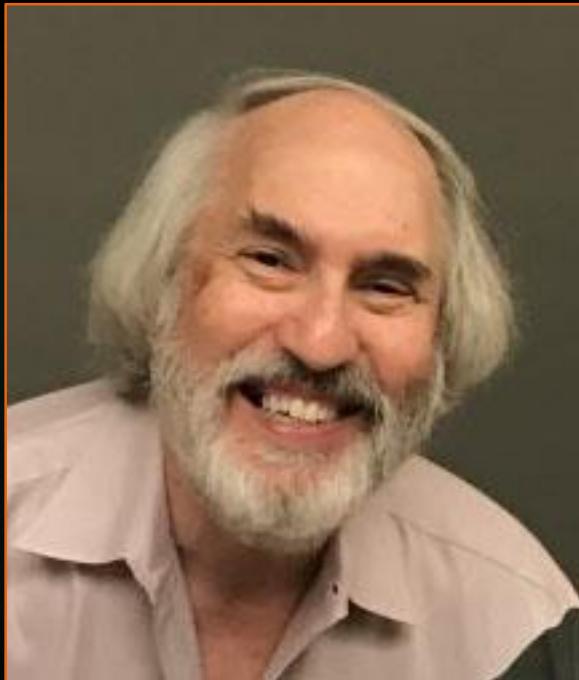


January 17, 2023
Creating Assistive Technologies - Understanding the Problem



ENGR110/210

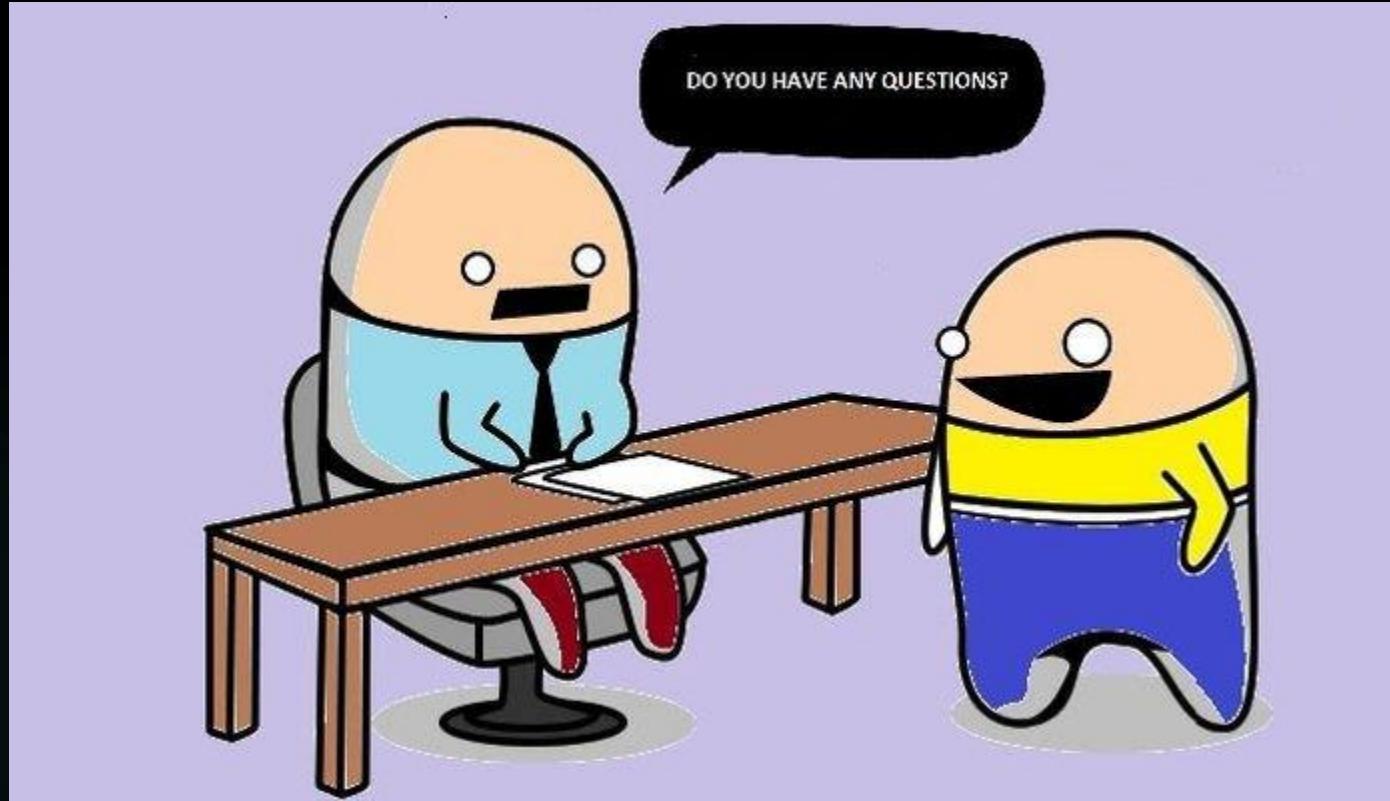
Perspectives in Assistive Technology



David L. Jaffe, MS
Instructor

17
Years

Do You Have Any Questions?



