

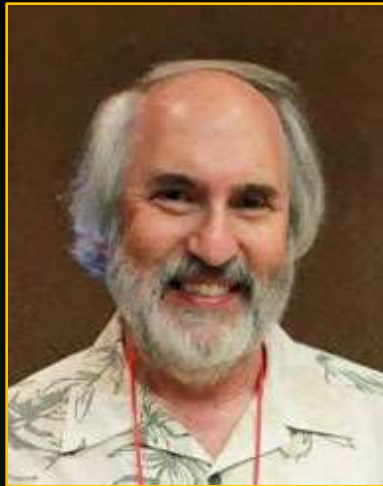
January 16, 2018

Needfinding and Assistive Technologies - Gayle Curtis



# ENGR110/210

## Perspectives in Assistive Technology



David L. Jaffe, MS  
Instructor



# Questions?



# THE DESIGN PROCESS

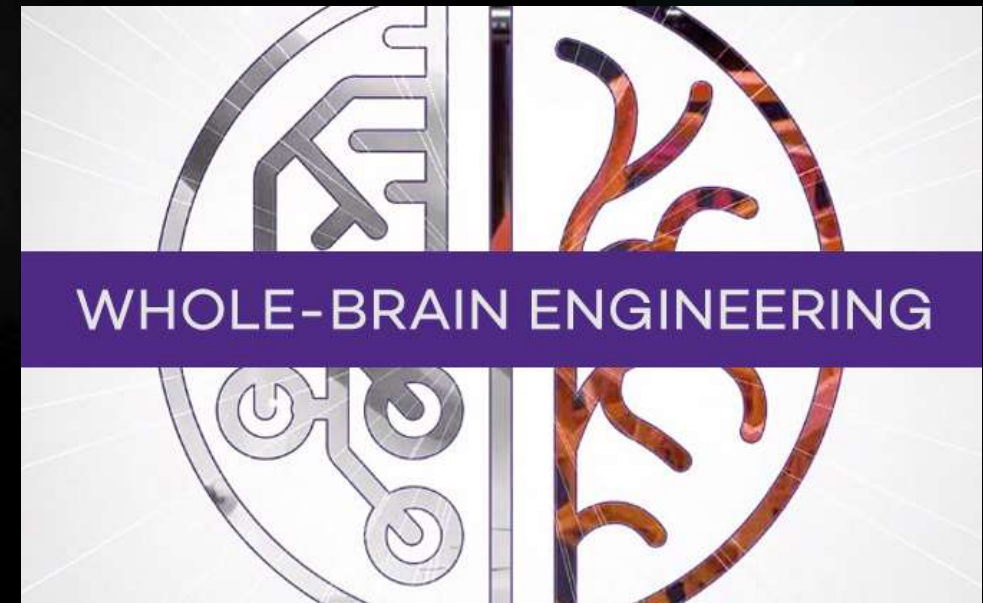
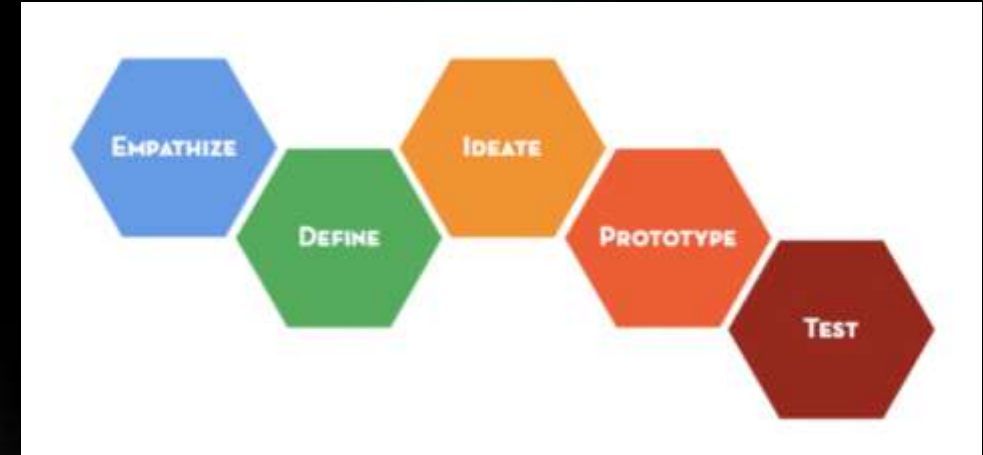


- ▶ A **process** is a step-by-step plan of action employed by makers, designers, or engineers to achieve a goal.
- ▶ Using a structured process increases the chances of success.



