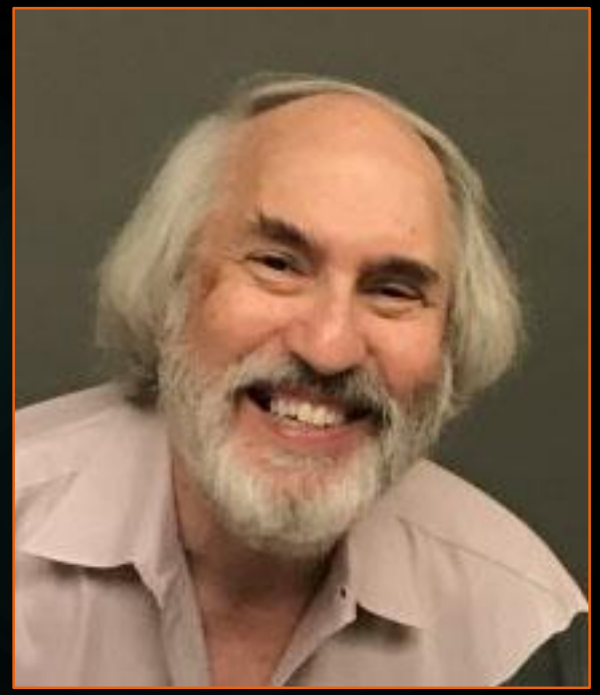
February 11, 2021

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

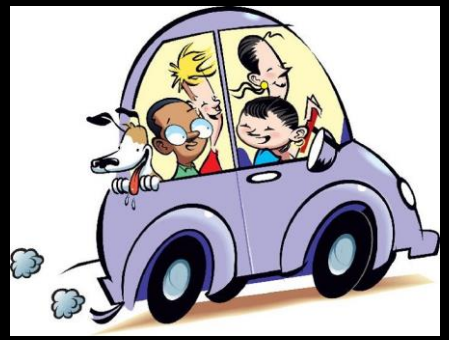
- Let me know if you are unable to arrive on time or must leave early
- Review slides and watch Zoom video of missed portion of the class session
- Make up missed class sessions

Upcoming class sessions

- Tue, Feb 16th
  Mid-term Student Project Presentations

- Thu, Feb 18th
  Aesthetics Matter & Empathy and Problem Definition
  Jules Sherman

- Tue, Feb 23rd
  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

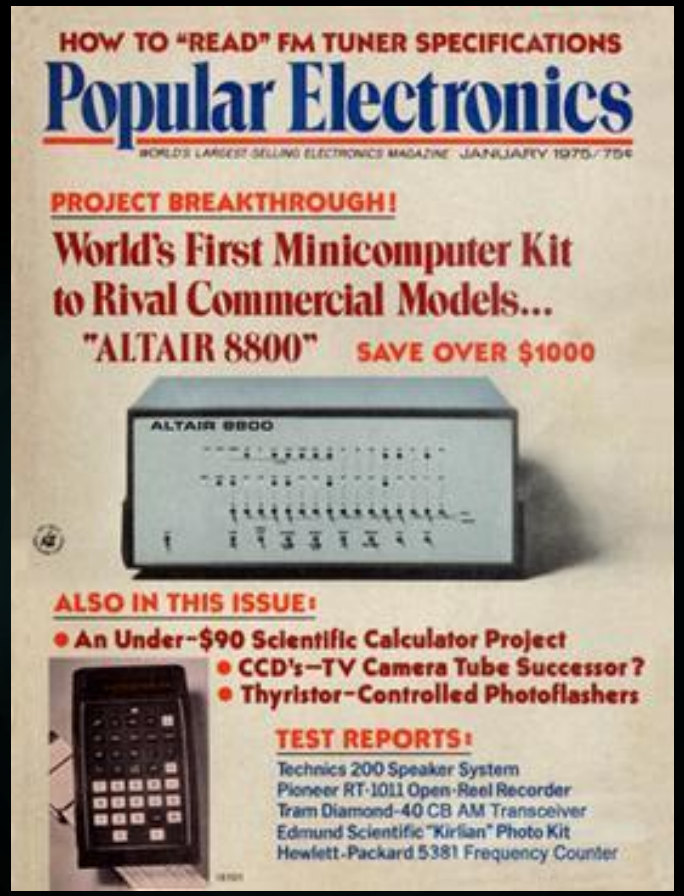
Students working on projects
Mid-term Report Update

- 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 16th
- Practice your presentation!

Vintage Technology



46 years ago!