Odds & Ends



- ▶ Week 1 in Review sent on Sunday
- ▶ Pre-apologies
- ▶ Face blindness - Brad Pitt
- ▶ Individual Projects
- ▶ Team Projects



Attendance Sheet, Evaluation Form, and Meet with Dave Signup



For all students:

- Sign Attendance Sheet - important to verify your attendance
- Sign up to meet with Dave for lecture makeup, Individual Project discussion, or Team Project updates



For everyone:

- Fill out Class Session Evaluation Form



Pre-lecture Discussion Topics



Select all topics of interest - Google Form

Pre-lecture Discussion Topics

Select all topics of interest Hand in this form

- Overview of Accessibility - How this design feature relates to products, with many examples
- Ethical / Moral Dilemmas Related to Disability
- Assistive Robotics - Robotic technology benefitting people with disabilities and older adults
- In the News - New Assistive Technology products and research
- Vintage Assistive Technology - Products and devices from the past
- Ten Commandments of Making - Adam Savage's Maker Faire video
- The Upside of Failure - Learning from prototypes that didn't work
- Who is Disabled? - Making a determination with limited information
- Video Theatre - Watch and discuss videos of new products and prototypes
- Innovative Marketing Metrics - How we use words to measure and advertise
- Famous people with disabilities - Focus on TV characters
- Students' Choice - Class determines topic - specify _____

For Students Working on Team Projects



- ▶ All 9 teams have been formed
- ▶ Schedule to meet to discuss project
- ▶ How was the team formation & project selection process?

Deliverables for Team Projects



- ▶ Weekly meetings with Ayano or me and emailed project progress reports (alternate weeks)
- ▶ Mid-term presentation & report
- ▶ End-of-term presentation & report

Project Documentation



- ▶ Lab notebooks are not required
- ▶ Optional diary for your Individual Reflection
- ▶ Take photos and short videos:
 - ▶ Working with a person with a disability
 - ▶ Illustrating your design process
 - ▶ Prototypes



Work with Diligence



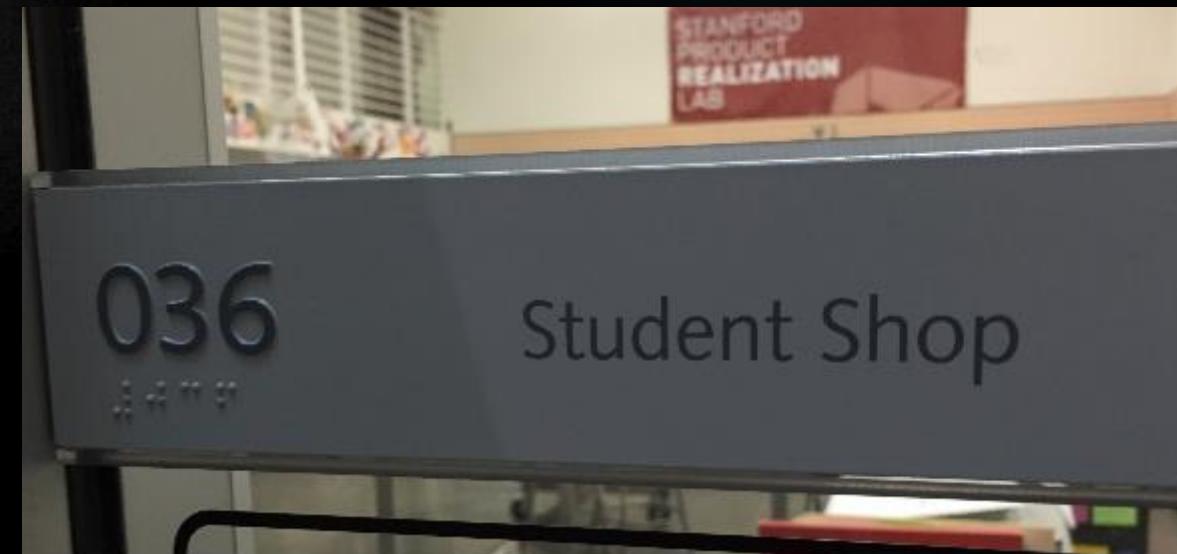
- ▶ Time is your team's most precious resource
- ▶ 7 weeks of class left to work on your projects
- ▶ Mid-term presentations in 4 weeks!



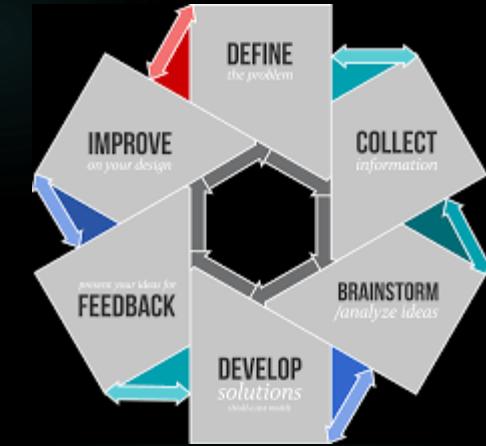
Miscellany



1. Weblinks and slides linked on lecture webpages
2. Last bits:
 - ▶ I have difficulty remembering names & recognizing faces
 - ▶ I am totally supportive
 - ▶ I want to award good grades
 - ▶ Sign up for PRL Safety Training



