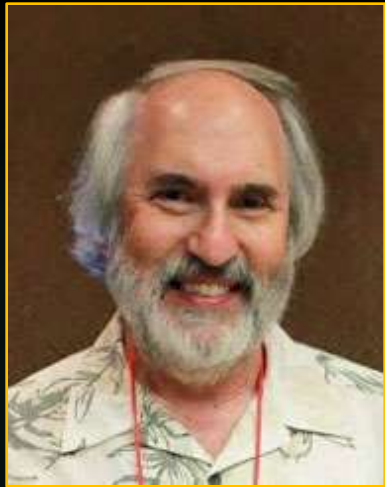


January 15, 2019
Needfinding and Assistive Technologies - Gayle Curtis



ENGR110/210

Perspectives in Assistive Technology



David L. Jaffe, MS
Instructor

13
Years



Pre-lecture Discussion Topics



Select all topics of interest

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 Individual Projects



Tulsi
Trisha
Stella

- ▶ Consider the these options:
 - ▶ Assistive technology topic
 - ▶ Paper design of an assistive technology device
 - ▶ Work of art
 - ▶ Aftermarket aesthetic, functionality, usability design
- ▶ Interview an individual with a disability. This could include: a family member, a friend, a classmate, a community member attending class, or others that I can suggest
- ▶ Report on their lives, challenges they have faced, successes they have achieved, desires for their future, assistive technology they use, and problems they have experienced with them.
- ▶ Meet with Dave to agree on project

Team Project Selection Procedure



The image shows a screenshot of a spreadsheet titled "ENGR110/210 Student Team Project Preferences - 01/15/2018 - 8:00am". The spreadsheet has a header row labeled "Student / Project" and contains multiple columns and rows of data, likely representing student preferences for various projects.

- ▶ Browse to [Project Preferences](#)
- ▶ Or suggest a student-defined project
- ▶ Make sure the project your are interested in is [available](#)
- ▶ Contact project suggestor for more information & access to users
- ▶ Refer to [Student / Project Preference Matrix](#)
- ▶ Contact other students who have similar project interests
- ▶ Verify their desire and availability to work on the project
- ▶ Once a **team of three** is formed, email me with your project selection, team members, and team name - **due this Friday**

Available Projects



- ▶ Abby's Wheelchair
- ▶ Simultaneous Operation
- ▶ Harness for Nathan
- ▶ ~~WHILL~~ Recharging
- ▶ Magical Bridge with Jay
- ▶ Magical Bridge with Olenka
- ▶ Elbow Lifter
- ▶ Pick Me Up
- ▶ Wheelchair Dancing
- ▶ Instrumented Wheelchair
- ▶ Get a Grip
- ▶ Clean House
- ▶ Within Reach
- ▶ Creative Expression
- ▶ Designing Your Afterlife
- ▶ Student-defined projects



Team Project Selection Policies



- ▶ Form a team of three
- ▶ There are 27 students enrolled in Team Projects, so there will be exactly 9 teams
- ▶ The Magical Bridge Playground supports two teams - one with Jay, one with Olenka
- ▶ Projects are reserved on a “first-to-submit” basis



Team Project Selection Policies



- ▶ Ok for the two *Magical Bridge Playground* teams to share background tasks
 - ▶ Driving to the facility
 - ▶ Interviewing project suggestors



Team Project Selection Policies



Since there is no guarantee that other students will have the same project interests or that your preferred projects will still be available, you should be prepared to:

- ▶ convince others to work with you on one of your selected projects
- ▶ consider working with another student on a project he/she has chosen
- ▶ keep an open mind