# 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

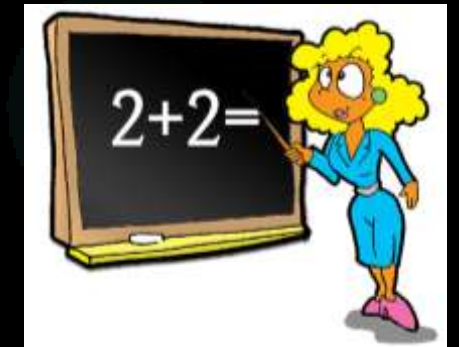
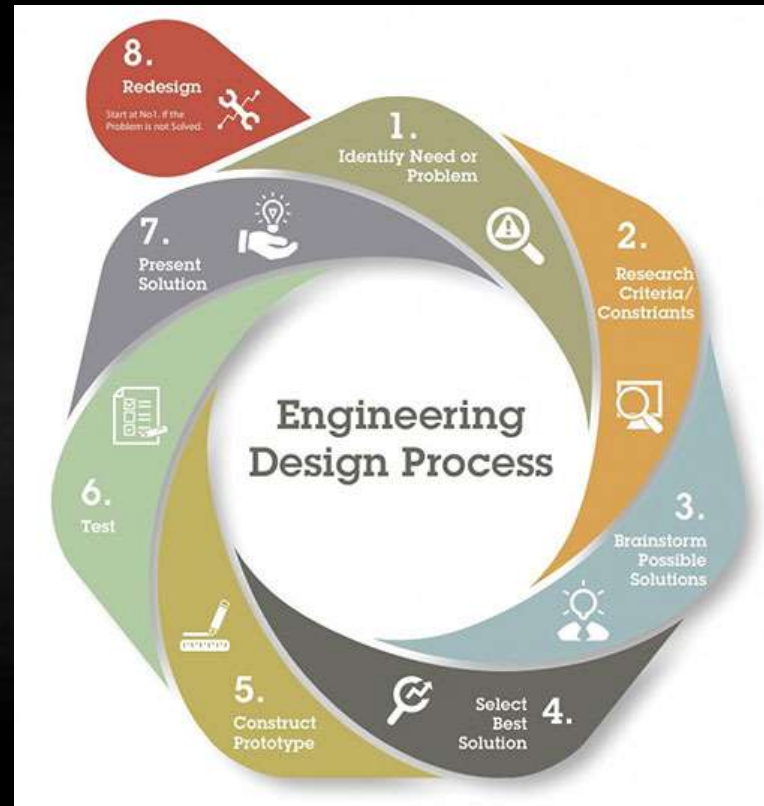


# The Engineering Design Process

## Activities

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

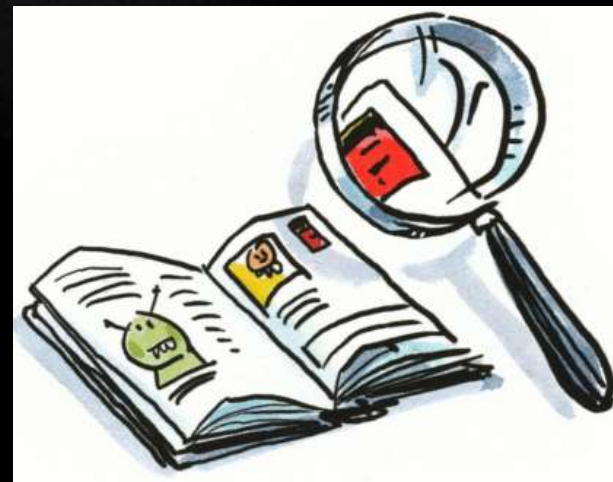
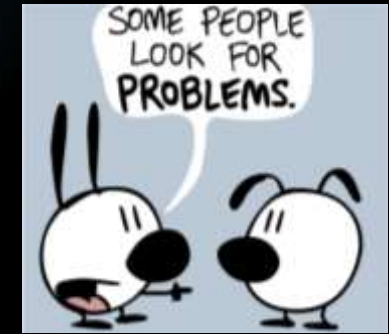
DESIGN SQUAD