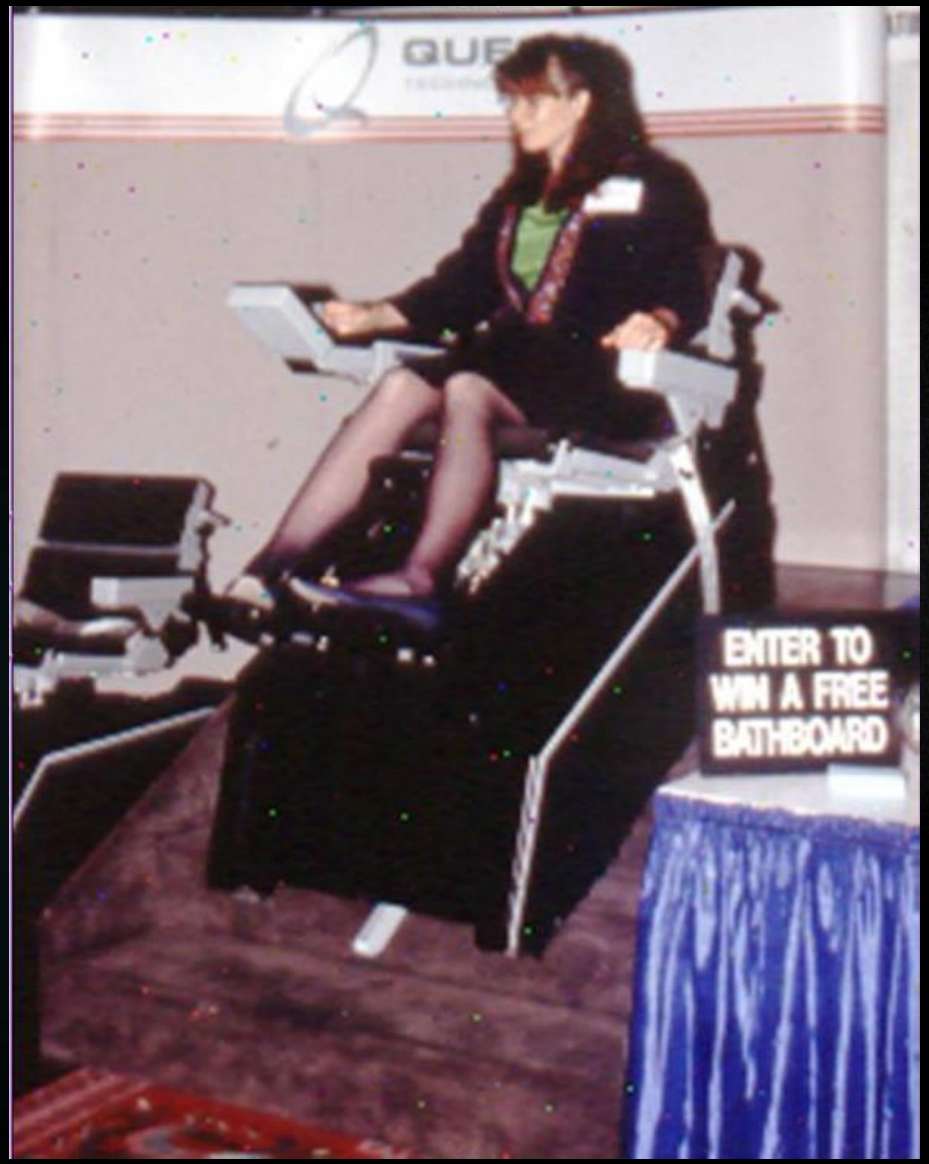
Vintage Computer Technology

Vintage Assistive Technology
Old Wheelchair Designs

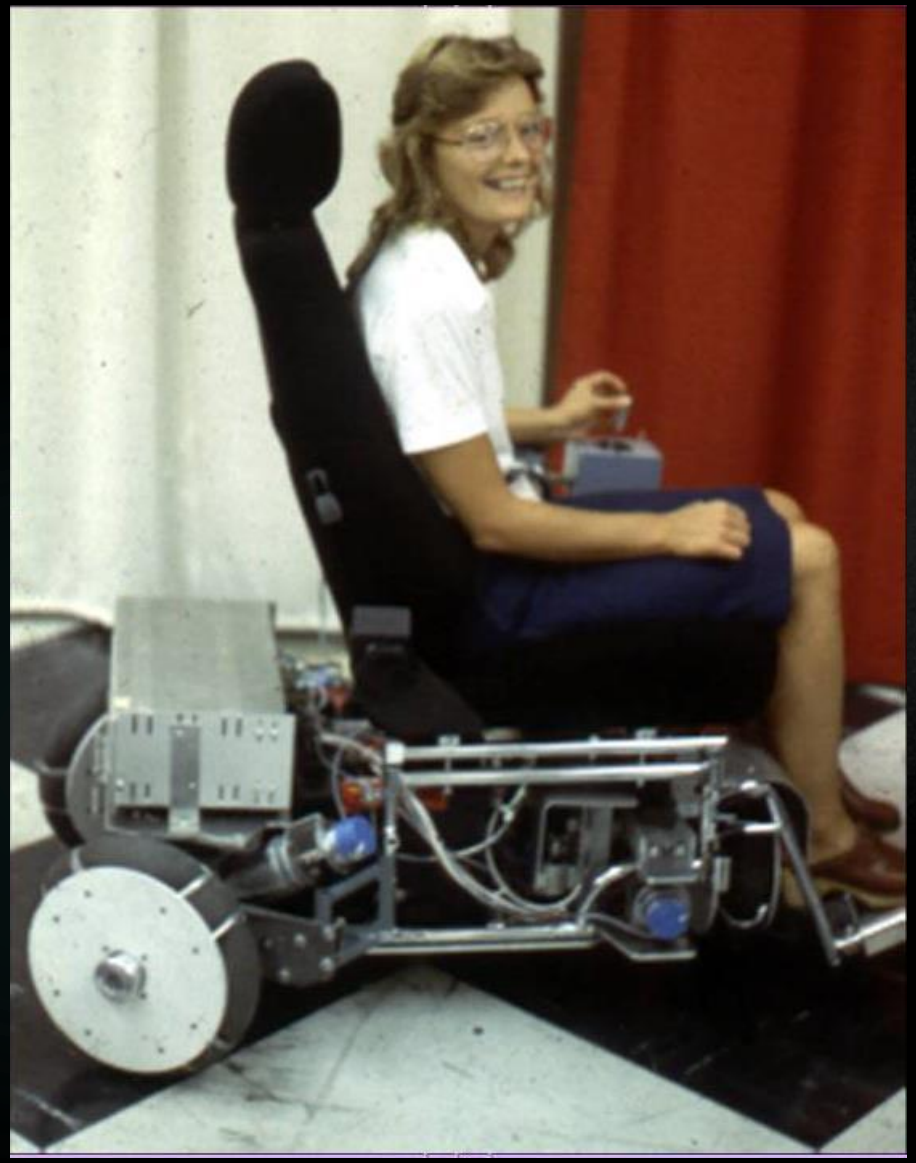
Old Wheelchair Designs