Project Documentation

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



Work with Diligence

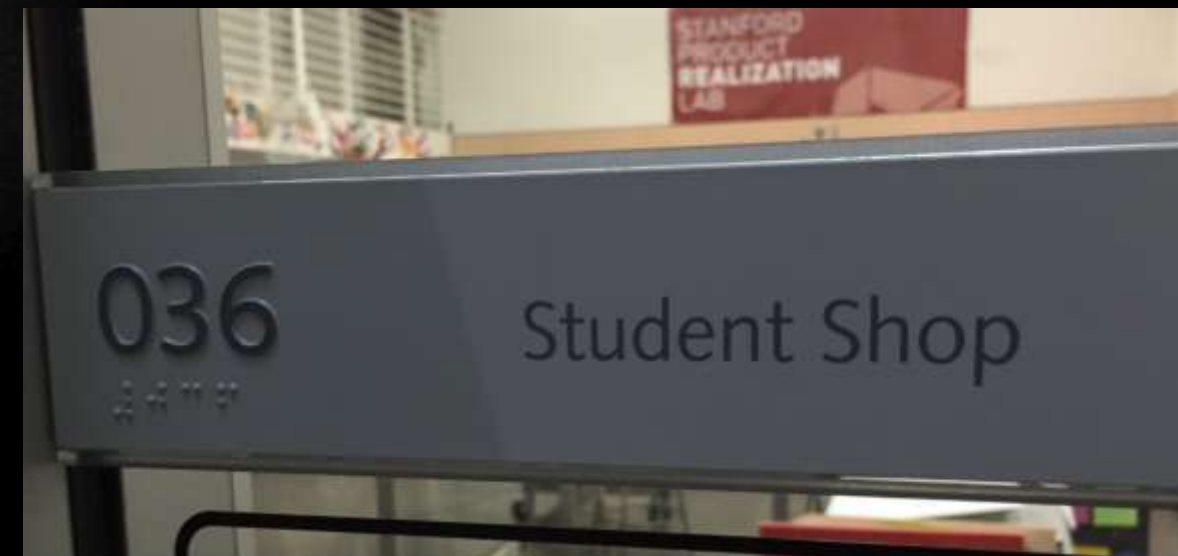
- ▶ Time is your team's most precious resource
- ▶ 7 weeks of class left to work on your projects
- ▶ Mid-term team presentations in 4 weeks!



Miscellany



1. Weblinks, videos, and photos linked from lecture webpages
2. [Anonymous Suggestion Box](#) for comments and rhetorical questions
3. Sign up for PRL Safety Orientation & Shop passes
4. Last bits:
 - ▶ I have difficulty remembering names
 - ▶ I am on your team
 - ▶ I am on your side
 - ▶ I want to award good grades



Formed Project Team

- ▶ **The Hide-Away Lap Tray**
- ▶ **The First Team with No Name**
 - ▶ Tita Kanjanapas
 - ▶ Ashley Lau
 - ▶ Lynee Turek-Hankins



Formed Project Team

- ▶ Elevator Button Pusher
- ▶ **The Second Team with No Name**
 - ▶ Lindsie Jeffries
 - ▶ Jessica Hsueh
 - ▶ Jenny Park



Formed Project Team

- ▶ Lap Extender
- ▶ **The PRL Tray-Iblazers**
 - ▶ Andrea Banuet
 - ▶ Marissa Luna
 - ▶ Annie Sinclair



Formed Project Team

- ▶ **Lap Tray for Danny**
- ▶ **Travola**
 - ▶ Arkira Chantaratananond
 - ▶ Tony Hua
 - ▶ Jenny Kim



Formed Project Team

- ▶ WHILL Recharging
- ▶ **Mean Machine**
 - ▶ Jack Barber
 - ▶ Ryan Dudzinski
 - ▶ Cameron Scarlett



