Do You Have Any Questions?
Thanks to:

- **Students:**
  - Enrolling and participating in the course
  - Filling out lecture evaluations and comments

- **Haas Center for Public Service**
  - Funding

- **Community members**
  - Participating and “adding to the conversation”

- **Project suggestors**
  - Suggesting great projects
  - Working with teams
Reminder for Everyone
Students

If you haven’t already done so, please enroll or drop ENGR110/210 on Axess.

If you weren’t here on Tuesday, pick you your personalized handout packet.
Missing a required class session

1. Let me know (beforehand, if possible) by email
2. Do not provide a reason
3. Make up the missed class session promptly
## Enrolled Student Attendance List

### All enrolled students:

Please sign this list in every class session to confirm your attendance.

<table>
<thead>
<tr>
<th>Name of Enrolled Student</th>
<th>Email address @stanford.edu</th>
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</thead>
<tbody>
<tr>
<td>Alwine, Winer Leonardo</td>
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<tr>
<td>Barber, Jack Shoa</td>
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<td>Blanchard, Rick O'kane</td>
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<td>Chaffin, Brian Earl</td>
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<td>Denet, Yuki</td>
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<td>Dhaliwal, Alroy</td>
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<td>Ding, Victoria</td>
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<td>Drepper, Jack Harrison</td>
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<td>Dutdzevski, Ryan David</td>
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<td>Evans, Chiyo</td>
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<td>Garnder, Michael Ross</td>
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<td>Ghanem, Connor Reeves</td>
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<td>Georghi, Cadietri</td>
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<td>Helley, Claudia Roth</td>
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<td>Itiner, Virginia</td>
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<td>Immel, Brad Eagles</td>
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<td>Jeffries, Lincoln</td>
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<td>Joe, Kyle Armando</td>
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<td>Kardajanas, Tihi</td>
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<td>Kundeberg, Gil Landh</td>
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<td>Kuharmo, Fredie</td>
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<td>Lempi, Caroline Kimberly</td>
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<td>Lattiero, Allison</td>
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<td>Lives, Winston Oxford</td>
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<td>Little, Kendrick Patrick</td>
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<td>Matthew, Axl in Clarke</td>
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<td>Moiragou-Kelly, Molly Ann</td>
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<td>Ortega, Aniño</td>
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<td>Patrik, Jessi</td>
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<td>Rackermann, Shetan</td>
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<td>Rivera, Jessica Karina</td>
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<td>Suyage, Paula</td>
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</tbody>
</table>

Students not listed above or who haven't enrolled yet:

### Other students:

Please sign this list in every class session to get credit for your attendance.

It is important to verify your attendance at every class session.
Candidate Team Projects

For students taking the course for three credits.

Web links
## Today’s Handout - Project Preferences for Students working on Team Projects

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Student Name</th>
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</thead>
<tbody>
<tr>
<td>Projects with Abby’s Wheelchair - Abby Tamara</td>
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<tr>
<td>Enhanced Visibility Project</td>
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<td>Storage Project</td>
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<td>Simultaneous Operation Project - Abby Tamara</td>
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<td>Lap Extender - Tony DeSylva</td>
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<tr>
<td>Easier While Recharging - Fernanda Castelo</td>
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<tr>
<td>Magical Bridge Playground Project - Jay Gluckman</td>
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<tr>
<td>Magical Bridge Playground Project - Olenka Villarreal</td>
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<td>Elbow Lifter - Angie Lee</td>
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<td>Laptray for Danny - Stanford Stickney</td>
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<td>Donna’s Pick Me Up - Donna &amp; Jeannie Yeager</td>
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<td>Wheelchair Dancing - Amy Li</td>
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<tr>
<td>Hide Away Lap-Tray - Nick Zipolo</td>
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<tr>
<td>Get a Grip Project - Debbie Pitch</td>
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<tr>
<td>Creative Expression - Dave</td>
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<tr>
<td>Designing Your Affordable - Dave</td>
<td></td>
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<tr>
<td>Student-defined team projects - See Dave for approval</td>
<td></td>
</tr>
</tbody>
</table>

