

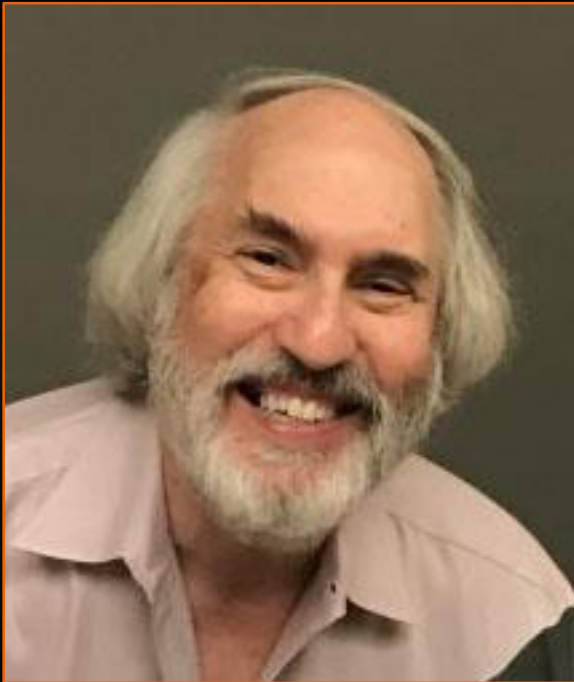
February 11, 2021

*The Design and Control of Exoskeletons for Rehabilitation*



# ENGR110/210

## Perspectives in Assistive Technology



David L. Jaffe, MS  
Instructor

15  
Years

# Questions?



Please notify me of your comments, suggestions, and concerns so I can explain / address / correct them.

# Age-Related Ability



- ▶ I'm getting my COVID vaccination on Tuesday!





# Age-Related Disability Intolerance to Spinning





# ATTENDANCE



- ▶ Let me know if you are unable to arrive on time or must leave early
- ▶ Review slides and watch Zoom video of missed portion of the class session
- ▶ Make up missed class sessions

# Upcoming class sessions



- ▶ Tue, Feb 16<sup>th</sup>  
Mid-term Student Project Presentations
- ▶ Thu, Feb 18<sup>th</sup>  
Aesthetics Matter & Empathy and Problem Definition  
Jules Sherman
- ▶ Tue, Feb 23<sup>rd</sup>  
Improving Home Environments for Older Adults  
Matteo Zallio, M.Arch, PhD





# Students working on projects

## Expected Activities for Fabrication Projects



- ▶ Connect with project partner
- ▶ “Understand the Problem”
- ▶ Brainstorming
- ▶ Select Design Concept(s)
- ▶ Sketches, low resolution prototypes
- ▶ Preparing for Mid-Term presentation and Report



# Students working on projects

## Mid-term Presentations Update



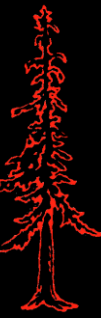
- ▶ Mid-term presentations will be 3 minutes, no slides, no screen sharing, informal, not graded – **but be professional**
- ▶ Be concise, avoid every detail
- ▶ “Elevator Pitch” & Update the Boss
- ▶ Include feeling & emotion
- ▶ Presentation order from Signup Sheet
- ▶ **Practice for timing**





# Students working on projects

## Mid-term Report Update



- ▶ Mid-term report - 10 pages maximum - of narrative submitted collectively by all students working on the same project
- ▶ Suggested format different for fabrication vs non-fabrication projects
- ▶ Include sketches and photos
- ▶ Goal: short, concise, well-written, and highly readable report with few grammatical and spelling errors.
- ▶ Report Writing Tips document sent by email

# Reminder - Work with Diligence



- ▶ Time is your most precious resource
- ▶ Five days until Mid-term Presentations - Tue, Feb 16<sup>th</sup>
- ▶ Practice your presentation!



# Vintage Technology



46 years ago!



# Vintage Computer Technology



## What kind of man owns his own computer?

Rather revolutionary, the whole idea of owning your own computer? Not if you're a diplomat, printer, scientist, inventor... or a kite designer, too. Today there's Apple Computer. It's designed to be a *personal* computer. To un-complicate your life. And make you more effective.

### It's a wise man who owns an Apple.

If your time means money, Apple can help you make more of it. In an age of specialists, the most successful specialists stay away from uncreative drudgery. That's where Apple comes in.

Apple is a real computer, right to the core. So just like big computers, it manages data, crunches numbers, keeps records, processes your information and prints reports. You concentrate on what you do best. And let Apple do the rest. Apple makes that easy with three programming languages—including Pascal—that let you be your own software expert.