Form your Project Teams this week

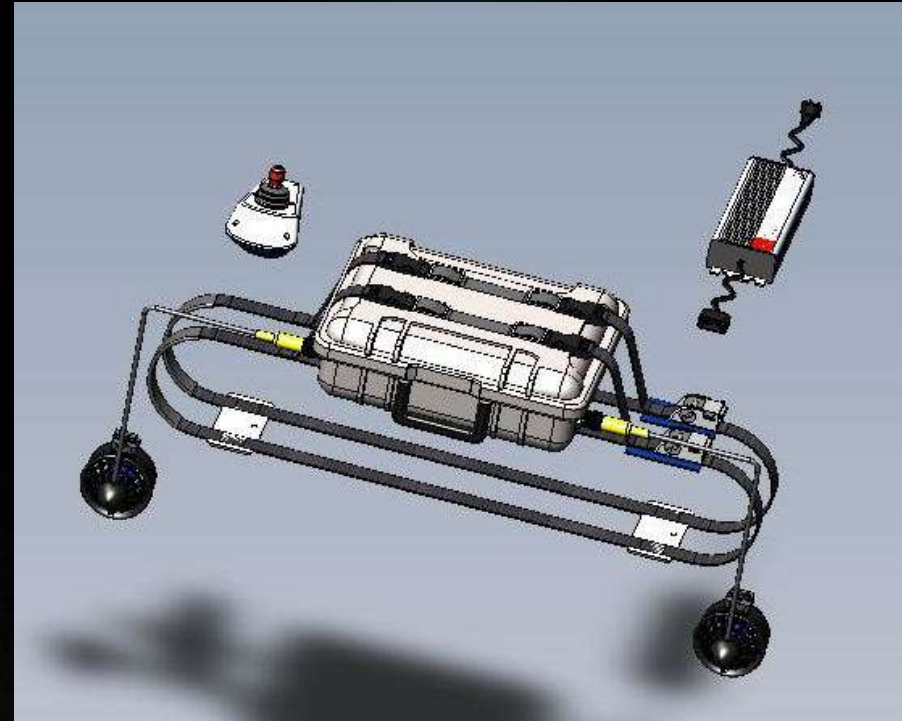


- ▶ **Your Project**
- ▶ **Your Team Name**
 - ▶ Student 1
 - ▶ Student 2
 - ▶ Student 3



Other Items

- ▶ Your team project effort is self-directed
- ▶ Your project budget is \$200
- ▶ Your class participation is appreciated



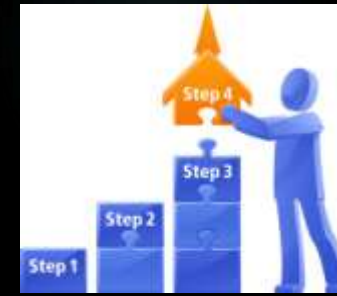
Questions?



Design Process



THE DESIGN PROCESS

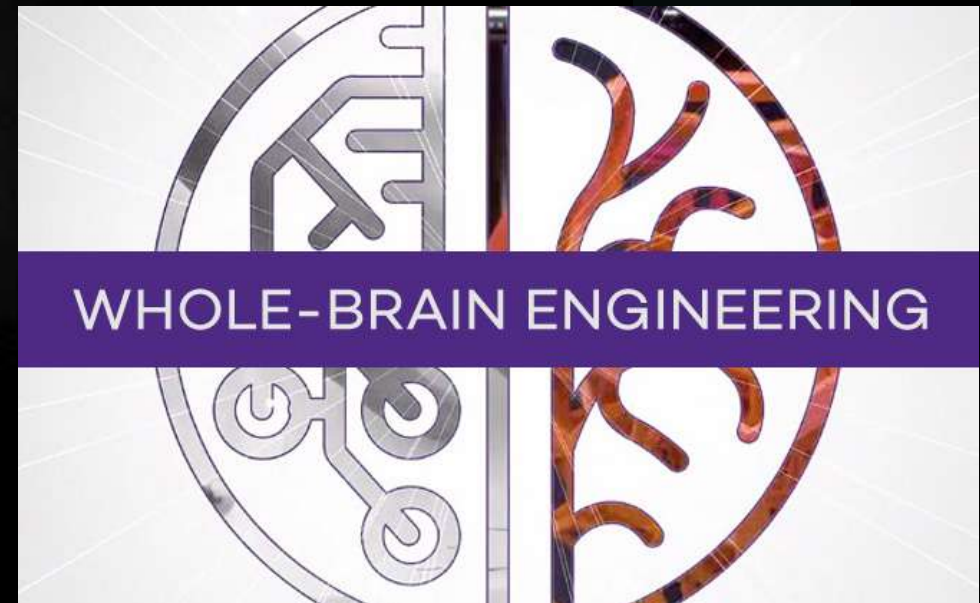
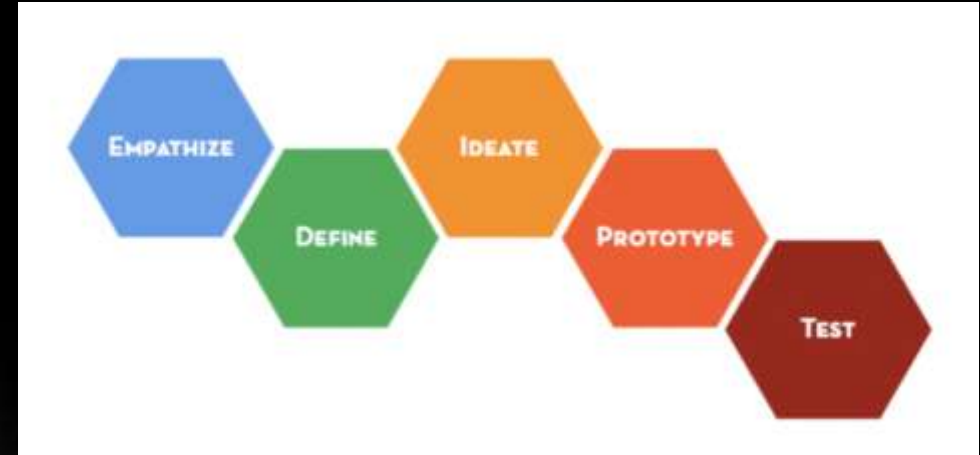


- ▶ A **process** is a step-by-step plan of action employed by makers, designers, or engineers to achieve a goal.
- ▶ Using a structured process increases the chances of success.



