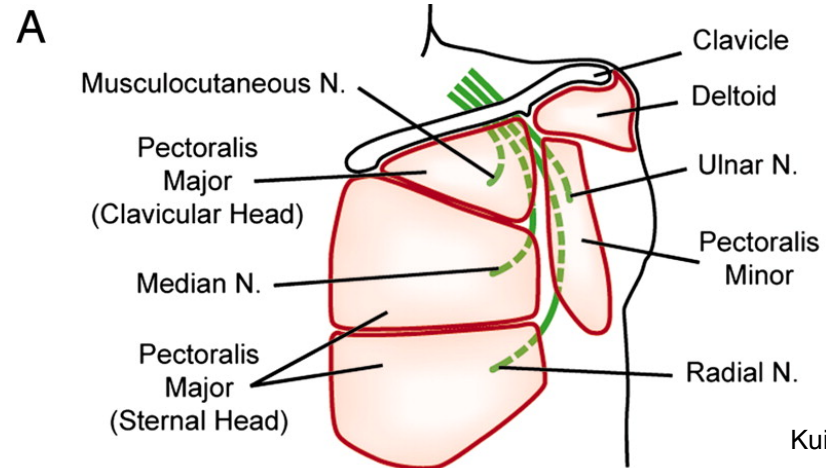
Use Case – Transradial Amputee



Transradial Electromyography



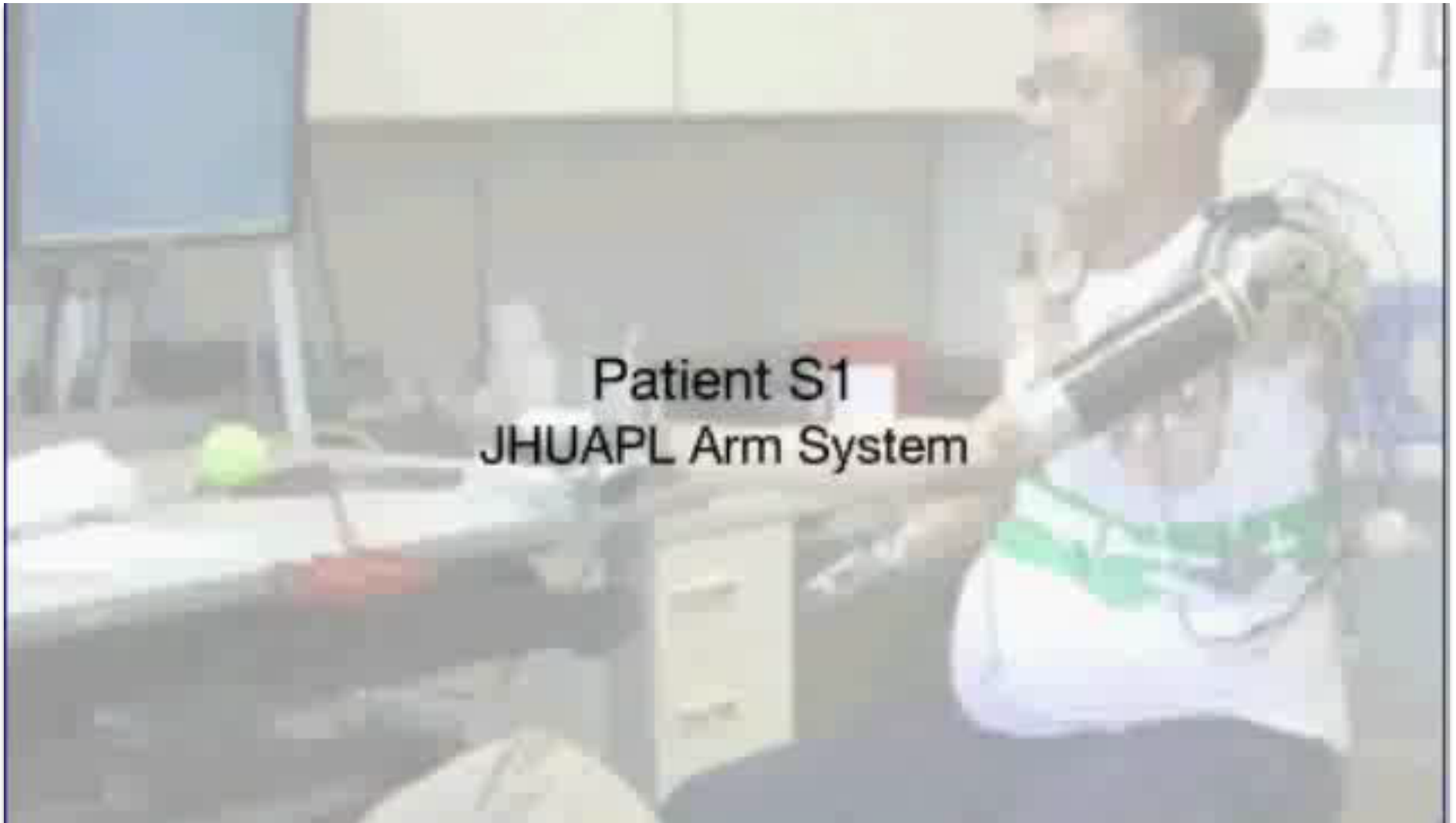
Use Case – Shoulder Disarticulation Amputee