### Apple, the computer worth not waiting for.

Time waiting for access to your company's big mainframe is time wasted. What you need in your department —

on your desk — is a computer that answers only to you... Apple Computer. It's less expensive than timesharing. More dependable than distributed processing. Far more flexible than centralized EDP. And, at less than \$2500 (as shown), downright affordable.



### Visit your local computer store.

You can join the personal computer revolution by visiting the Apple dealer in your neighborhood. We'll give you his name when you call our toll free number (800) 538-9696. In California, (800) 662-9238.

Apple Computer, 10260  
Bandley Drive,  
Cupertino,  
CA 95014.





# Vintage Assistive Technology

## Old Wheelchair Designs



# Old Wheelchair Designs



Garden party for Wounded men at the  
White House 6/5/24 30963

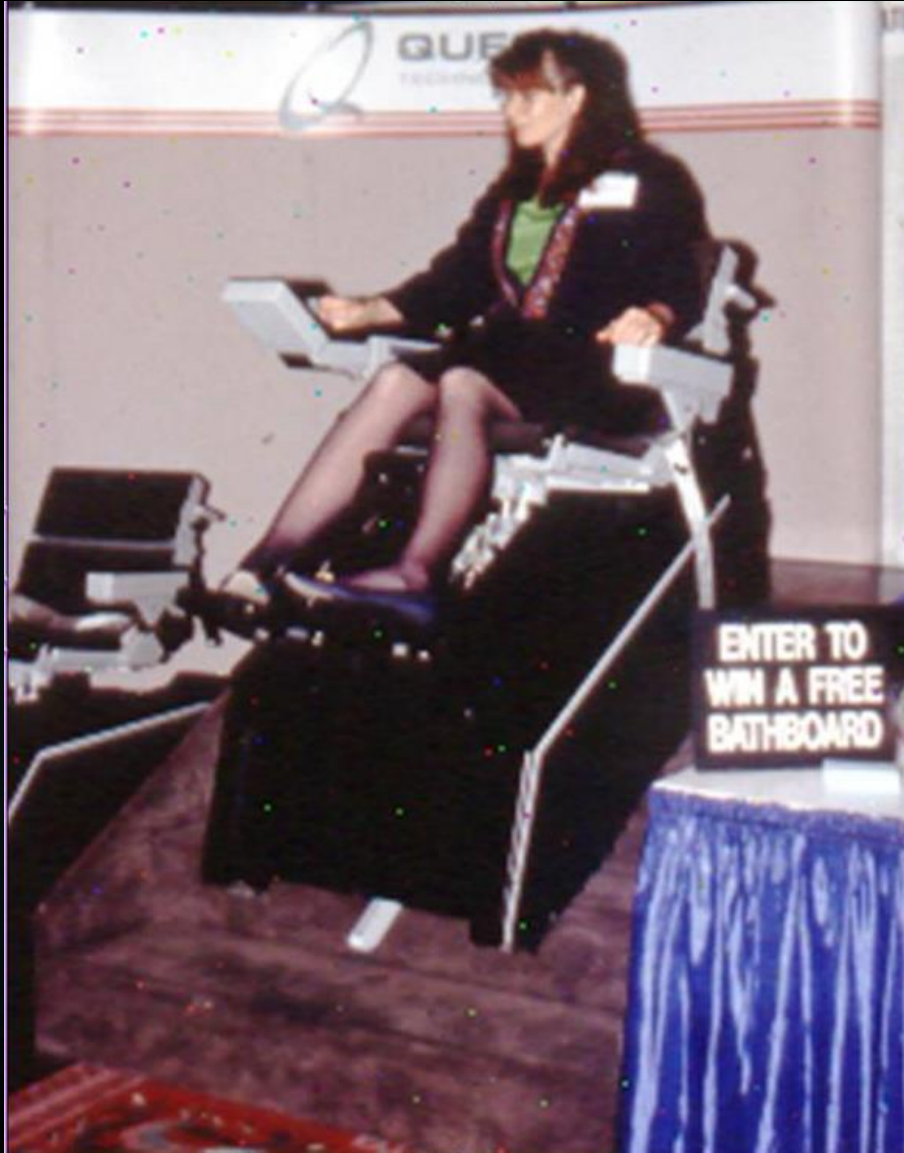


# Old Wheelchair Designs



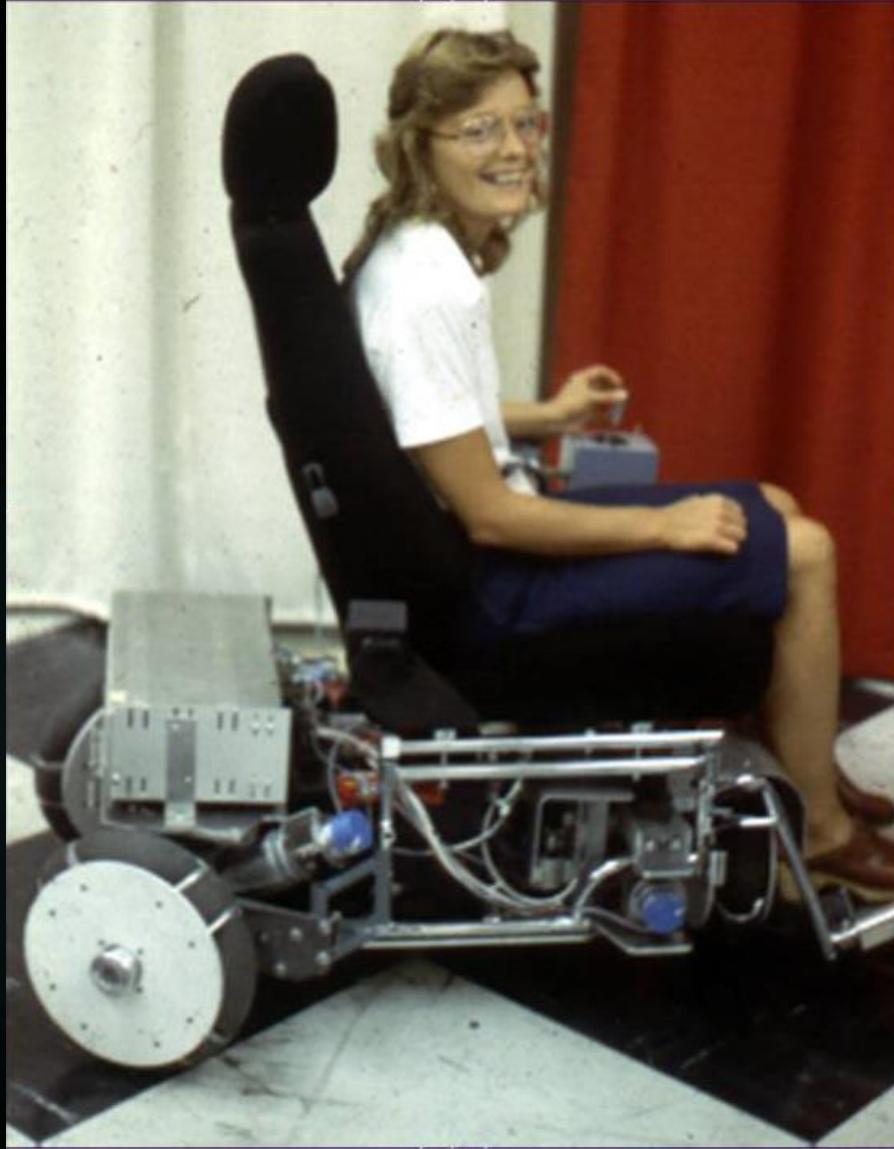


# Old Wheelchair Designs



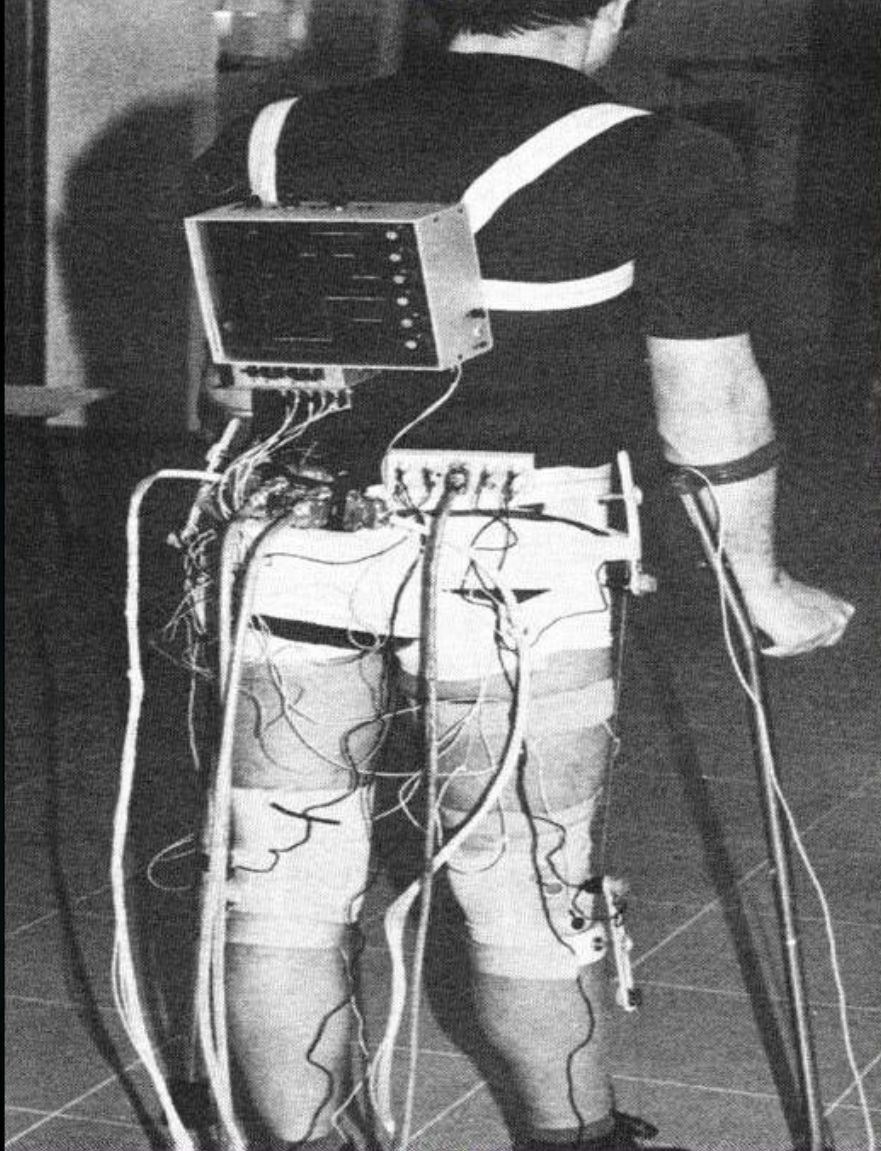


# Omni-directional Wheelchairs



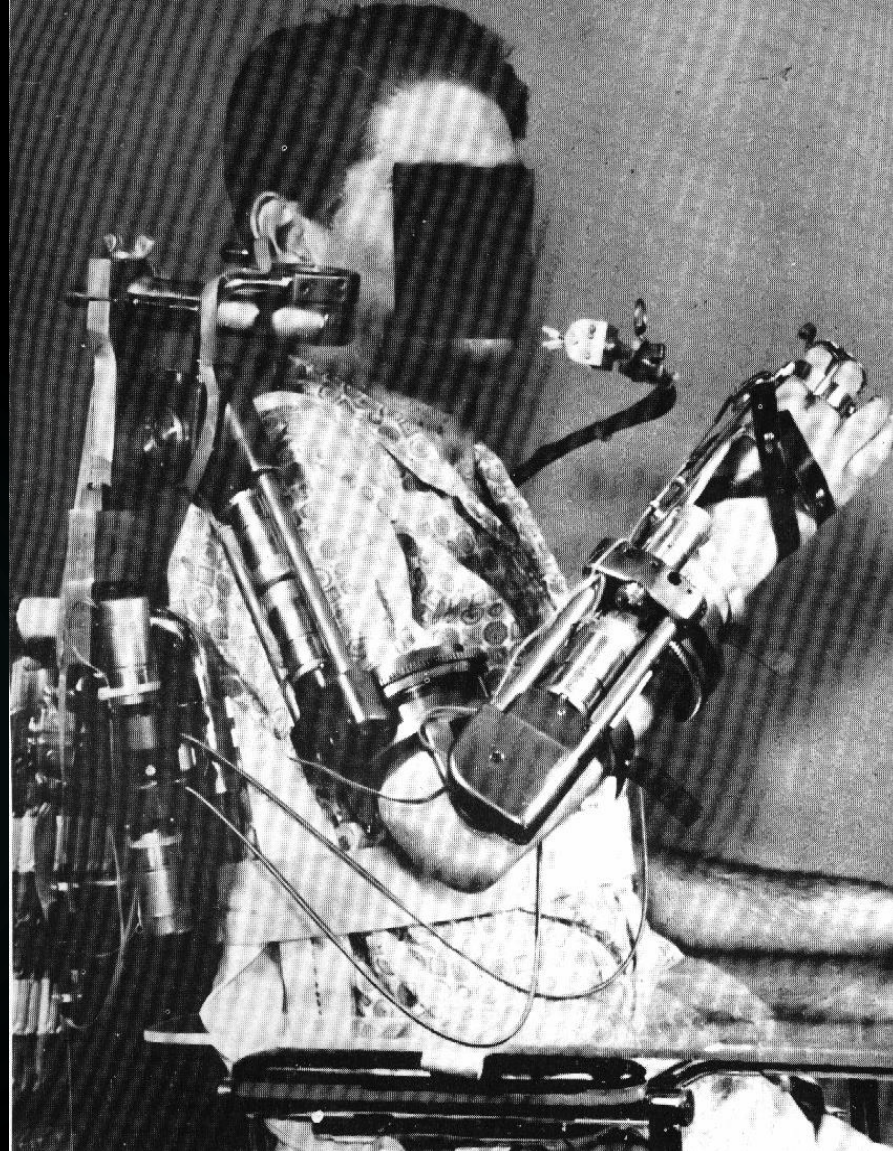