Design Processes

- ▶ Design Thinking - d.school
- ▶ Whole-Brain Engineering - Northwestern
- ▶ Human-Centered Design
- ▶ User-Centered Design
- ▶ Empathetic Design
- ▶ Compassionate Design
- ▶ Co-Design
- ▶ Cooperative Design
- ▶ Bystander Design

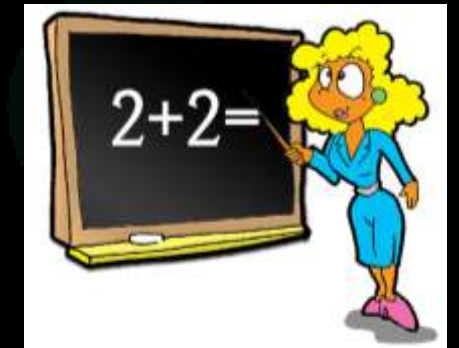
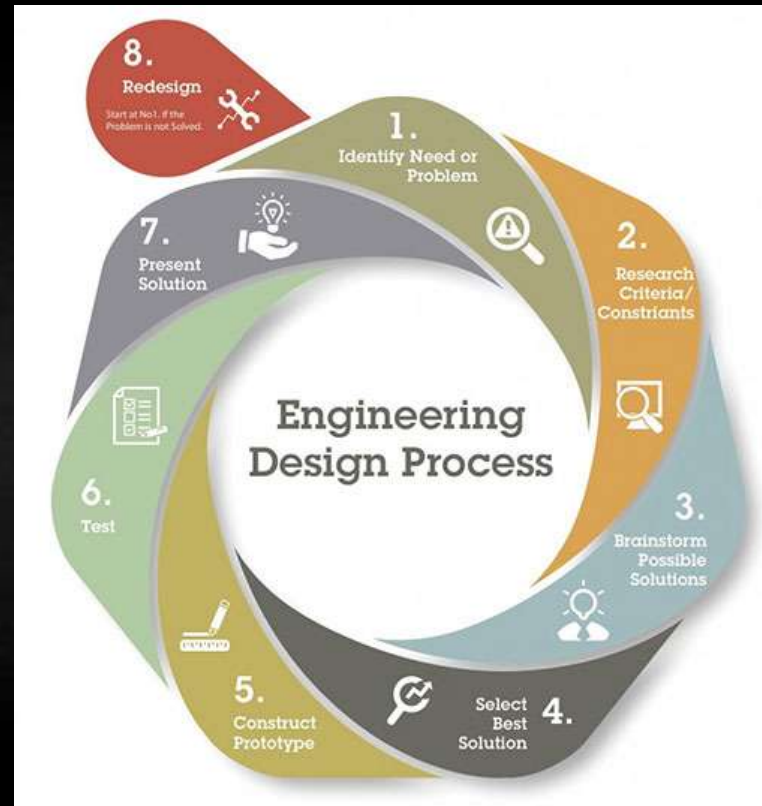


The Engineering Design Process

Activities

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

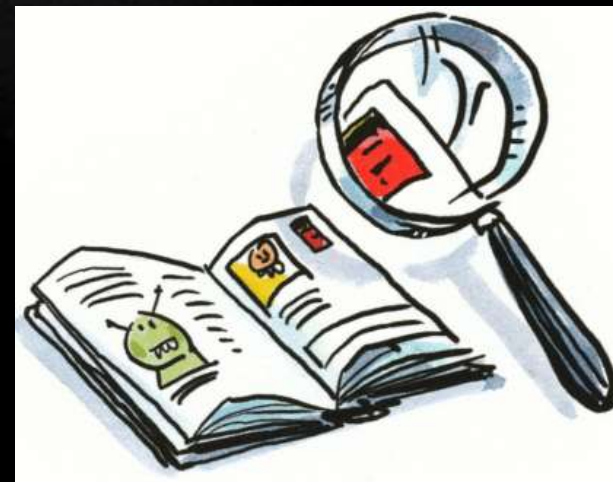
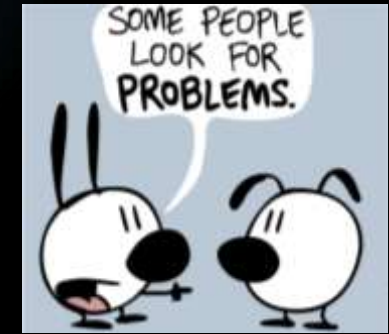
DESIGN SQUAD