Old Wheelchair Designs

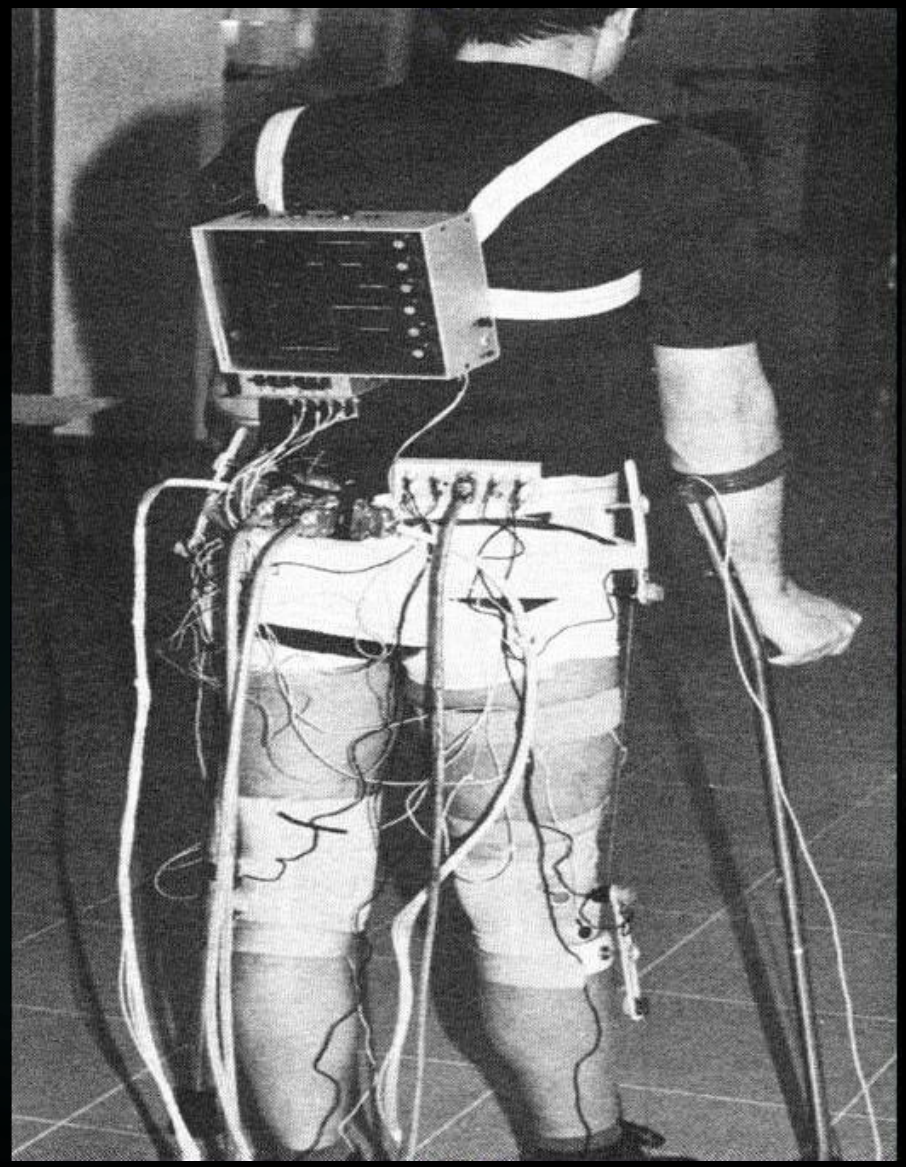
Old Wheelchair Designs



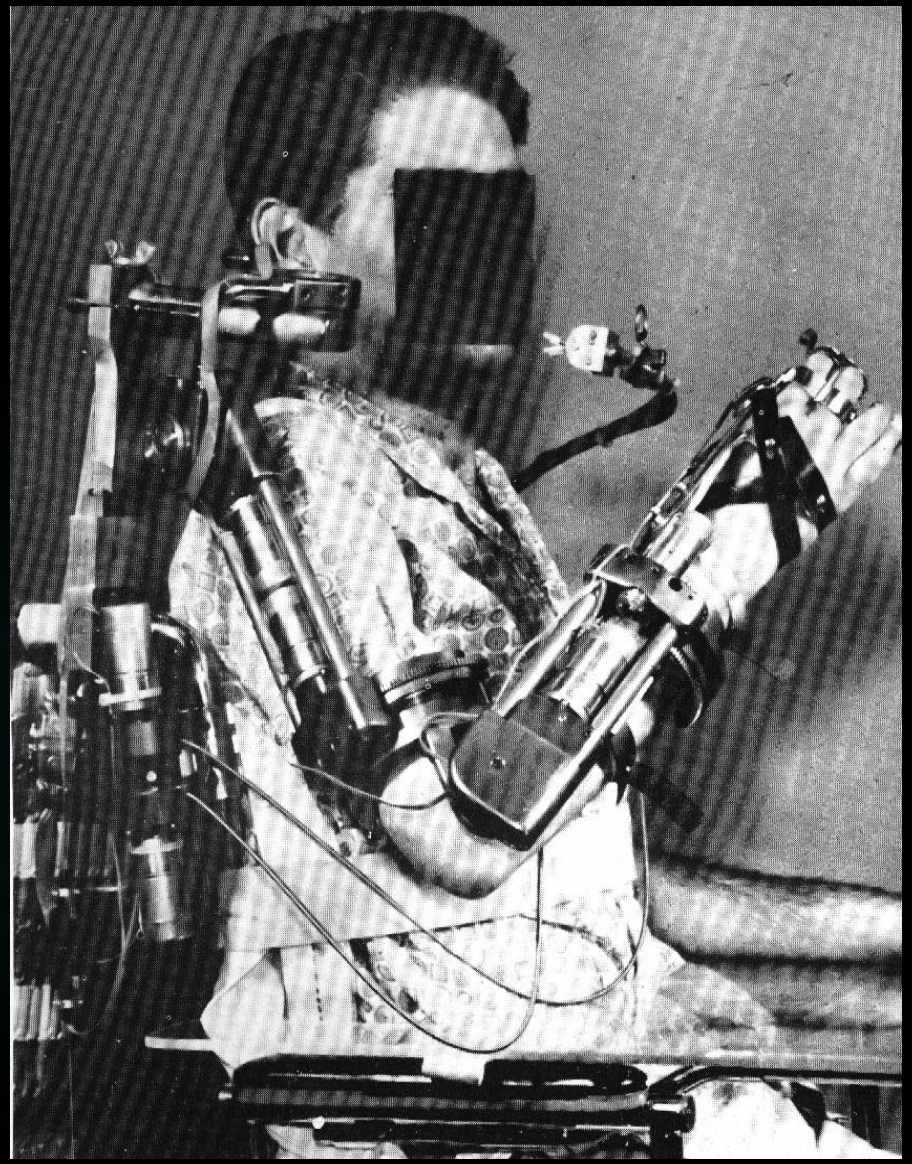
Omni-directional Wheelchairs



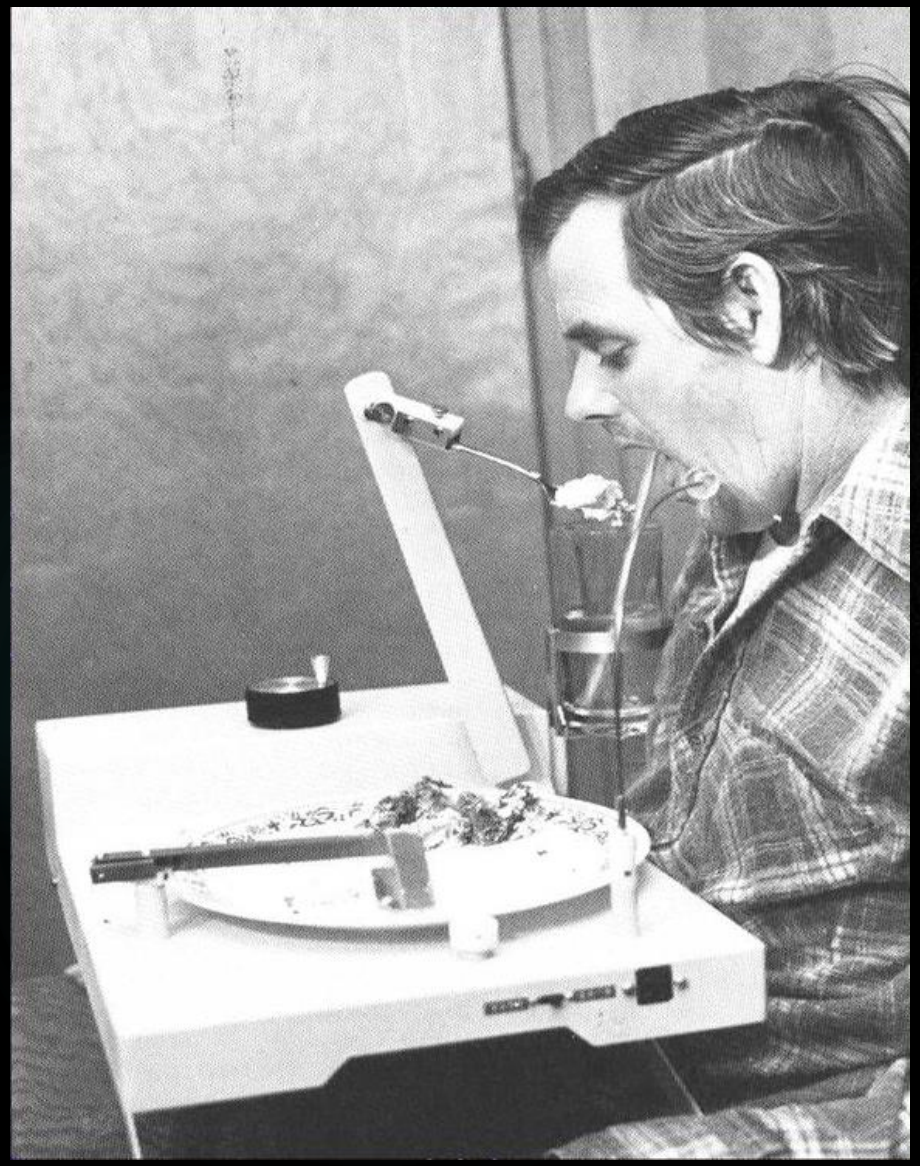