# FES Walking



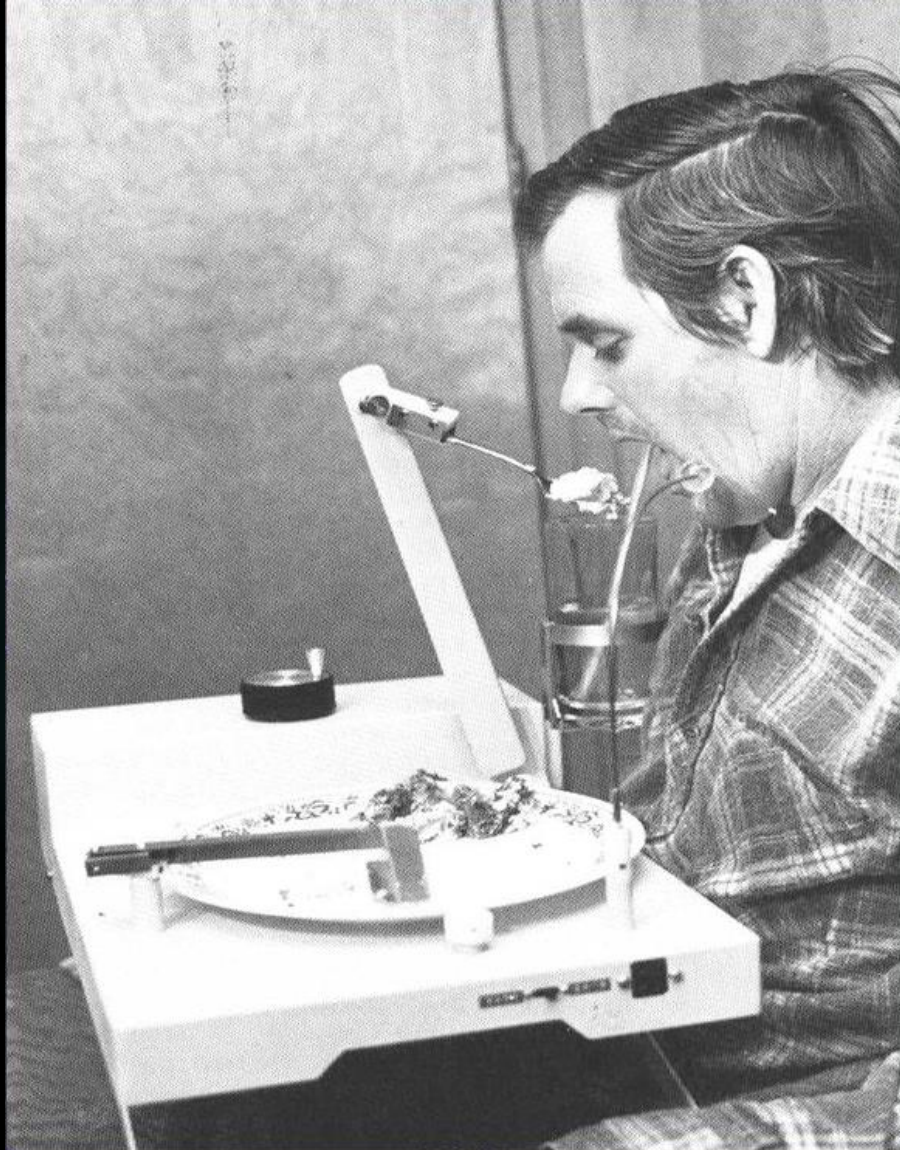


# Chin Controlled Arm Exoskeleton



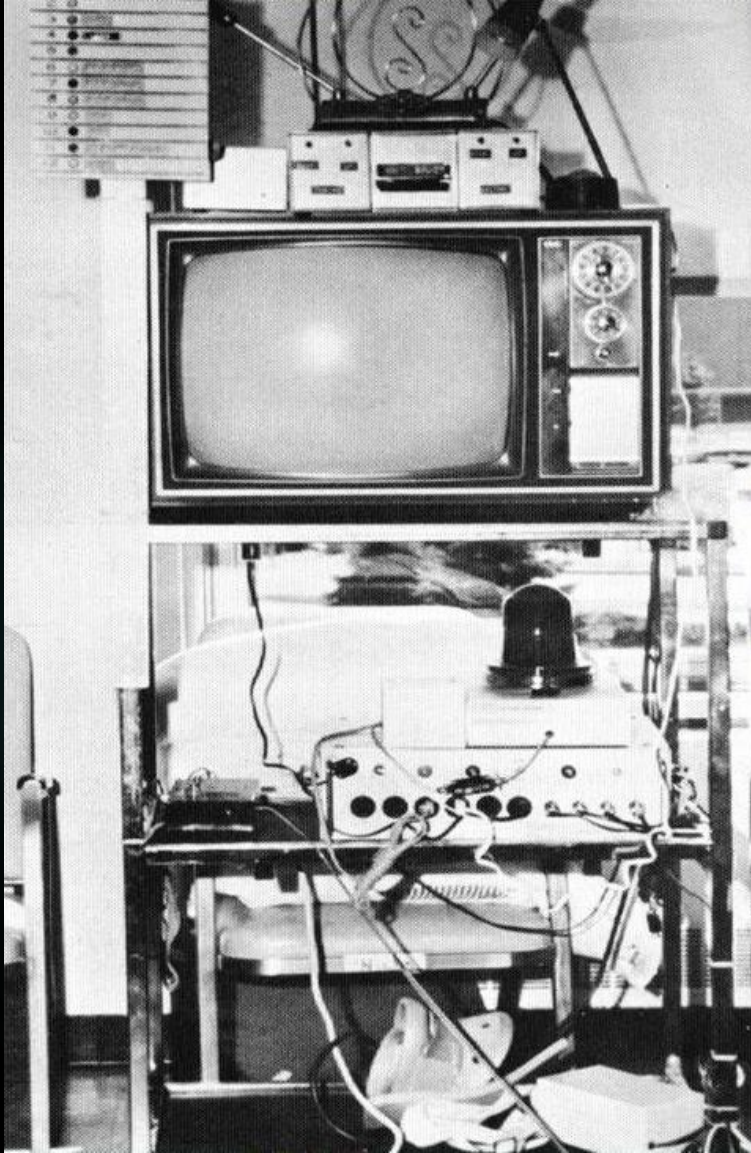


# Robotic Feeding Aids





# Early Environmental Control Systems





# Eye Gaze Control

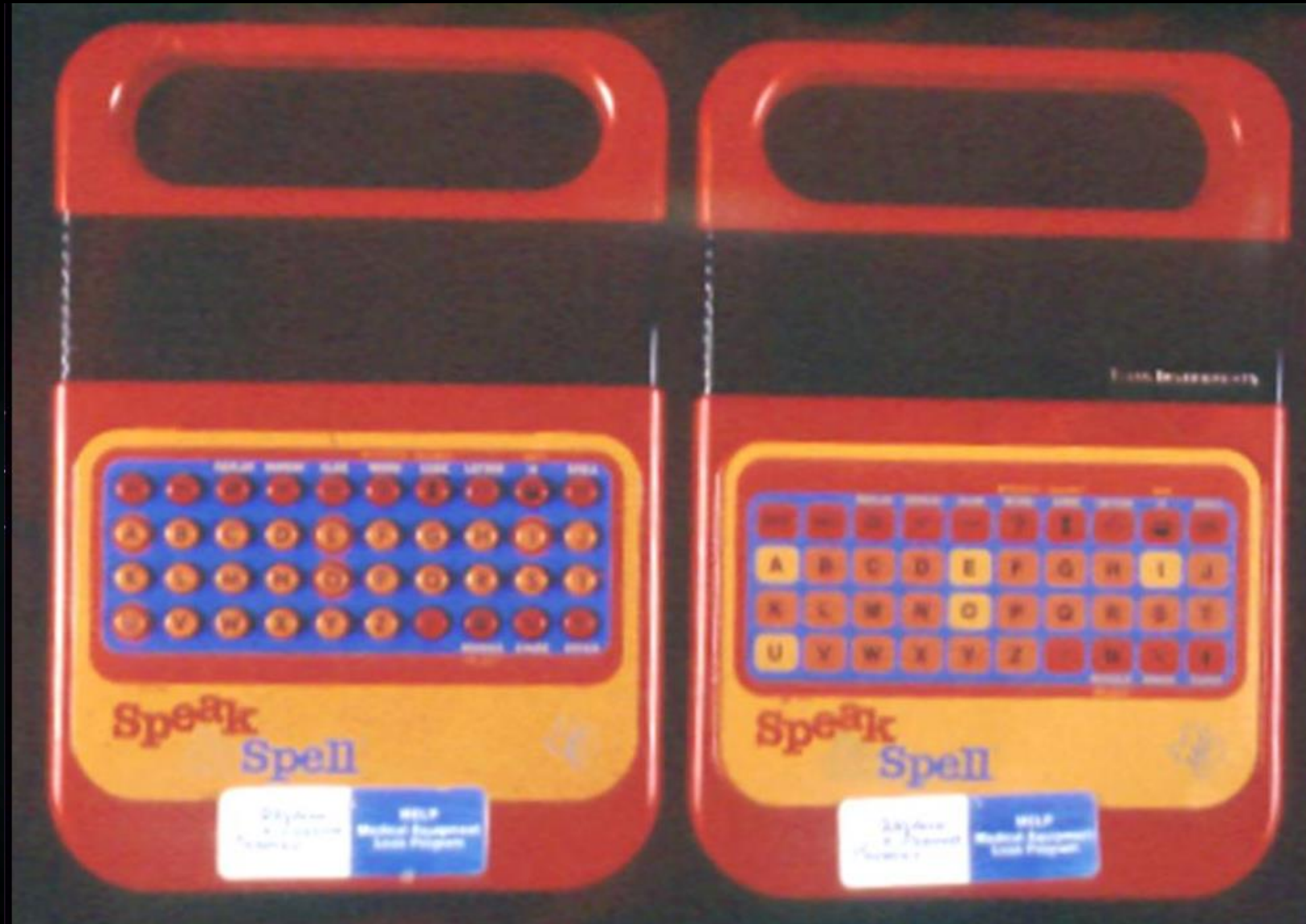


# Augmented Communication System



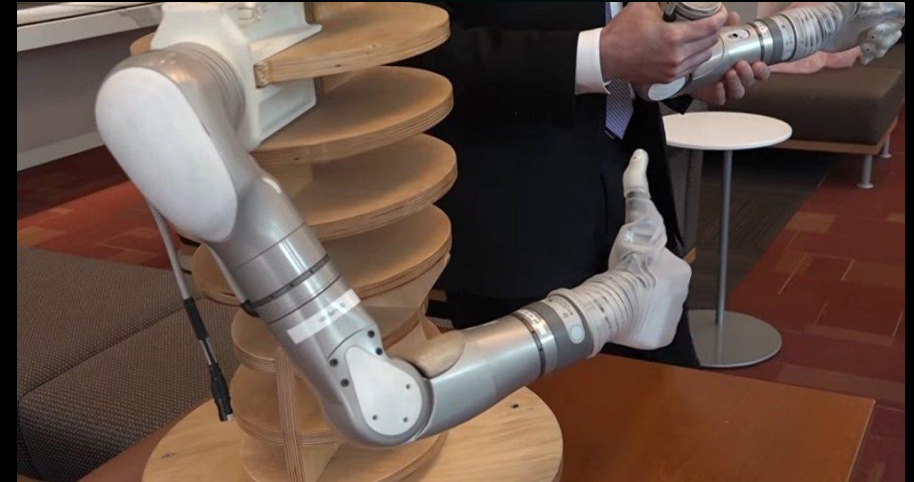


# Augmented Communication System





# Artificial Arm from 1560 - 