The Design Process

The Problem

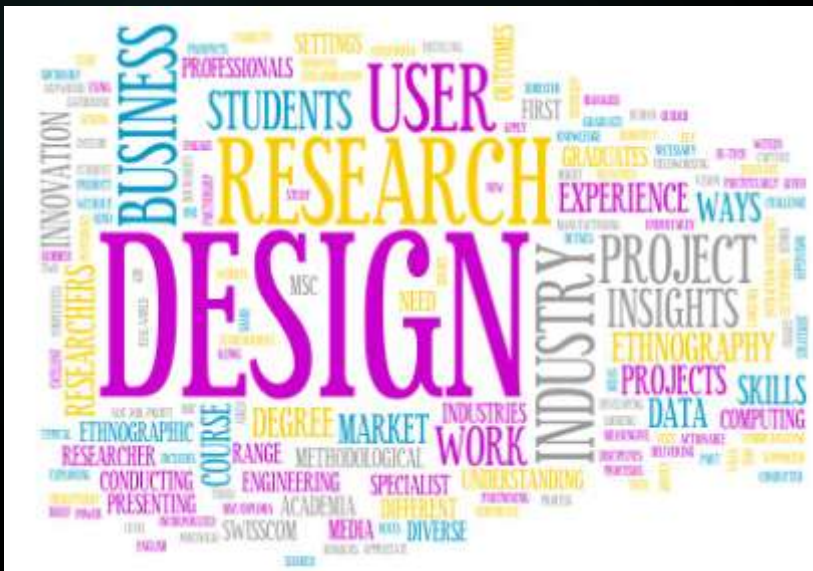
1. Search for the Problem
2. Identify the Problem
3. Describe the Problem
4. Understand the Problem
5. Determine the Need



The Design Process

Search for the Problem

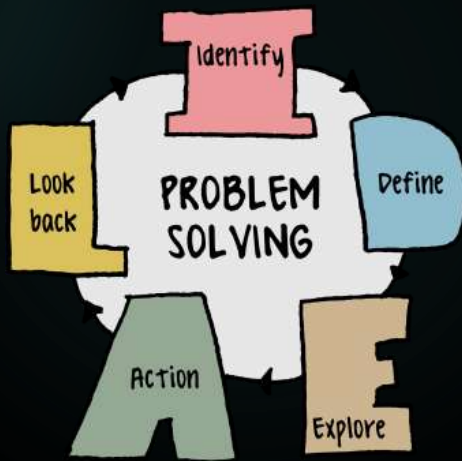
- ▶ Pick a field, user group, technology
- ▶ Employ ethnography, observation, discussion, interview techniques



The Design Process

Identify the Problem

- ▶ Identify a specific challenge
- ▶ Identify the customers / stakeholders
- ▶ Identify resources and technologies



The Design Process

The Problem Statement



Compose a written problem statement that includes:

- ▶ Project Title
- ▶ Background
- ▶ Problem
- ▶ Goal / Aim
- ▶ Design Criteria
- ▶ Other Information
- ▶ Contacts



insert title here

a catchy phrase would be great too

Problem Statement Example

Enhanced Visibility Project



- ▶ **Background:** The WHILL Model A is a mobility device meant to give wheelchair users a sleek alternative to standard products, which often lack aesthetic appeal and thereby reinforce stereotypes of weakness or helplessness.
- ▶ **Problem:** While the WHILL has built-in lights that are designed into the rear wheel cover, they are insufficient to provide adequate visibility (to see and be seen) at night.
- ▶ **Aim:** Explore designs that will enhance the night time visibility of the WHILL and thereby increase user safety.
- ▶ **Design Criteria:** The design should:
 - ▶ not alter or permanently deface or damage the physical structure or operation of WHILL
 - ▶ integrate well with WHILL's appearance
 - ▶ provide forward illumination (like a car's headlights)
 - ▶ enhance both side and rear visibility
 - ▶ automatically operate based on sensed ambient lighting
 - ▶ include a manual override
 - ▶ optionally include a light show mode
- ▶ **Links:**
 - ▶ [Whill](#)
 - ▶ [Ashley's Passion to Redefine Accessibility](#)
 - ▶ [Whill's back light](#)
- ▶ **Contact:**
 - ▶ Whill contact
 - ▶ User contact