As each project is pitched, indicate your general interest in one of the first three columns with a ✔️ or ✗️. At the end of all the presentations, select your top five project preferences in the fourth column by providing an ordinal (1st, 2nd, 3rd, 4th, 5th) ranking.
Needfinding and Assistive Technologies

Gayle Curtis - UX Design Consultant
1. Persistent vegetative state - loss of higher brain functions
2. Course website - http://engr110.stanford.edu
   Syllabus
   Lecture Schedule
3. Gender disability
4. Suggestions and observations
5. Bono is almost never seen in public without sunglasses, as he suffers from experiences glaucoma.

"[I have] very sensitive eyes to light. If somebody takes my photograph, I will see the flash for the rest of the day. My right eye swells up. I've a blockage there, so that my eyes go red a lot. So it's part vanity, it's part privacy, and part sensitivity."
Today’s Agenda

1. Introduction of Course Resource People
2. Overview of PRL and Room 36 Resources
3. Brief break
4. Considerations for Team Formation and Project Selection
5. Project Pitches
6. Open Question Time and Non-Random Access
Course Resource People

- Matteo Zallio, PhD
- Deborah E. Kenney, MS, OTR/L
- Douglas F. Schwandt, MS
- Jules Sherman
Five Minute Overview of PRL & Room 36 Resources

- Elliot Helms - PRL Coaching Assistant and ENGR110 Student Last Year
INTRODUCTION TO
ROOM 36

Student Shop

036
Elliot Helms
PRL CA
ENGR110 Student Last Year
STANFORD PRODUCT REALIZATION LAB

- Design and Manufacturing
- Open to any current Stanford student
- Any project*, personal or class-related
- Tools and Workspace
- Training, Advice, and Inspiration from our talented and knowledgeable faculty, staff, course assistants, and user community
CAs boarded in red have taken ENGR110
ROOM 36
RAPID PROTOTYPING

› Make Something!
› Build, Test, and Communicate your ideas... quickly
› No experience necessary
› Think with your hands
› Have Fun!
ADDITIVE MANUFACTURING
SEWING
MATERIALS
ADVICE
STANFORD PRODUCT REALIZATION LAB

ROOM 36
IN JEN-HSUN HUANG ENGINEERING CENTER

OFFICES/CLASSROOMS
IN BLDG 590

MAIN LAB
IN BLDG 610

MAIN QUAD
ROOM 36

HOW TO GET STARTED

› Visit Webshop  https://webshop.stanford.edu

› Create a login profile with your student ID number

› Sign up for a safety orientation (roughly 75 min)

› Pay for a lab pass when you show up for the safety orientation
  ($60 for 1 quarter, $80 for 2, $100 for the academic year)

› That’s it! Then come in and use the PRL!
SEE YOU SOON!

https://productrealization.stanford.edu
Short Break

- Pick up your personalized handout packet if you weren’t here on Tuesday or have changed your enrollment option
- Sign Attendance Sheet
- Sign up to Meet with Dave
- Hand in your Student Signup Form from Tuesday
For those working on **team** projects:

- Read project descriptions
- Fill out Project Preferences Form during pitches
- Talk to project presenters after the pitches
- Hand in Project Preferences Form
- Your preferences will be posted online
  - [http://engr110.stanford.edu/preferences.html](http://engr110.stanford.edu/preferences.html)
- Inform me of team members (teams of 3 only)
  - Students on the Wait List are not eligible
  - Name of your team
  - Name of your selected project
  - Name your device (after it develops a “character”)
Project Selection & Team Formation

Your preferences will be posted online

- [http://engr110.stanford.edu/preferences.html](http://engr110.stanford.edu/preferences.html)
Considerations for Team Formation and Project Selection (1 of 2)

**Project preference**
- All team members should have a desire to work on the same project.

**Team's engineering skill set**
- Match the team's skills and expertise with the project needs. (This depends on the solution chosen.)