1600



# Peg Leg Bates

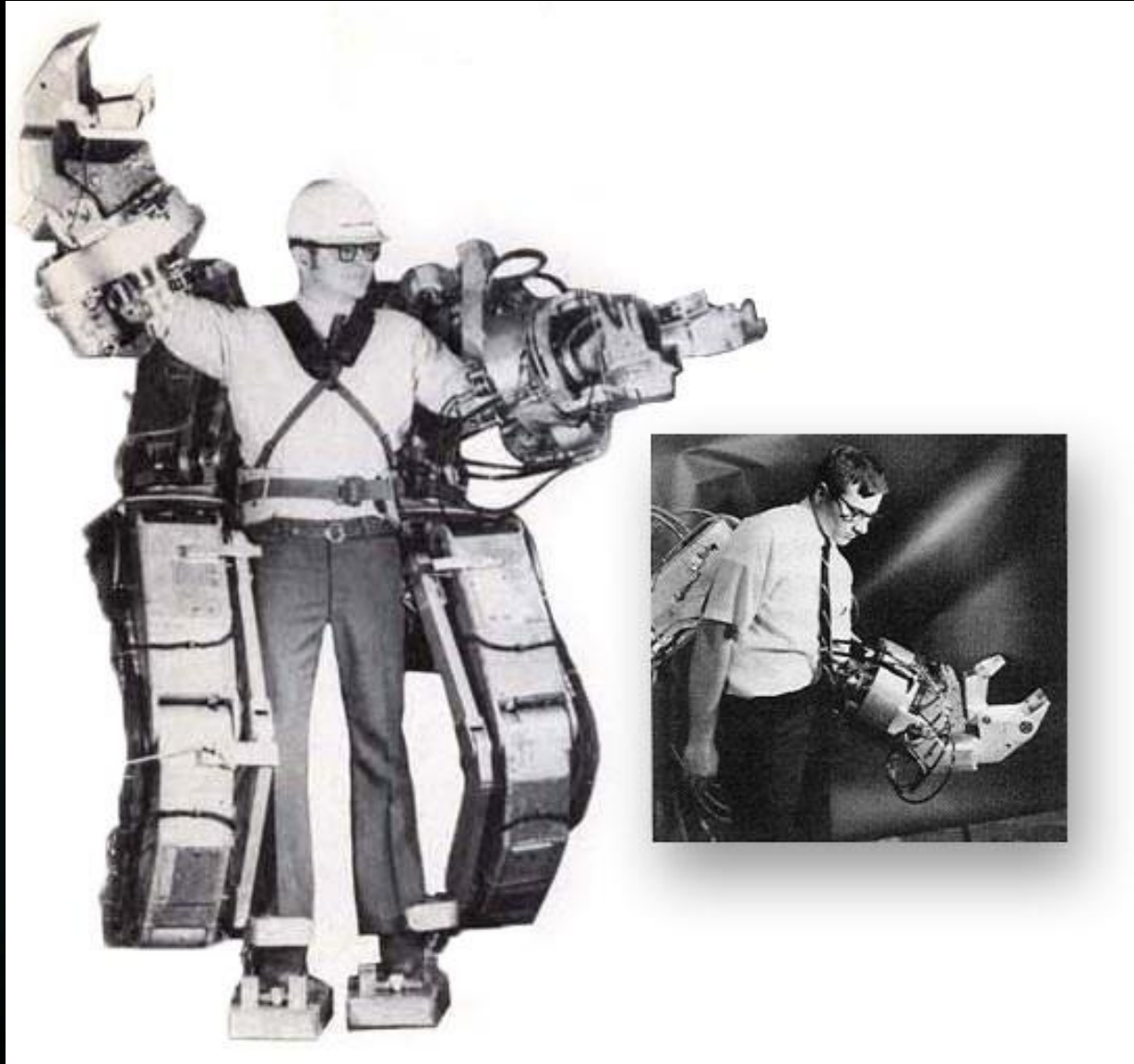


# Wooden Prosthetic Legs





# Hardiman Prototype - 1950s



# Student Exoskeleton Arms





# Ultimate Exoskeleton



# Ultimate Hand Orthotic

Space,  
Time,  
Reality,  
Mind,  
Soul,  
and  
Power.



Thanos' Infinity Gauntlet





# Steampunk Professor Xavier Wheelchair Project



Steam Punk Professor Xavier's Wheelchair  