FES Walking

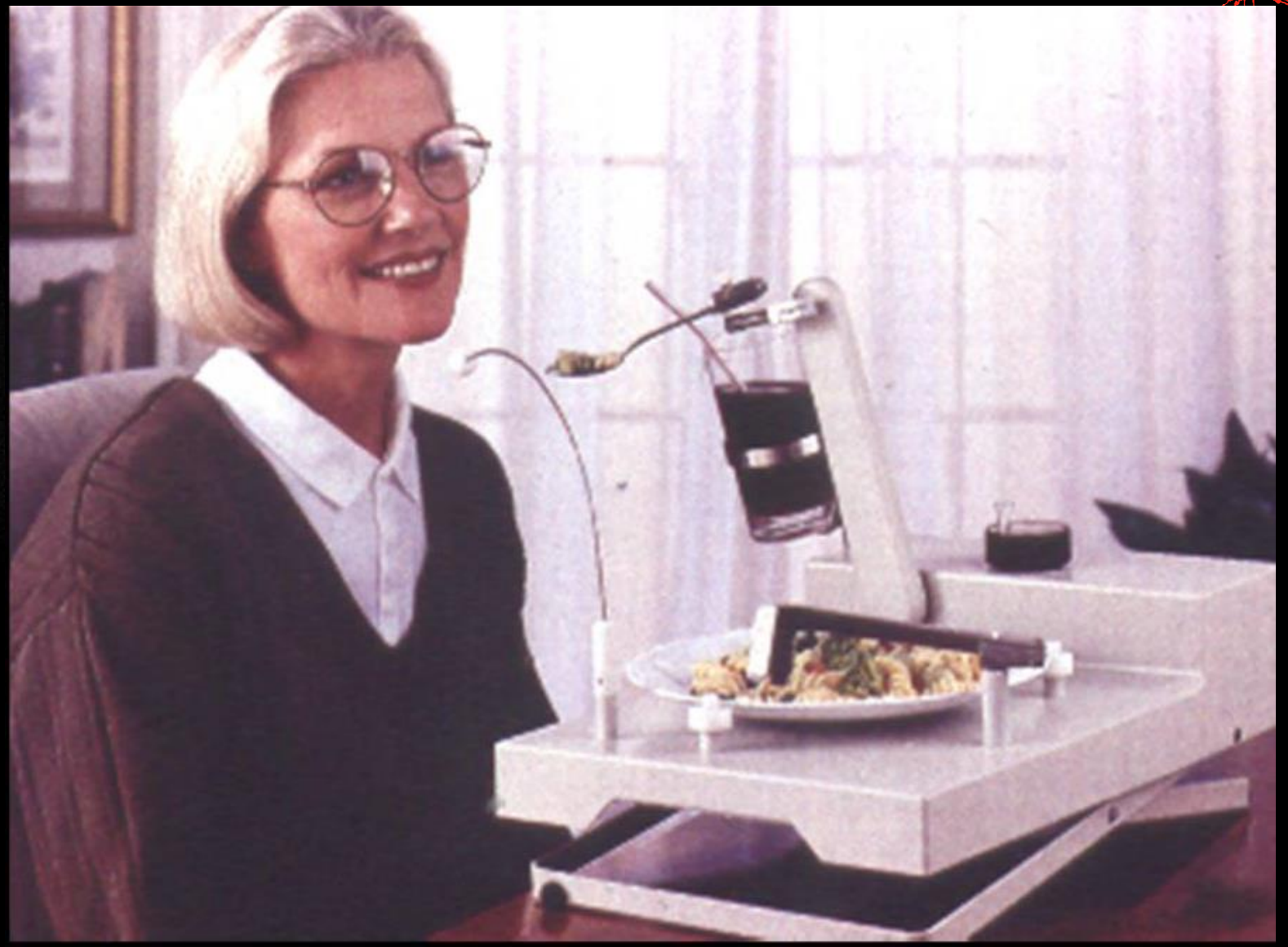


Chin Controlled Arm Exoskeleton

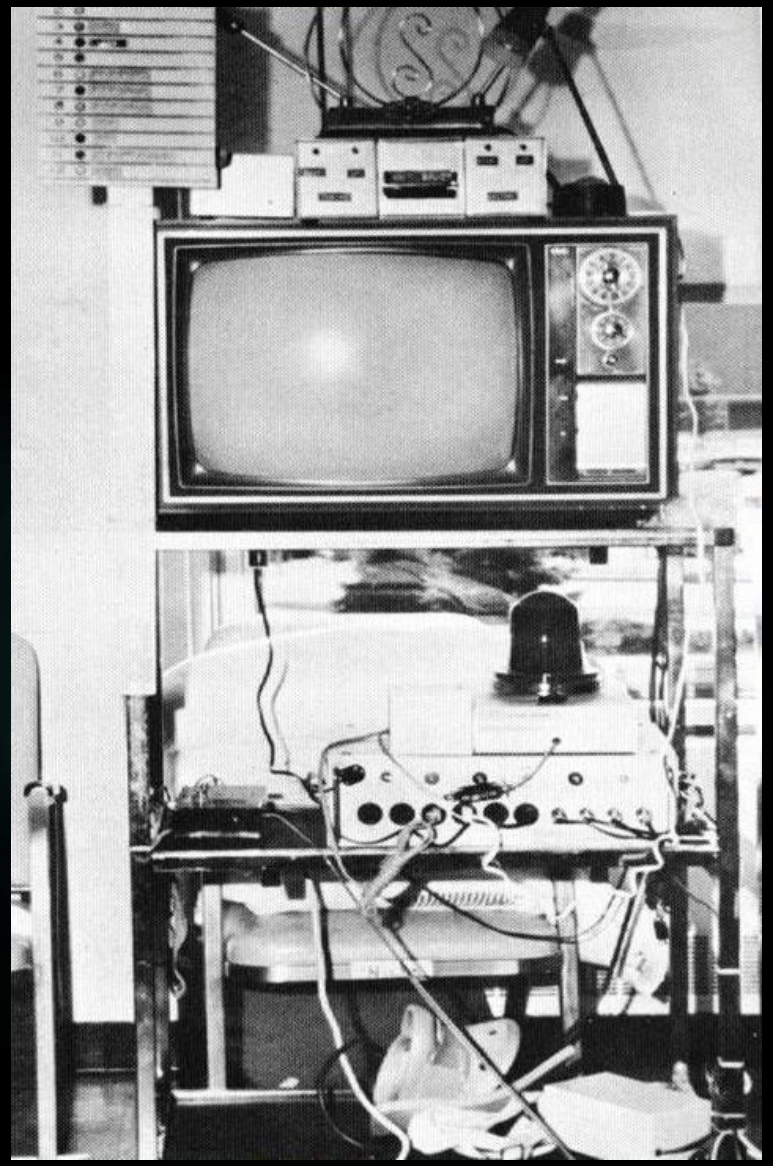


Robotic Feeding Aids