**Spring Quarter student desire and availability to continue project**
- It would be good if all team members were available to participate in an optional Spring Quarter continuation of their project as Independent Study.
Considerations for Team Formation and Project Selection (2 of 2)

**Personality**
- There should be a compatible mix of personalities in the team.

**Friends and team members**
- A good friend does not necessarily make a good team mate.

**Course load**
- Can you spend the time working on a team project? Courses like ME203, ME210, ME218, ME310, and BioE141 are very demanding. Are you a TA? Do you have athletic practices?
Team Project Preferences

- Email Dave with selected project, team name, and team members by Friday, January 18\textsuperscript{th}

- Prepare to “hit the ground running”
Why you may want to

If you have enrolled for three units, you may want to consider taking the course for one unit or waiting until next year if:

1. You are not graduating, or
2. If you have limited fabrication experience, or
3. If you are already taking a project course like ME112, ME203, ME210, ME218, ME310, BioE141, or …
4. If you have to miss lectures or field trips, or
5. You are on the Wait List, or
6. You are not able to devote 4 hours per week to your project.

Take it twice!
Team Formation Preparedness

Since there is no guarantee that other students will have similar project interests, you should be prepared to do one of the following:

1. Convince others to work with you on one of your selected projects
2. Consider working with another student on a project he/she has chosen
3. Keep an Open Mind!

It pays to keep an open mind, but not so open your brains fall out.
- Carl Sagan
Project Selection & Team Formation

For those working on **individual** projects:

- Research an assistive technology topic
- Work on a paper design of an assistive technology device
- Create a work of art
- Engage in an aftermarket aesthetic design
- Engage in an aftermarket functionality / usability design
- Pursue a listed individual project
- Optionally pair with another student (new for 2018)
- These projects are **not** being pitched

- Meet with Dave for suggestions and approval
Team Projects Pitched by Suggestor

- Projects for Abby’s Wheelchair - Abby Tamara
  - Enhanced Visibility Project
  - Storage Project
  - Backpack Project
- Projects with Abby’s Service Dog, Nathan - Abby Tamara
  - Simultaneous Operation Project
  - Harness Project
- Lap Extender - Tony DeSylva (by video)
- Easier WHILL Recharging - Fernanda Castelo

Work on 2 out of these 3 sub-projects
Team Projects Pitched by Suggestor

- Playground Equipment for Students with Learning Disabilities and Challenges in Speech & Language - Jay Gluckman
- Playground Equipment along the Fence - Olenka Villarreal
- Elbow Lifter - Angie Lee (by video)
- Elevator Button Pusher - Angie Lee (by video)
- Laptray for Danny - Stanford Stickney
- Donna’s Pick Me Up - Donna & JeanneYeager
- Wheelchair Dancing - Amy Li
- Creative Expression using an Instrumented Wheelchair - Amy Li
- Hide-Away Lap Tray - Nick Zirpolo
Projects Suggested by Others, Pitched by Dave

- Clean House Project - June Fisher
- Within Reach Project - June Fisher
- Get a Grip Project - Debbie Pitsch
Projects Suggested by Dave

- Creative Expression
- Designing Your Afterlife
- Student-defined projects
Projects with Abby

- Projects for Abby’s Wheelchair (work on 2 of these 3 sub-projects)
  - Enhanced Visibility Project
  - Storage Project
  - Backpack Project

- Projects with Abby’s Service Dog, Nathan
  - Simultaneous Operation Project
  - Harness Project

On deck: Tony by video
Projects for Abby’s Wheelchair

- Projects for Abby’s Wheelchair - Abigail Tamara
  Work on 2 of these 3 sub-projects:

  - Enhanced Visibility Project - Explore ways to enhance the nighttime visibility of Abby’s wheelchair
  
  - Storage Project - Explore ways to add a personal secure storage space and facilitate grocery transportation and handling
  
  - Backpack Project - Explore solutions for accommodating a backpack (or other storage product) that eliminates sitting against straps
Projects for Abby’s Wheelchair

“"I am mobility impaired, 4'11" tall, and only able to lift 10 pounds. I am very active in advocacy and social justice issues, especially focusing on individuals with disabilities. I speak at national conventions for many organizations.””