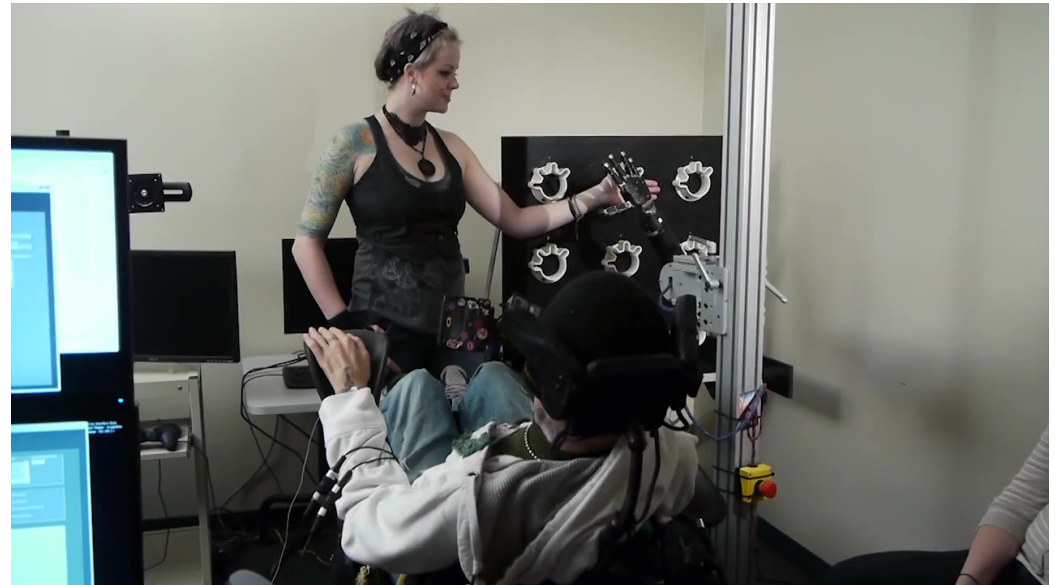
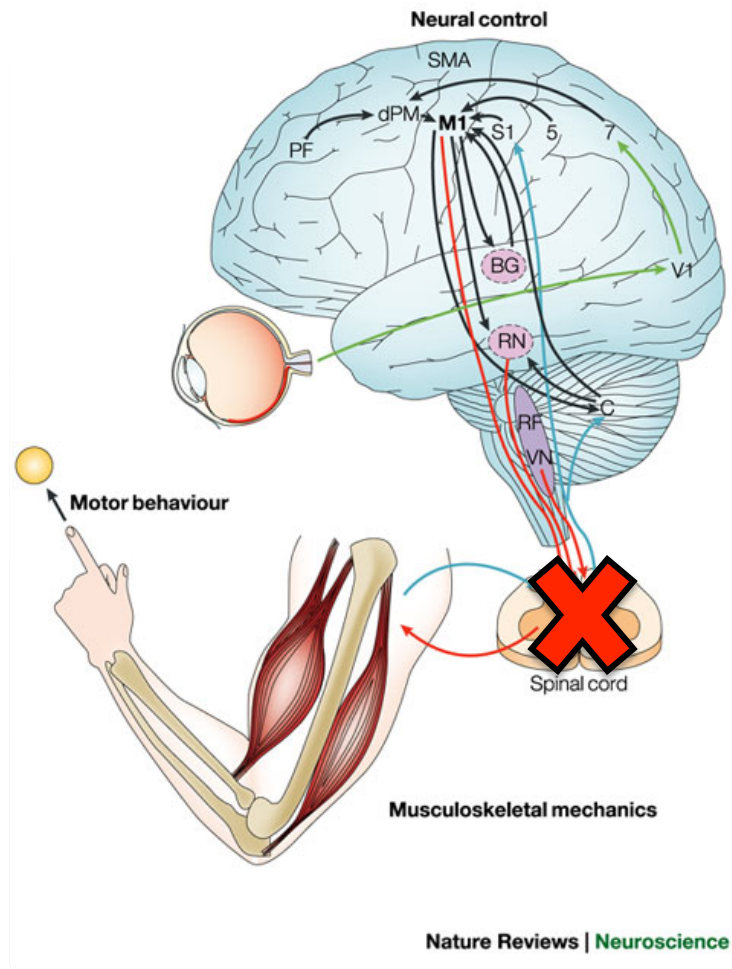
Kuiken et al., PNAS, 2007