By: Daniel Valdez  
<http://www.smecon.com/>

Video

# Orange County Chopper



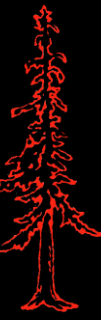
► Christopher & Dana Reeve Foundation

► [Video](#)





# Tuesday, February 16th



*Mid-term Student Project Presentations*

19 projects

# Today



*The Design and Control of Exoskeletons for Rehabilitation*

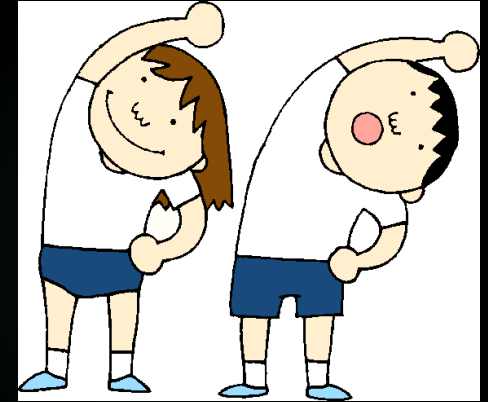
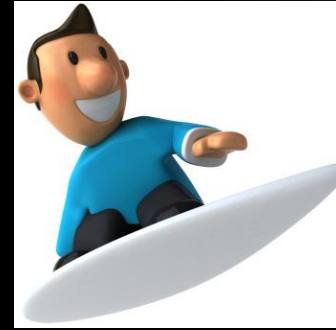
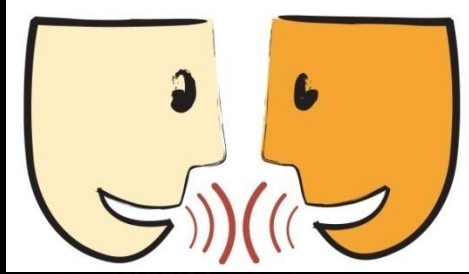
Katherine Strausser, PhD

Ekso Bionics – Principal Controls Engineer



# Break Activities

- ▶ Breakout rooms
- ▶ Attendance sheet
- ▶ Stand up and stretch
- ▶ Take a bio-break
- ▶ Text message
- ▶ Web-surf
- ▶ Respond to email
- ▶ Talk with classmates
- ▶ Reflect on what was presented in class



# Short Break