“I have just acquired a new power chair. It is called a WHILL model M. WHILL is a Japanese company with the US headquarters in San Carlos, CA, about 10 miles from my home. The WHILL is 4 wheel drive, and will operate on most terrains.”

Challenges to address: (pick two out of three)
- enhanced visibility
- storage
- backpack
The Model M has a much more integrated and reinforced seat back than the Model A. The ergonomic back cushion overlaps the reinforced back support in such a way that doesn’t have the same ease of attaching and accommodating a substantial backpack. The only way I have found to attach the backpack is over the back of the seat.
The Model M has a different seat configuration that requires that the straps of a backpack be positioned over the seat back.
My yellow backpack attaches to the Model M by thick shoulder straps and a small cross strap on the seat back. These straps are painful on my back and defeat the ergonomic features of the chair.
I found an alternative backpack that has thinner straps, but is not as well reinforced to carry all my items. It is still uncomfortable on my back and does not provide me with ergonomic seating.
I am looking for an attachment solution for a substantial backpack that does not require its straps go over the seat back.
Projects for Abby’s Service Dog, Nathan

- Projects with Abby’s Service Dog, Nathan - Abigail Tamara
  - Simultaneous Operation Project - Explore ways to make it easier for Abby to operate her wheelchair and control Nathan
  - Harness Project - Explore ways to make it easier for Abby to put on and take off Nathan’s harness
Projects for Abby’s Service Dog, Nathan

“Nathan, my service dog, provides me with balance and support as I hold on to his harness.”
Projects for Abby’s Service Dog, Nathan

Simultaneous Operation Project - Explore ways to make it easier for Abby to operate her wheelchair and control Nathan

Flexi Attachment on a Power Wheelchair
Projects for Abby’s Service Dog, Nathan

Harness Project - Explore ways to make it easier for Abby to put on and take off Nathan’s harness

- “With my arthritis and grasping difficulties, the buckles that hold the harness on Nathan are difficult for me to work. The buckles attach by pinching one of the parts to fit in the other part. There are two buckles on the front piece, and one under the belly that attaches on the left side.”
Projects for Abby’s Service Dog, Nathan

Detail of Harness Buckles
Lap Extender

- Lap Extender - Tony DeSylva

- Explore designs for a wheelchair accessory that will not interfere with propulsion while carrying important items.

On deck: Fernanda Castelo
Easier WHILL Recharging

- Easier WHILL Recharging - Fernanda Castelo

- Explore designs to improve Fernanda's WHILL charging experience.

On deck: Jay Gluckman & Olenka Villarreal
Magical Bridge Playground

Two Projects

- Jay Gluckman & Olenka Villarreal

  - Jay - Playground Equipment for Students with Learning Disabilities and Challenges in Speech & Language - Explore designs to create new play and educational experiences incorporating multiple senses and actions for all playground users and visitors that could also have positive outcomes for those with learning disabilities and challenges in speech & language.

  - Olenka - Playground Equipment along the Fence - Explore designs to create new play and educational experiences along the fence that incorporate multiple senses, actions, and outcomes for all playground users and visitors, especially those with visual impairments and diminished fine motor skills.

On deck: Angie Lee (by video)
Magical Bridge Playground founder, Olenka Villarreal often says, "The playground is a child's first classroom."

Introducing children as early as possible to the variety of people in their community is our best hope for removing social and physical barriers.
It all started with a mom, two daughters, and a playground need. Determined to create the kind of outdoor space that both her disabled and non-disabled daughters (and all their friends!) would love, Olenka Villarreal mobilized a team of volunteers to fulfill a dream to create such a place.