Student Project Preferences

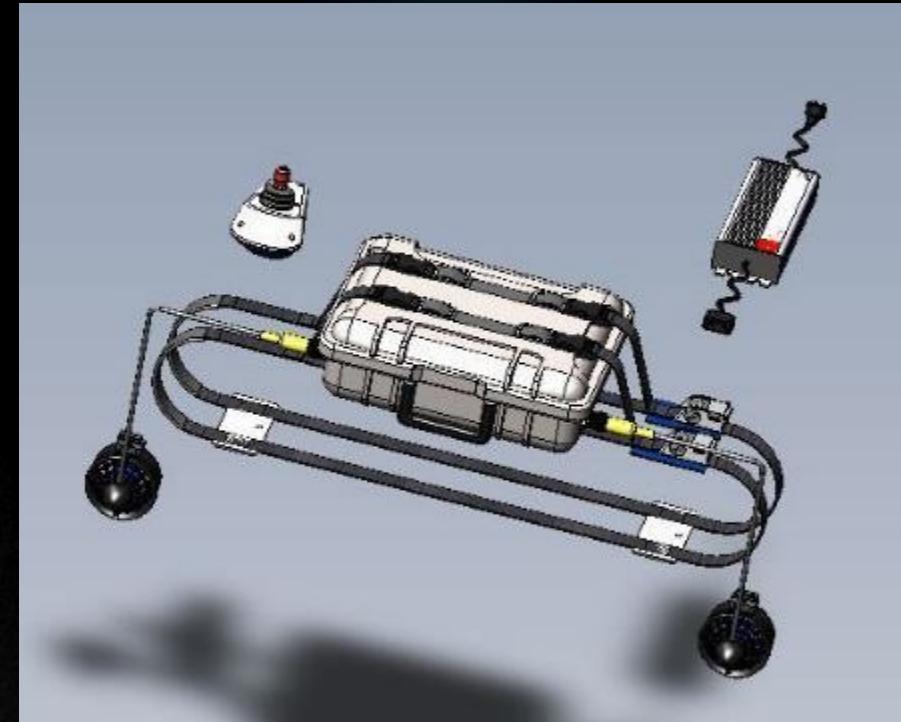


Open Projects:

- ▶ <http://web.stanford.edu/class/engr110/preferences.html#preferences>

Other Items

- ▶ Your project effort is largely self-directed
- ▶ Weekly progress reports
- ▶ Keep your receipts
- ▶ Your class participation is appreciated



Questions?

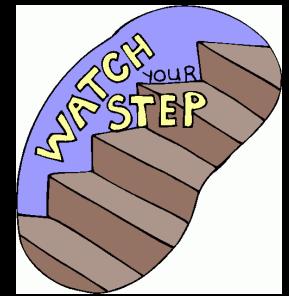


Design Process

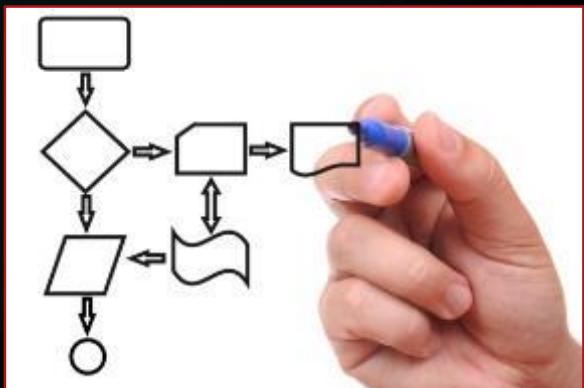


- ▶ Gayle & I have similar - but not identical - thoughts about Design Process
 - ▶ I have an engineering outlook based on teaching this course
 - ▶ Gayle has a Product Design viewpoint