# 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

## Identify the Problem

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





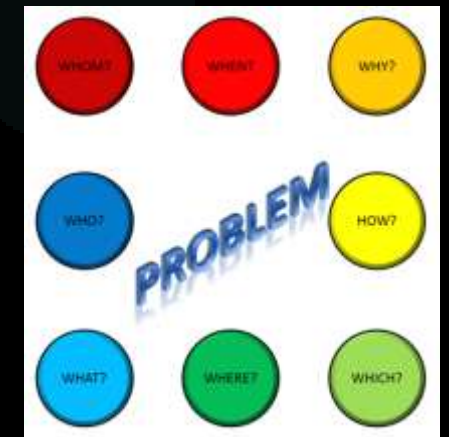
# The Design Process

## 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

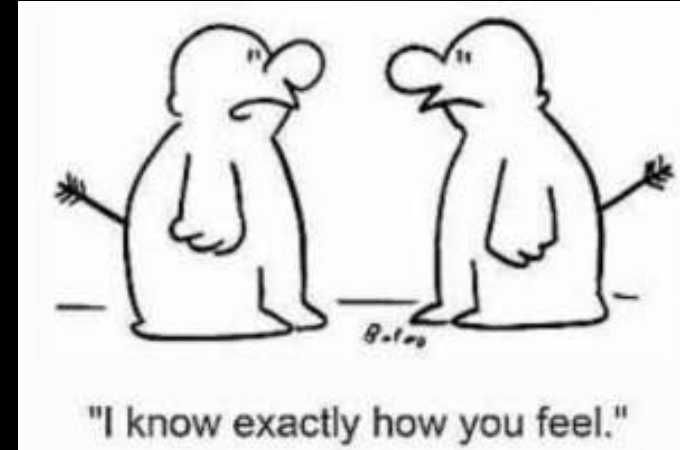
- ▶ Clarify goals and objectives
  - ▶ Incorporate **users' perspectives** and standards of care
- ▶ Gather information
  - ▶ WWW, library, journals (research)
  - ▶ Product catalogs (existing products)
  - ▶ Stakeholders
  - ▶ Experts & health care professionals



# The Design Process

## Understand the Problem

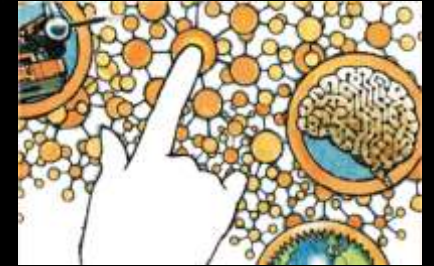
- ▶ Often called “Empathy”
- ▶ Find out as much as you can
- ▶ User’s specific background and situation
- ▶ Review information on the disability condition
- ▶ Solicit the perspectives of people with disabilities and older adults, family members, friends, health care professionals, colleagues, researchers,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

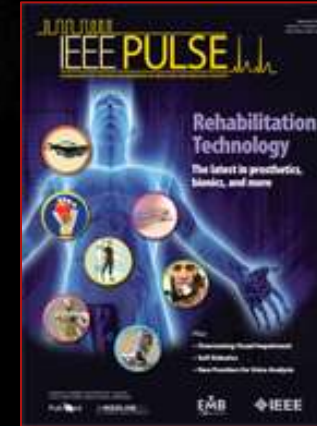


# The Design Process

## 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)



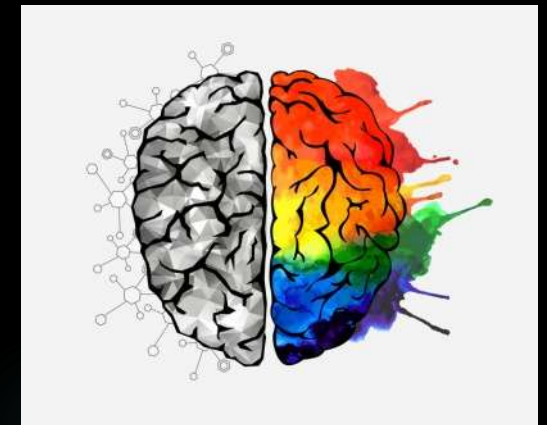
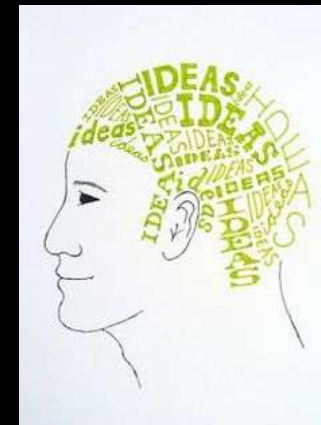
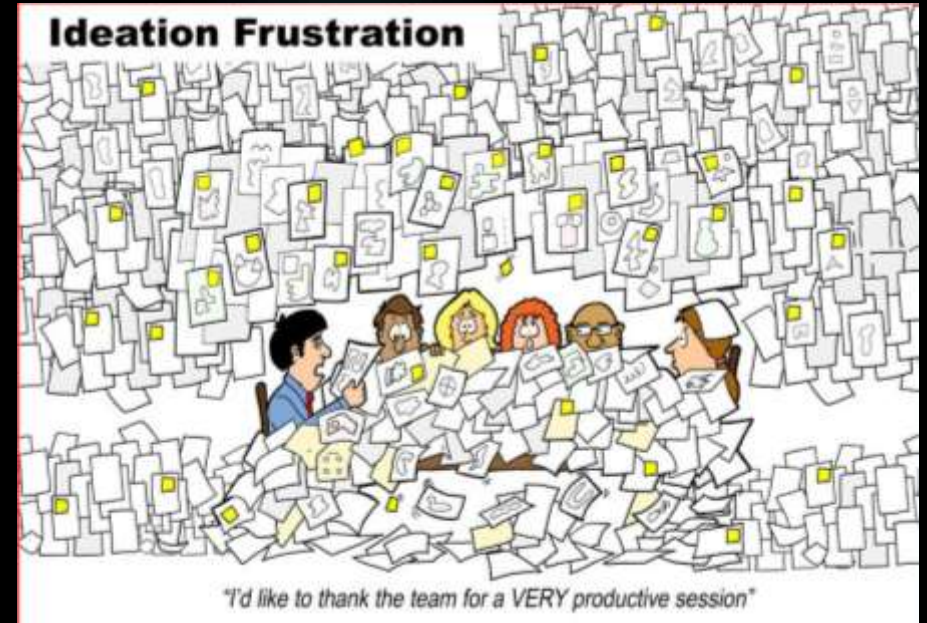