In 2015, Magical Bridge Playground opened to great enthusiasm. Since then, the success of the playground has inspired an awareness that today’s parks leave far too many behind.

With long-time friend and team member, Jill Asher, Olenka created Magical Bridge Foundation as a non-profit organization in 2016. The foundation is beginning to extend its reach beyond the Bay Area and continues to bring the joy of play, kindness and new friendships to as many families as possible.
ADA “Accessibility” Just Isn’t Enough

- Not a single public playground has been designed with everyone’s unique play needs in mind.
- ADA standards do not meet the needs of many living with a disability.
Magical Bridge Playground, Palo Alto

Seven Unique Zones: Playhouse & Tree Deck, Slide Mound, Spinning Zone, Picnic & Performance Area, Swinging & Swaying Zone, Music Zone, and Tot Play Zone

The Playhouse is two stories and the Tree Deck has two bridges including a “rope” bridge. The entire structure is wheelchair accessible.

Playground features are a mix of custom designed equipment and off-the-shelf technology often applied in unique ways.

Seven years of research went into this playground design.
Construction MAGIC is underway at Red Morton Park in Redwood City! Magical Bridge Playground in Redwood City will welcome and serve visitors of all abilities and disabilities in San Mateo County and beyond! We plan to complete construction and open to the public in Summer 2019.

Magical Bridge Playground Projects are also underway in Morgan Hill, Mountain View, and Sunnyvale.
A working design particularly catered to the needs of those with mobility challenges. The user utilizes their mechanical energy to rotate a crank to move the structure in a circular path.
Sensory Wall Panel - 2016

- Team worked collaboratively on overall structure to mount prototypes.
- Individual team members each focused on individual prototypes.

- QR Codes with links or text to provide information for the visually impaired
- Pick up and play musical instrument.
- Tactile puzzle with slideable pieces.
- Slideable bead exploration.
- Tactile Braille exploration for the visually impaired and the sighted.
Sensory Dome - 2016
Jay’s notes regarding prototyping for the Magical Bridge Playground

- There will be an opportunity to get information about the project and feedback about teams’ fabricated prototypes on site from playground visitors.

- The prototypes can be as rough or refined as your team chooses - we just want to understand your vision about how your design would work in an actual playground application.

- Prototypes can be strictly mechanical, structural, electrical, conceptual, or some combination thereof.

- Student prototypes may not necessarily be installed in a playground.

- Designs that would be large in the real world should be prototyped at reduced scale.
Playground Equipment for Students with Learning Disabilities and Challenges in Speech & Language

- Playground Equipment for Students with Learning Disabilities and Challenges in Speech & Language - Jay Gluckman

- Explore designs to create new play and educational experiences incorporating multiple senses and actions for all playground users and visitors that could also have positive outcomes for those with learning disabilities and challenges in speech & language.
Playground Equipment along the Fence

- Explore designs to create new play and educational experiences along the fence that incorporate multiple senses, actions, and outcomes for all playground users and visitors, especially those with visual impairments and diminished fine motor skills.
Be Part of the Magic - Join Us!

[Image of a groundbreaking ceremony]

Jay Gluckman
jaygluckman@gmail.com

Olenka Villarreal
olenka@magicalbridge.org
Elbow Lifter

- Elbow Lifter - Angie Lee

- Explore device designs that would enable Angie to feed herself completely independently.

On deck: Stanford Stickney

Video
Elevator Button Pusher

- Elevator Button Pusher - Angie Lee

- Explore device designs that would enable Angie to ride elevators independently.
Laptray for Daniel

- **Laptray for Danny** - Stanford and Daniel Stickney

- Explore ways for Daniel to easily access and store his personal items on his wheelchair and retrieve them when they fall to the floor.