THE DESIGN PROCESS

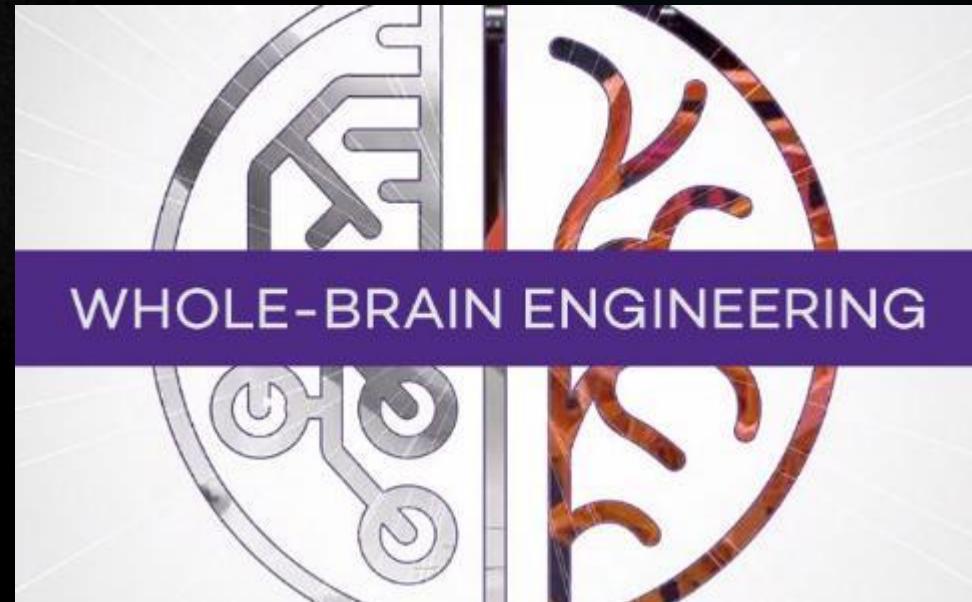
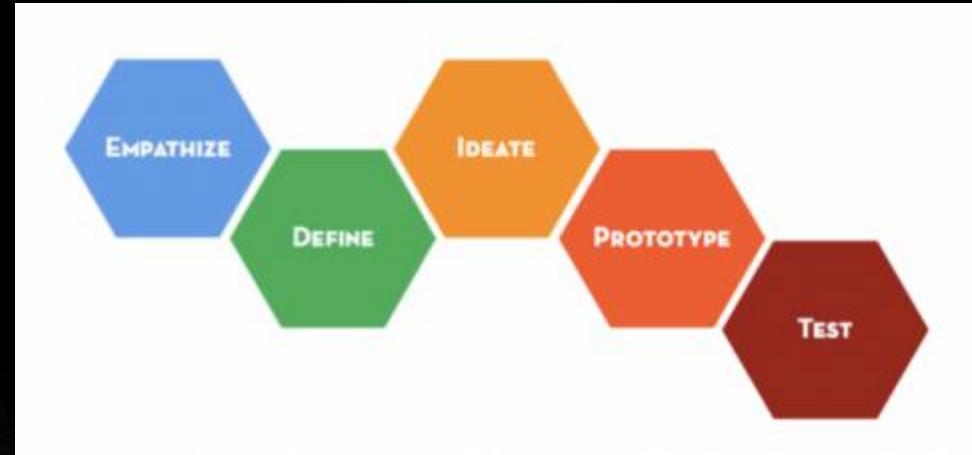


- ▶ A process is a step-by-step plan of action employed by makers, designers, or engineers to achieve a goal.
- ▶ Using a structured process increases the chances of success - and getting a good grade.



Design Processes

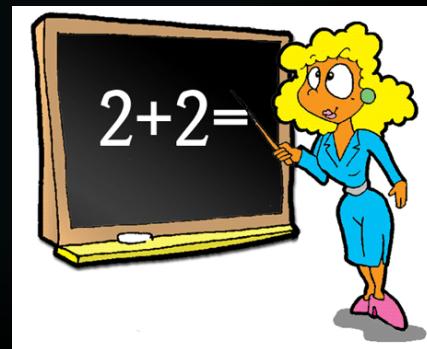
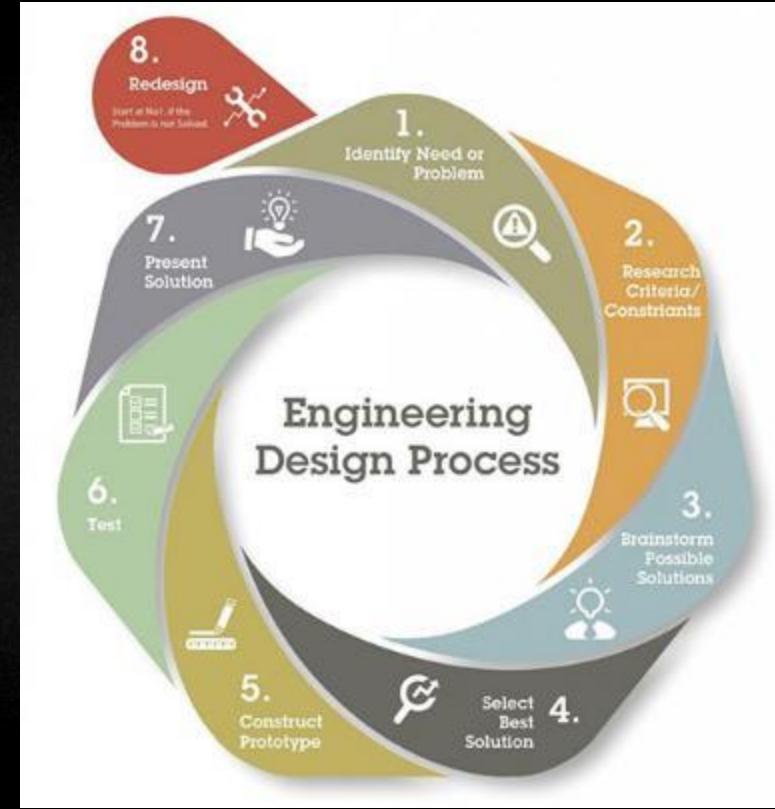
- ▶ Design Thinking - d.school Stanford
- ▶ Liberatory Design - USF
- ▶ People-First Engineering - UM
- ▶ Whole-Brain Engineering - NU
- ▶ Human-Centered Design
- ▶ User-Centered Design
- ▶ Empathetic Design
- ▶ Compassionate Design
- ▶ Co-Design
- ▶ Cooperative Design
- ▶ Bystander Design
- ▶ Biological Design Process = Evolution



The Engineering Design Process Activities

- ▶ **The Problem / Challenge**
- ▶ Brainstorming
- ▶ Selecting Design Concepts
- ▶ Prototyping (5 sub-activities)
- ▶ Communication (4 sub-activities)
- ▶ Role of the User