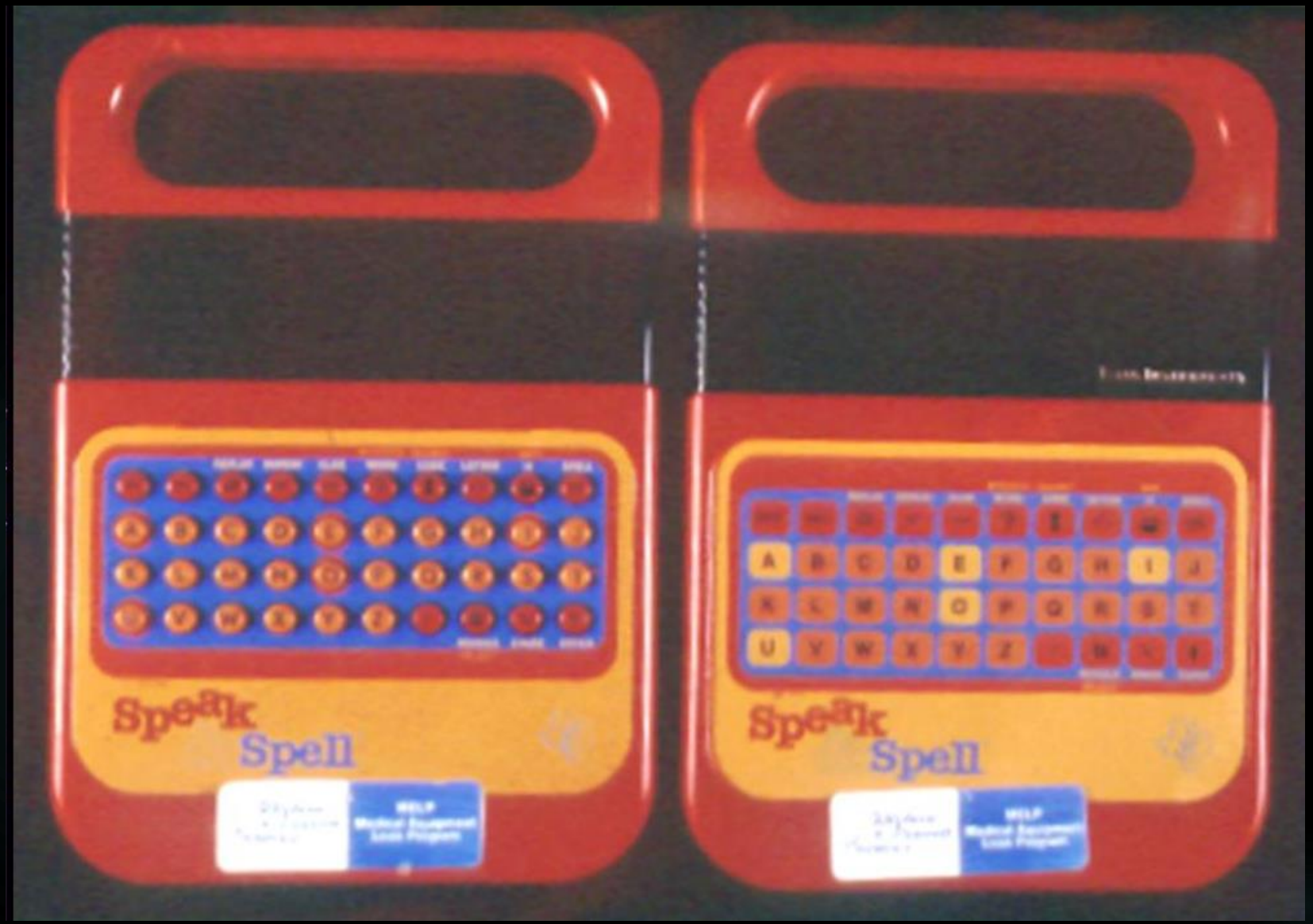
Early Environmental Control Systems



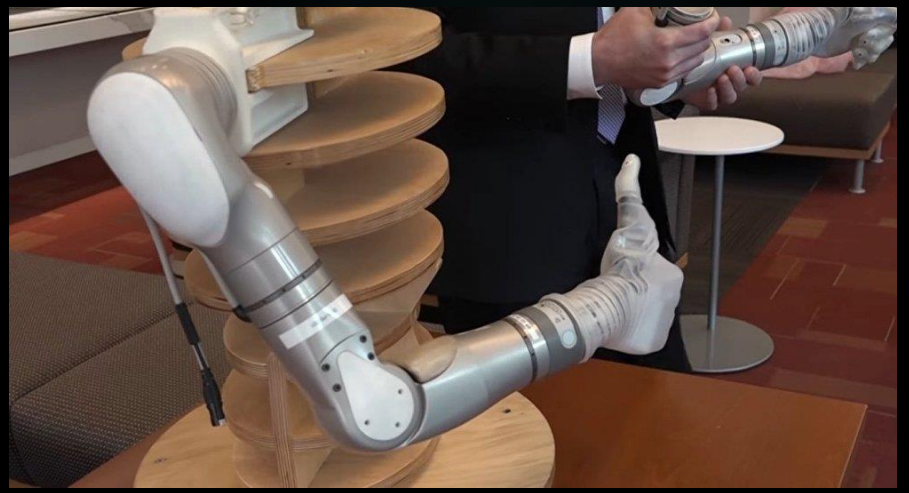
Eye Gaze Control

Augmented Communication System

Augmented Communication System