# The Design Process

## Brainstorming

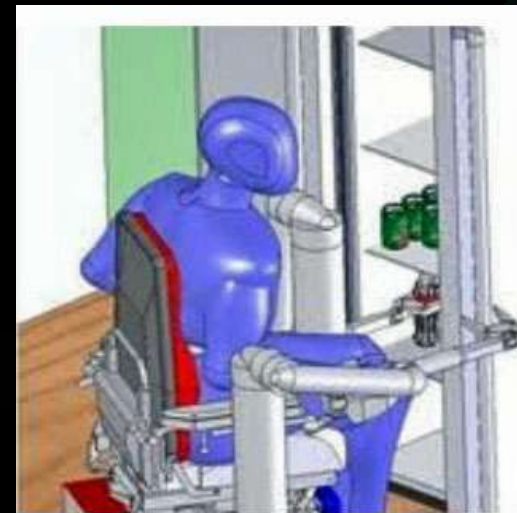
- ▶ Idea Generation - also know as “Ideation”
  - ▶ Morphological charts
  - ▶ Brainstorming
  - ▶ Other techniques
- ▶ Develop multiple preliminary ideas, concepts
- ▶ **Don't get stuck on your original idea** - Anchor Effect



# 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

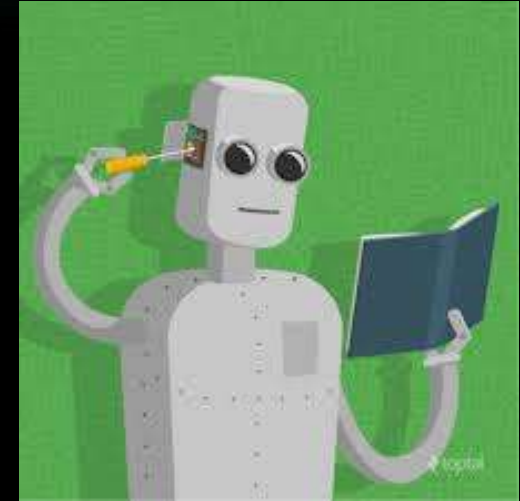


- ▶ Observe the problem / challenge firsthand
- ▶ Encourage them to tell a story
- ▶ Understand what a solution should do, but not how to do it
- ▶ List design features - don't forget the “coolness factor”
- ▶ Recognize that you may not be aware of the limitations and benefits of technology
- ▶ Interact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



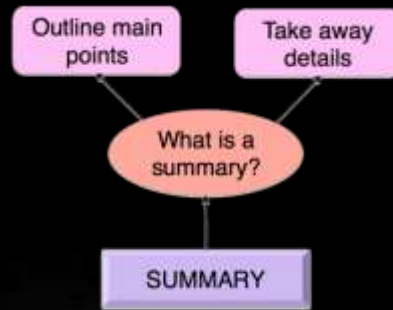
# Other Observations

- ▶ 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 18th



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



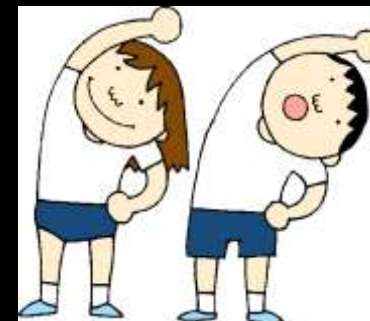
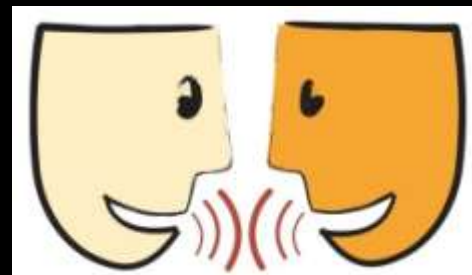
# Short Break



# 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.**