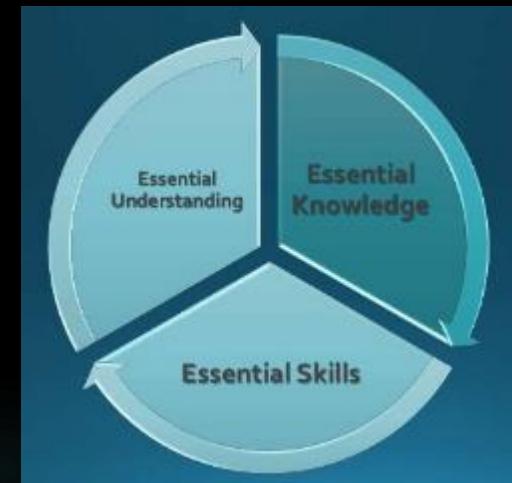
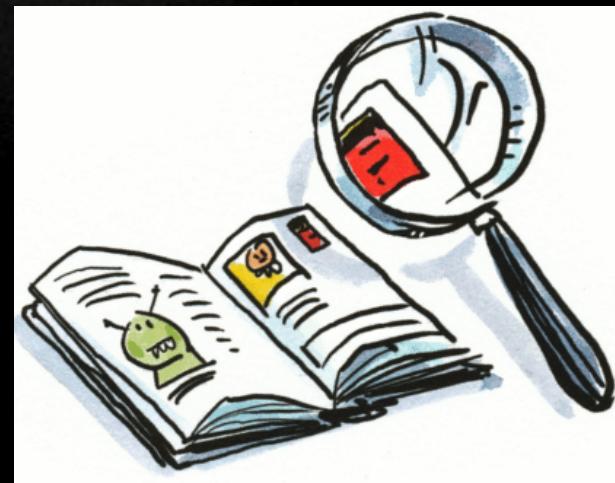
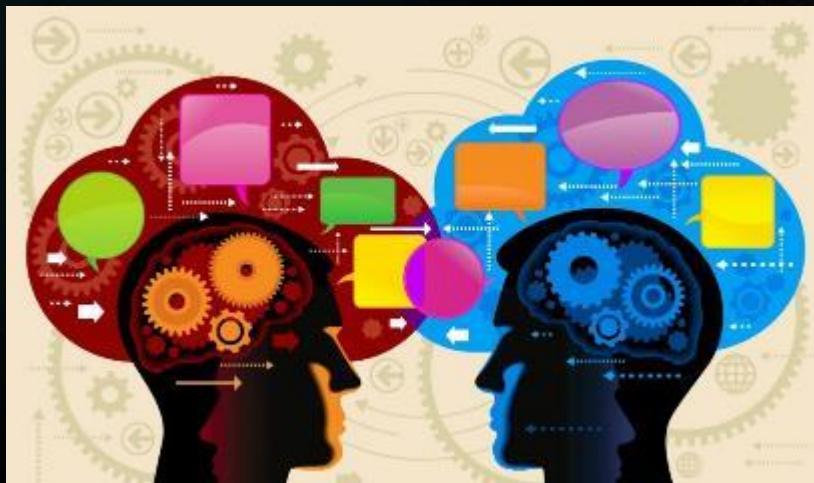
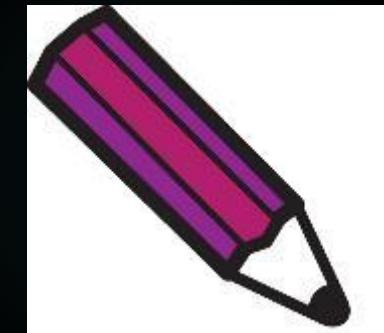
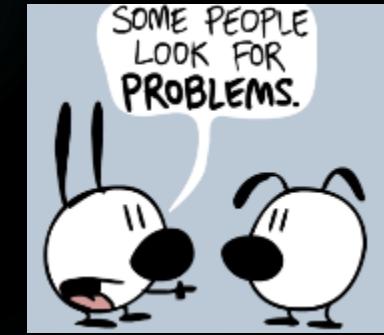
DESIGN SQUAD



The Design Process

The Problem / Challenge

1. Search for the Problem
2. Identify the Problem
3. Describe the Problem
4. Pitch the Problem
5. Understand the Problem
6. Determine the Need



The Design Process

Understand the Problem

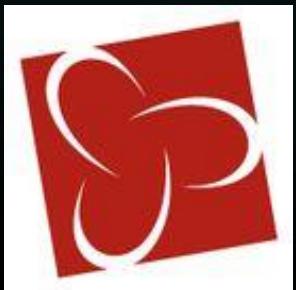
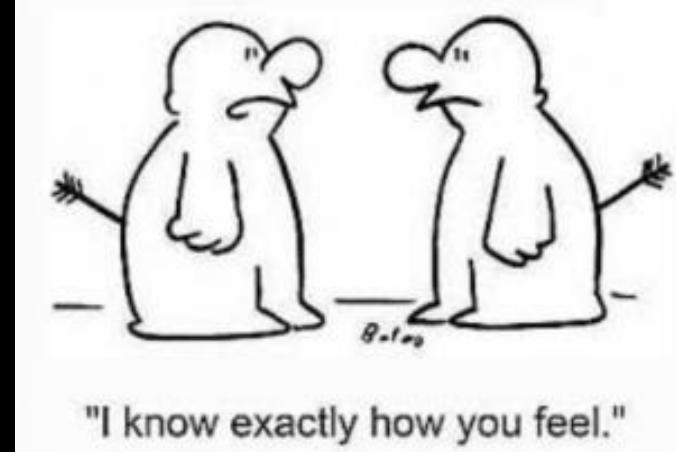
- ▶ Clarify goals and objectives
 - ▶ Incorporate users' perspectives and standards of care
- ▶ Gather information
 - ▶ WWW, library, journals (research)
 - ▶ Product catalogs (existing products)
 - ▶ Stakeholders
 - ▶ Experts & health care professionals