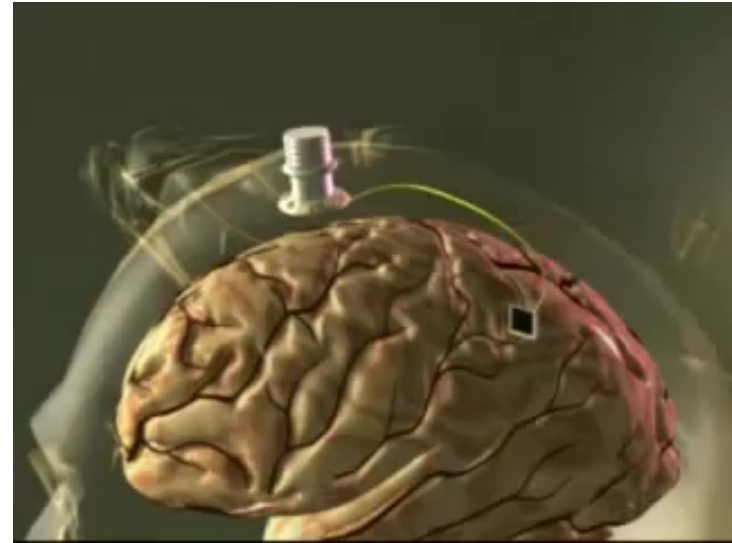
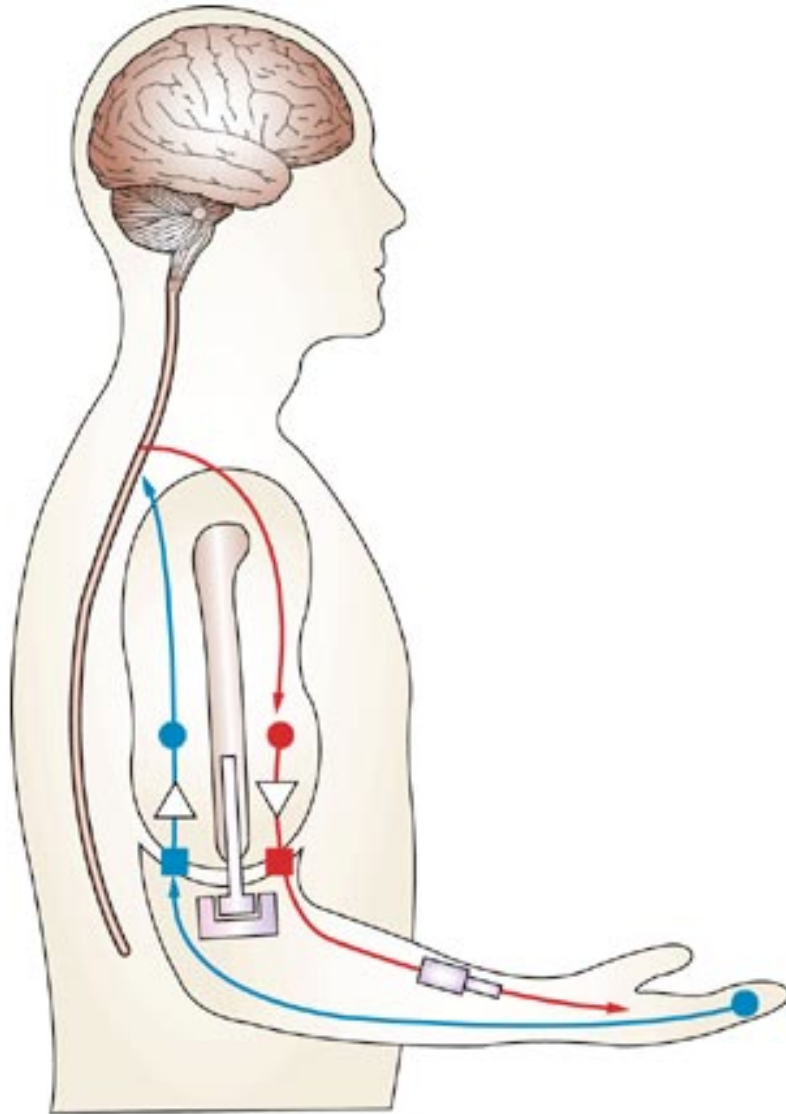
TMR Electromyography