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



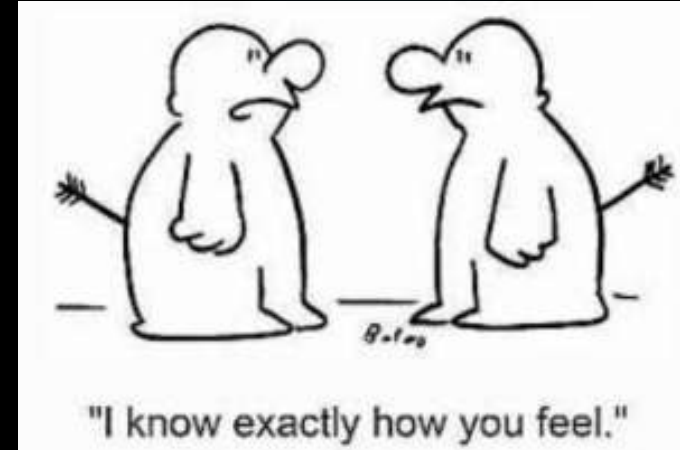
AbleData >>>
Tools & Technologies to Enhance Life



The Design Process

Understand the Problem

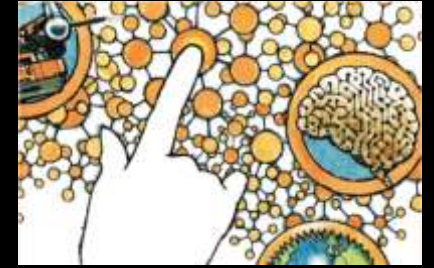
- ▶ Often called “Empathy”
- ▶ Find out as much as you can
- ▶ User’s specific background and situation
- ▶ Review information on the disability condition
- ▶ Solicit the perspectives of people with disabilities and older adults, family members, friends, health care professionals, colleagues, researchers,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



The Design Process

Understand the Problem

- ▶ *“While a user may have a good handle on The Problem, he/she may not fully appreciate the benefits and limitations of technology.” Dave*
- ▶ *“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.” Dave*

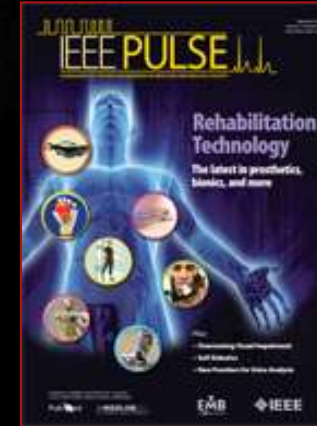


The Design Process

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

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



The Design Process

Understand the Problem

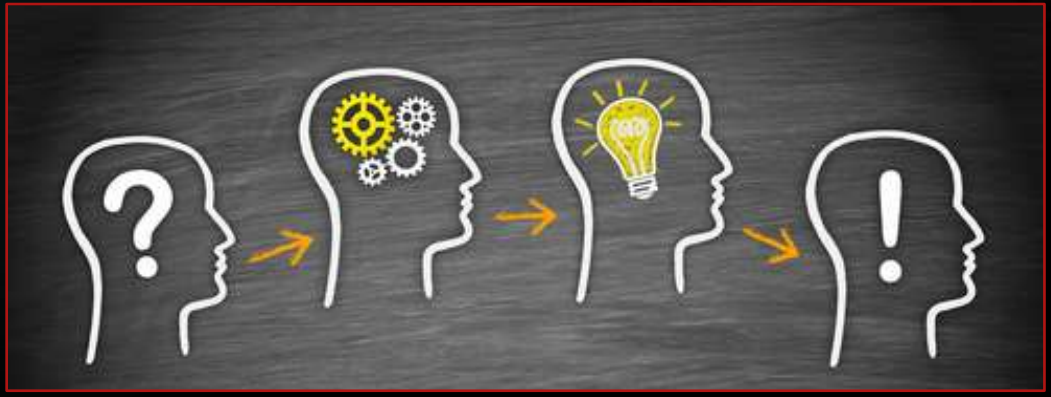
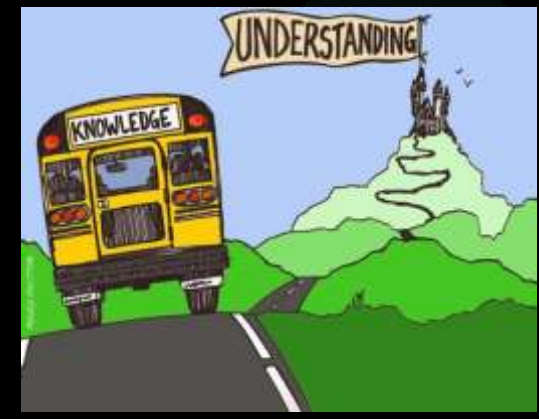
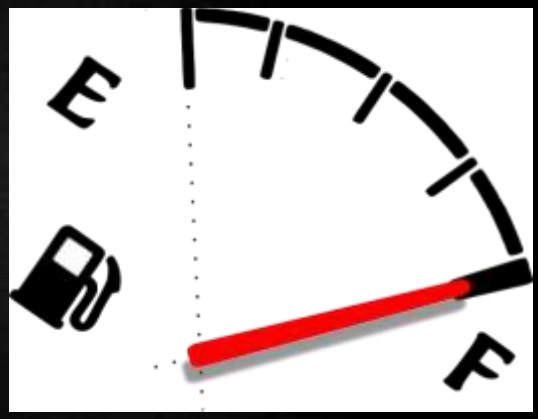
- ▶ Determine why current “solutions” don’t work
 - ▶ Important to find limitations of current products:
 - ▶ High cost, weight, reliability, etc
 - ▶ Ineffectiveness
 - ▶ Non-compliance or non-use
 - ▶ Poor aesthetics, functionality, durability, fit
 - ▶ Does not take advantage of current technology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