The Design Process

Understand the Problem

- ▶ Often called “Empathy”
- ▶ Find out as much as you can
- ▶ User's specific background and situation
- ▶ Review information on the disability condition
- ▶ Solicit the perspectives of people with disabilities and older adults, family members, friends, health care professionals, colleagues, researchers, engineers, product suppliers
- ▶ Query professionals via online listservs



The Design Process

Understand the Problem

- ▶ “While a user may have a very good handle on *The Problem*, he/she may not fully appreciate the benefits and limitations of technology.”
- ▶ “Since each person has *his/her own circumstances, desires, and sense of aesthetics*, a solution for one user may not be applicable for the entire user population.”

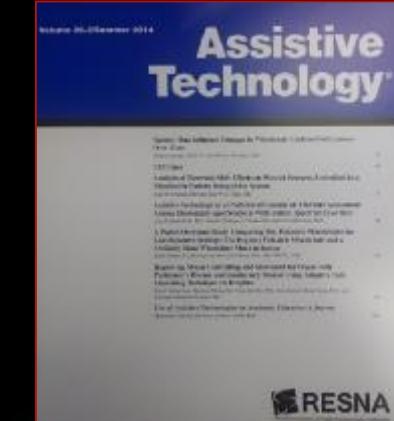
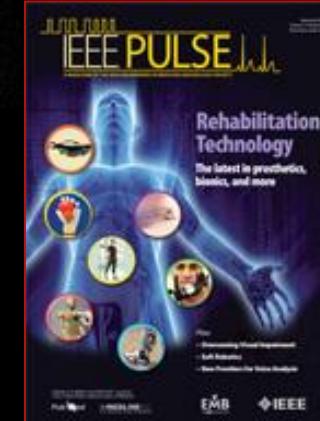


The Design Process

Understand the Problem

Research current solutions

- ▶ Published research
- ▶ Articles in popular media
- ▶ Previous student projects
- ▶ Product catalogs



The Design Process

Understand the Problem

Research current solutions

- ▶ What products currently address the problem?
- ▶ What products are most commonly used?
- ▶ What is considered the standard of care?
- ▶ You may not want to reinvent what already exists or has already been tried
- ▶ Build on existing solutions

“Sometimes the only problem is a lack of awareness of a suitable existing solution.”



The Design Process

Understand the Problem

- ▶ Determine why current “solutions” don’t work
 - ▶ Important to find limitations of current products:
 - ▶ High cost, weight, reliability, etc
 - ▶ Ineffectiveness
 - ▶ Non-compliance or non-use
 - ▶ Poor aesthetics, functionality, durability, fit
 - ▶ Does not take advantage of current technology
- ▶ Why a new solution may not work
“*The old shoe is more comfortable.*”
Barbara (age 92)

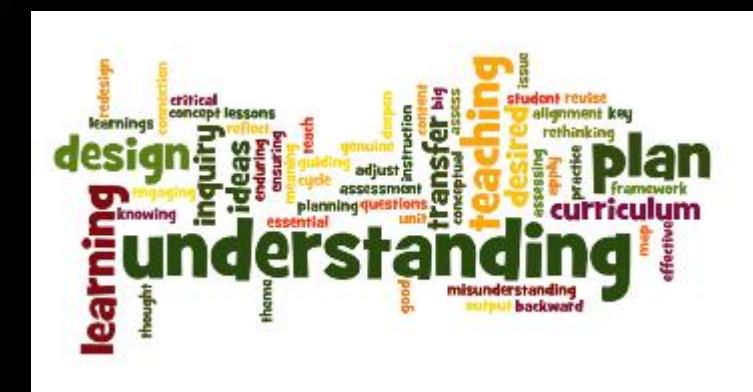
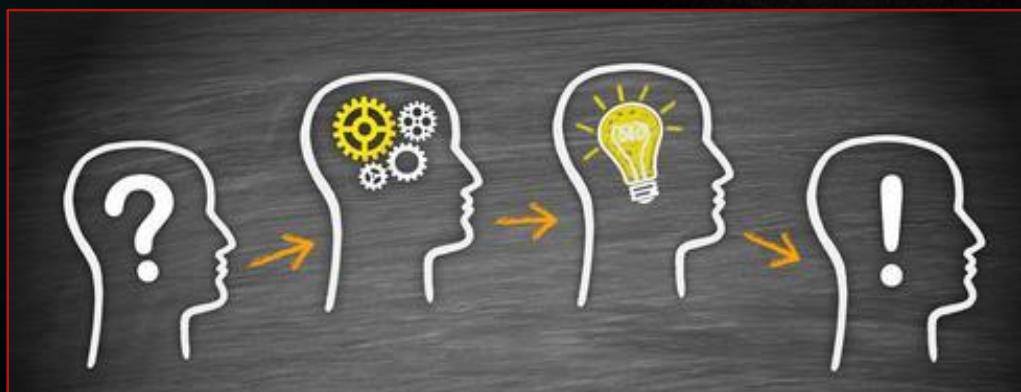
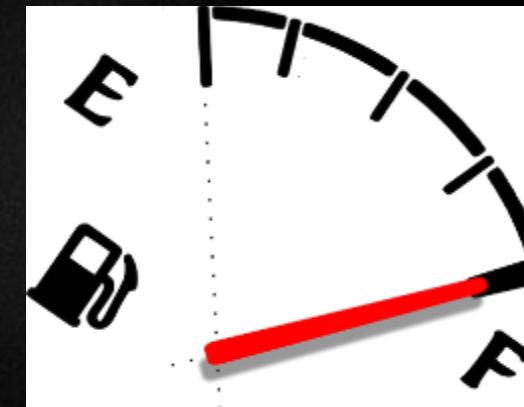