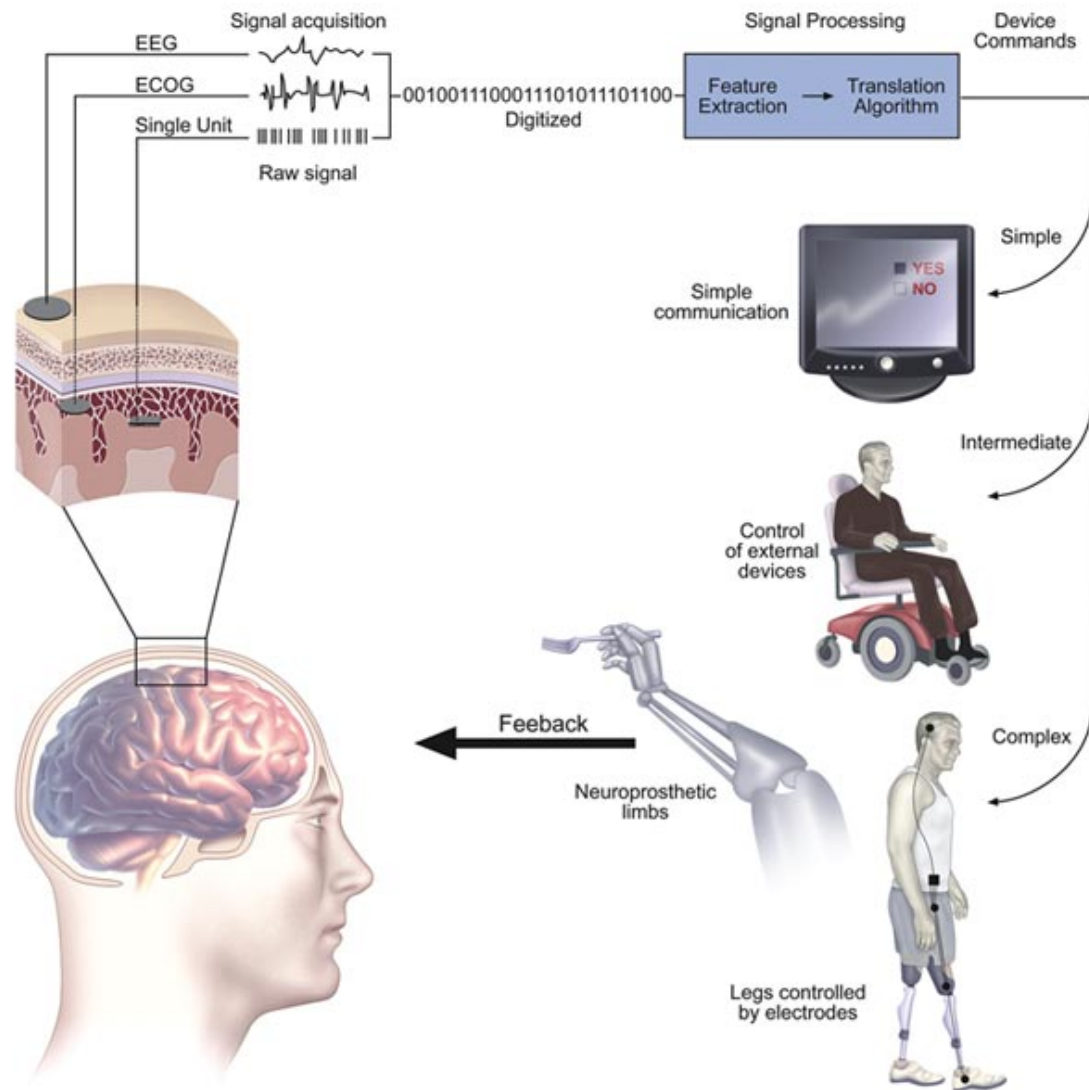
Use Case – Paralysis



Closed-Loop Cortical Control



Next steps in Brain-Computer Interfaces



Acknowledgements



CALTECH



University of Pittsburgh



NORTHWESTERN UNIVERSITY



The University of New Brunswick
Fredericton / Saint John



STANFORD UNIVERSITY



THE UNIVERSITY OF CHICAGO



RUTGERS



Rehabilitation Institute of Chicago
#1 Rehabilitation Hospital in America



Thank You!