The Design Process

Judge the Need

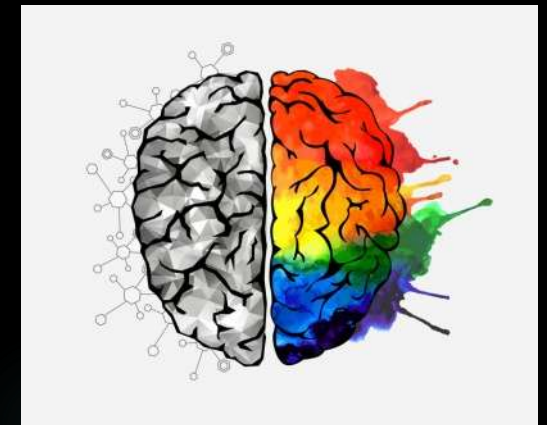
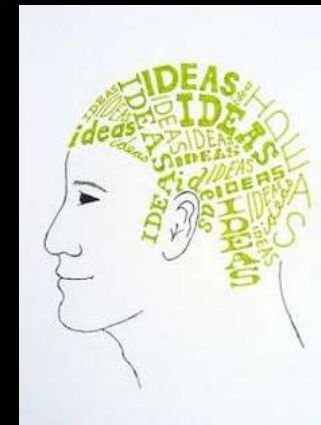
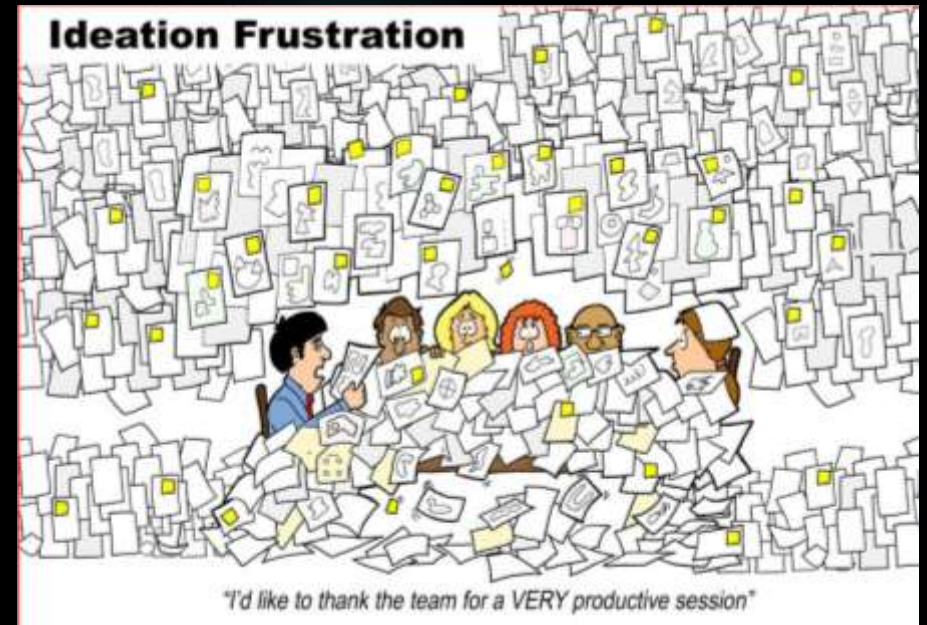
"Judge what is needed from a full understanding of the problem." Dave