The Design Process

Judge the Need



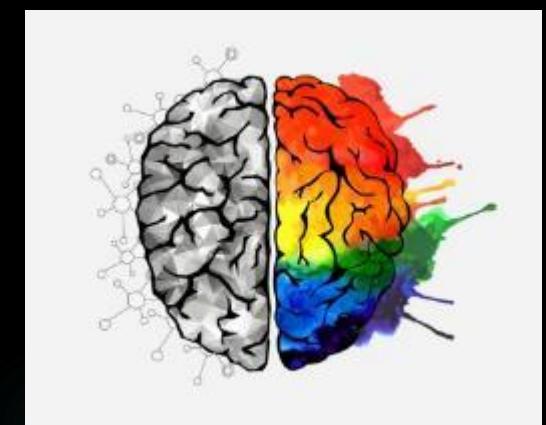
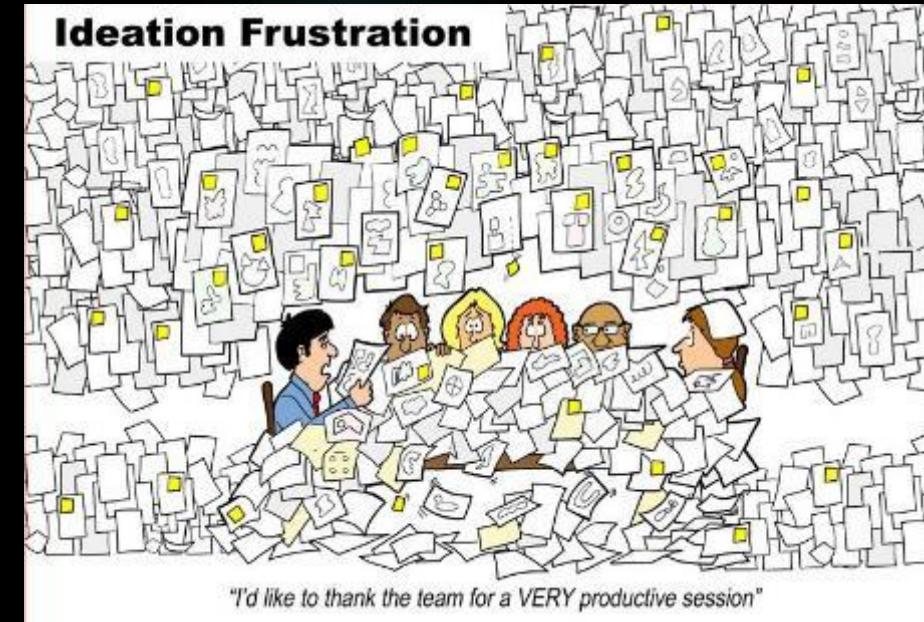
“Judge what is needed from a full understanding of the problem.”



The Design Process

Brainstorming

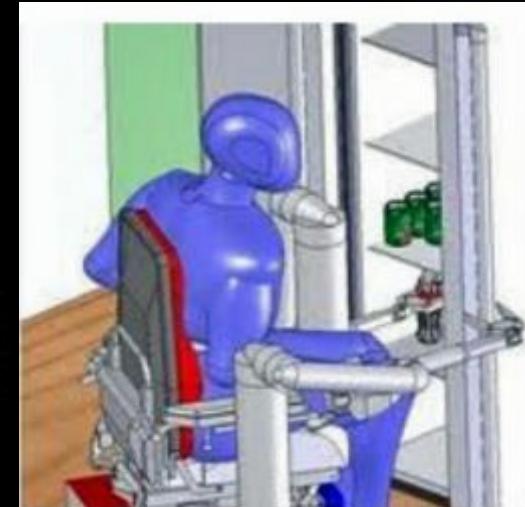
- ▶ Idea Generation - also known as “Ideation”
 - ▶ Morphological charts
 - ▶ Brainstorming
 - ▶ Other techniques
- ▶ Develop multiple preliminary ideas, concepts
- ▶ Don’t get stuck on your original idea - Anchor Effect



The Design Process

Survey Technology

- Seek out technology - including existing products - that could be brought to bear on the problem