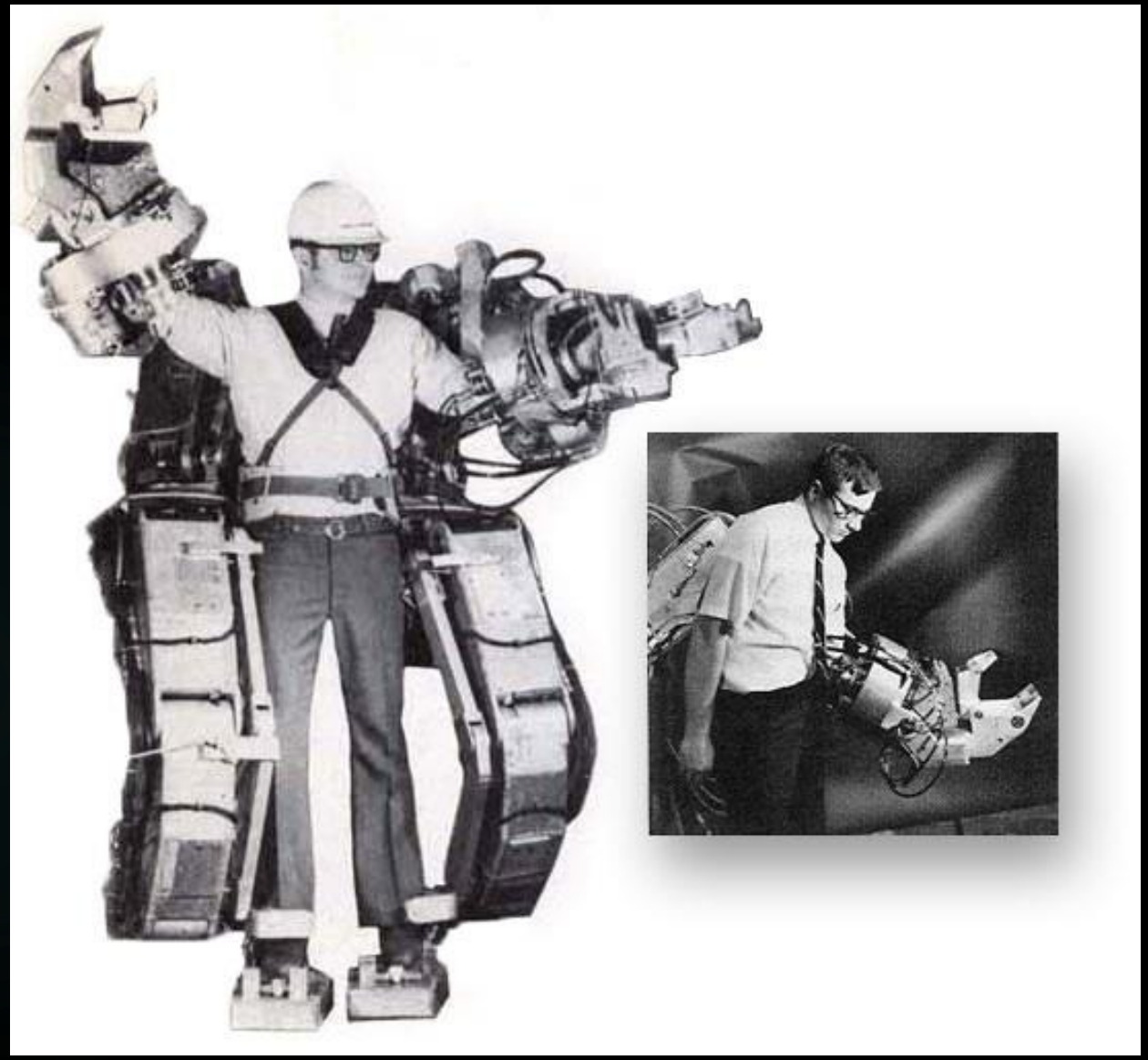
Artificial Arm from 1560 - 1600



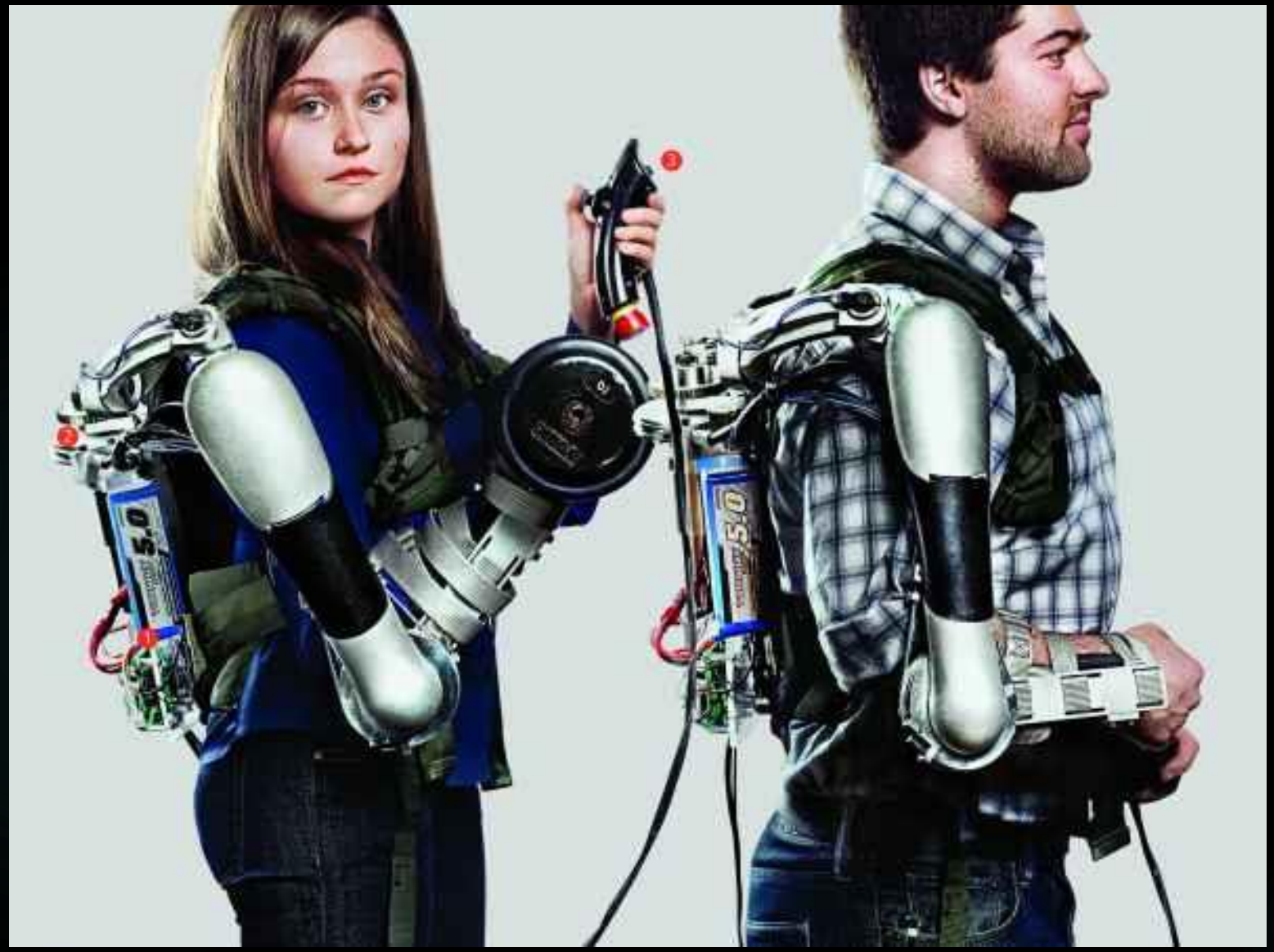
Peg Leg Bates

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