The Design Process

Brainstorming

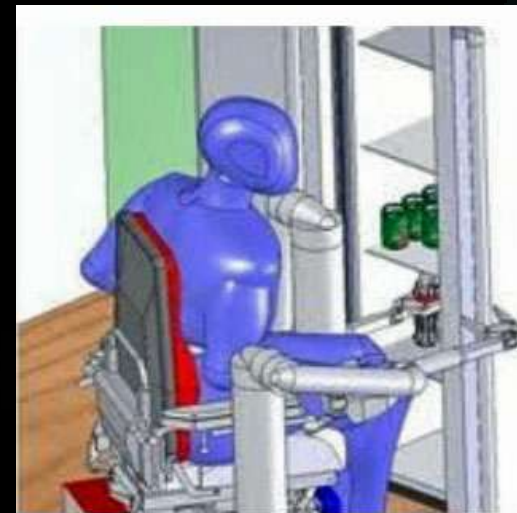
- ▶ Idea Generation - also know as “Ideation”
 - ▶ Morphological charts
 - ▶ Brainstorming
 - ▶ Other techniques
- ▶ Develop multiple preliminary ideas, concepts
- ▶ **Don't get stuck on your original idea** - Anchor Effect



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

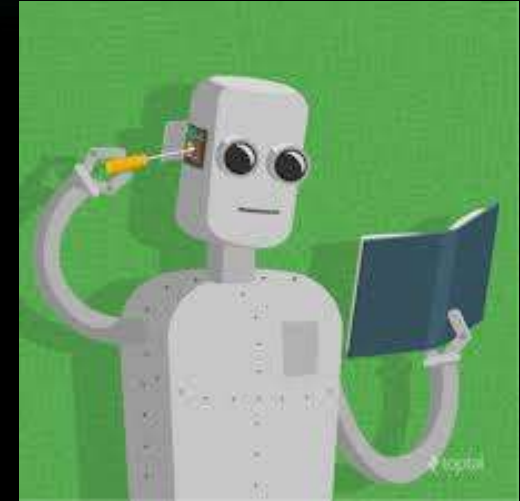


- ▶ Observe the problem / challenge firsthand
- ▶ Encourage them to tell a story
- ▶ Understand what a solution should do, but not how to do it
- ▶ List design features - don't forget the “coolness factor”
- ▶ Recognize that you may not be aware of the limitations and benefits of technology
- ▶ Interact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



Engineering Design Process

- ▶ Does not include:
 - ▶ Building to another's vision
 - ▶ Making incremental improvements
- ▶ Utilize project resources and team skills
 - ▶ PRL and Room 36 (equipment and TAs)
 - ▶ Person who suggested project
 - ▶ Course resource people
 - ▶ Classmates
 - ▶ Dave
- ▶ Make and justify all your project decisions



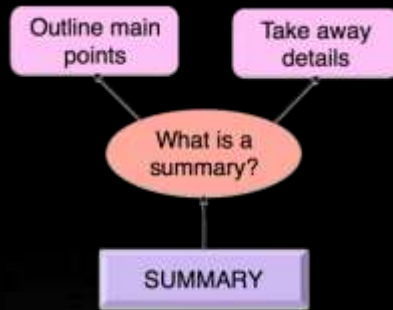
Other Observations

- ▶ 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.”
Dave



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 17th



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



Needfinding and Assistive Technologies

Gayle Curtis - UX Design Consultant



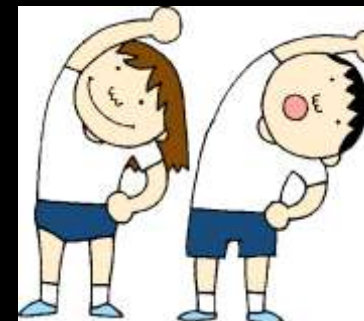
Short Break



Break Activities



- ▶ Sign attendance sheet
- ▶ Grab a cookie
- ▶ Stand up and stretch
- ▶ Take a bio-break
- ▶ Text message, web-surf, email
- ▶ Talk with classmates
- ▶ Reflect on what was presented in class



Short Break



THANK YOU FOR



YOUR ATTENTION.