How to interact with users

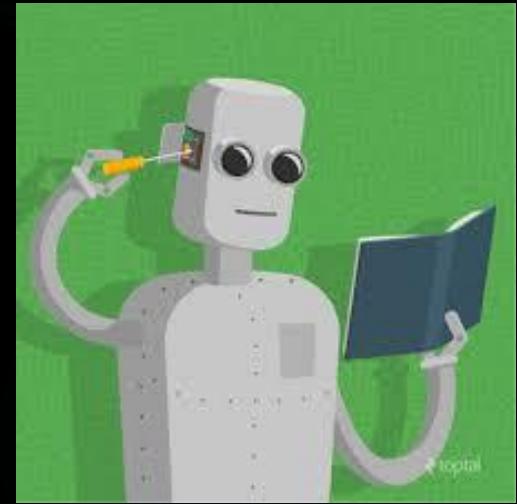
- ▶ Observe the problem / challenge in-person
- ▶ Encourage them to tell a story
- ▶ Understand what a solution should do, but not how to do it
- ▶ List design features - don't forget the “coolness factor”
- ▶ Recognize that you may not be aware of the limitations and benefits of technology
- ▶ Interact with user / suggestor



Engineering Design Process



- ▶ Does not include:
 - ▶ Building to another's vision
 - ▶ Making incremental improvements
- ▶ Utilize project resources and team skills
 - ▶ Person who suggested project
 - ▶ Course resource people
 - ▶ PRL & its CAs
 - ▶ Classmates
 - ▶ Dave
- ▶ Make and justify all your project decisions



Other Observations

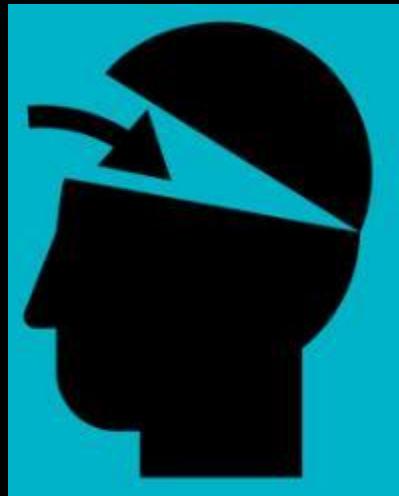
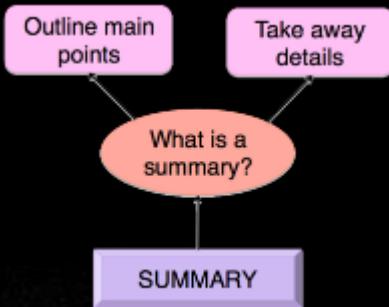
- ▶ Assistive Technology is a highly fragmented market
- ▶ A small market means high prices
- ▶ Avoid getting stuck in one aspect of the design process

“It’s not a failure if you learn something.”



SUMMARY

- ▶ Describe the problem
- ▶ Understand the problem
- ▶ Survey technology that addresses the problem
- ▶ Very few design concepts make it to market
- ▶ Advice for student engineers:
 - ▶ Employ users, caregivers, health care providers, and experts at each stage of the design process
 - ▶ Anticipate and plan for both successes and setbacks during development
 - ▶ “Fail” early and learn from “failures”
 - ▶ Start prototyping with low-cost materials



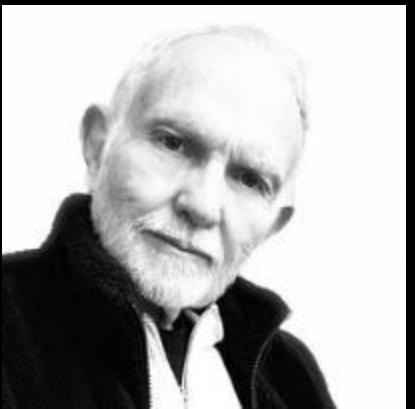
Thursday, January 19th



Bridging the Gap between Consumers
and Products in Rehabilitation Medicine

Deborah E. Kenney, MS, OTR/L
Stanford University
VA Palo Alto Health Care System
Foothill College

Today

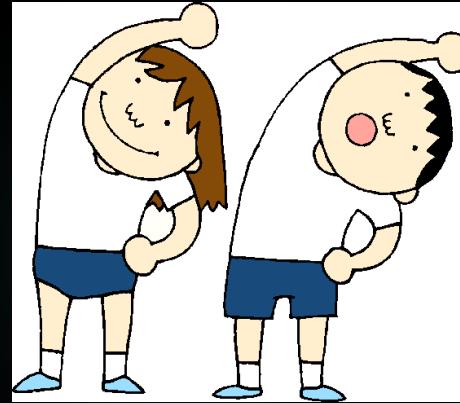
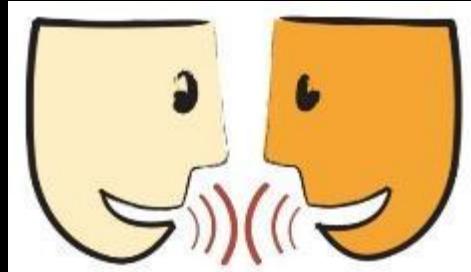


Creating Assistive Technologies - Understanding the Problem

Gayle Curtis, MS - UX Design Consultant

Break Activities

- ▶ Fill out forms
- ▶ 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