Video

Orange County Chopper

- Christopher & Dana Reeve Foundation

- Video

Tuesday, February 16th

Mid-term Student Project Presentations

19 projects

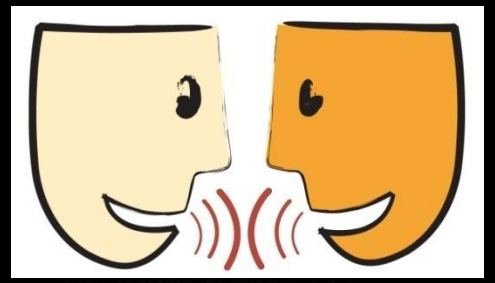
Today

The Design and Control of Exoskeletons for Rehabilitation

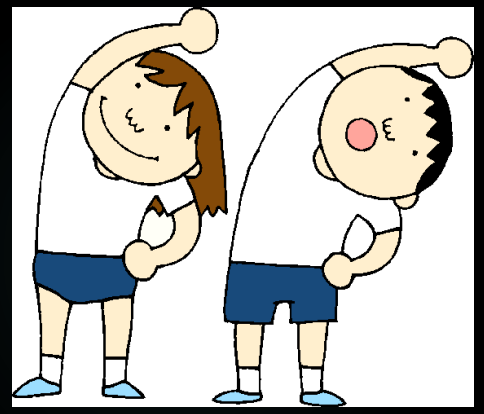
Katherine Strausser, PhD

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