On deck: Donna & Jeanne Yeager
Laptray for Daniel’s Independence

- Meet Daniel & Stanford Stickney
- Cerebral Palsy
- Cortical Vision Impairment
Laptray for Daniel’s Independence

- Explore ways for Daniel to easily access and store personal items on his manual wheelchair such as:
  - Phone
  - Water bottle
  - Clothes
  - Computer
  - Cat food

- Explore a mechanism to retrieve items when they fall on the floor
Laptray for Daniel’s Independence

Smile & the World Will Smile Back
Donna’s Pick Me Up

- Donna’s Pick Me Up - Donna Yeager

- Explore design solutions that would enable Donna to retrieve items from the floor

On deck: Amy Li
Donna’s Pick Me Up

Donna in her motorized Permabill wheelchair
Donna’s Pick Me Up

Donna tries to pick up a 10 pound item from floor, but due to arthritis in her toes, she is unable to lift more than 1 pund.
Donna’s Pick Me Up

The goal is to lift items 25 inches from the floor to “toe-level”.

Wheelchair Dancing

- Wheelchair Dancing - Amy Li

- Explore designs to provide encouragement and enhance the dance experience for both wheelchair users and individuals who can not stand for long periods.
Dancing Frequently Reduces the Risk of Dementia by 76%!

New England Journal of Medicine, 2003
Dancing Reduces 46% Cardiovascular Disease Death

American Journal of Preventive Medicine, 2016
Creative Arts Therapy (Music/Dance/Art) Improves Cancer Patients’ Quality of Life by 50%, Reduces Pain by 59%!

The JAMA Network, 2013
Exercise May Make Tumors Less Aggressive

American Cancer Society, 2015
Penguin Coldcap to Save My Hair from Chemo

@dance4healing   |   Amy@Dance4Healing.com   |   www.dance4healing.com
Problem: Isolated and Lonely, Tough Behavior Challenge

Loneliness is as damaging as smoking 15 cigarettes a day

- Leads to depression, anxiety, pain, falling, hostility, weight issues, diabetes, and suicidal thoughts.
- Caregivers/patients do not have enough exercise.
- Social connection from home is difficult.
- Current solutions are not adequate.

40% of Alzheimer’s caregivers die before care recipient.

62% of teenagers feel lonely, especially those with caregiver parents.
Creative Arts Therapy (music/dance/art) improves cancer patients' Quality of Life by 50%, reducing pain by 59%!

The JAMA Network, 2013
Imagine...

1. Visual Feedback?
   - Colorful lights?
   - Seasonal celebration?

2. Vibration Pads?
   - Directional guidance?
   - Synchronize with music or singing?

3. Tracking Movement? Auto Response?
   - Provide feedback, encouragement?
   - Confirm movement efficacy
   - Personalized recommendation using AI?
Creative Expression using an Instrumented Wheelchair

- Creative Expression using an Instrumented Wheelchair - Amy Li

- Explore ways to enhance creative expression for people with disabilities, especially those who use wheelchairs. This could include the creation of new activities or fabrication of new tools.
Explore designs for a compact lap tray that would prevent objects on his lap from falling and would support his laptop computer.
Projects Suggested by Others, Pitched by Dave

- **Clean House Project** - for June Fisher
- **Within Reach Project** - for June Fisher
- **Get a Grip Project** - for Debbie Pitsch
Clean House Project

- **Clean House Project** - June Fisher (pitched by Dave)

- **Background**: June is an older adult who uses a rollator for balance and stability when moving around her San Francisco home.

- **Problem**: June's use of her rollator makes it difficult for her to perform home cleaning tasks independently.

- **Aim**: Explore designs to provide a safe, effective, and independent means of performing common household cleaning tasks

- **Criteria**: The solution must be safe to use, easy to operate, and be compact to store.
Within Reach Project

- Within Reach Project - June Fisher

- **Problem**: Currently available step stool solutions do not meet June’s needs: some are too tall, others have a stepping area that is too small, and most do not have hand-holds to provide needed balance and stability during reaching. Finally many step stools are heavy and bulky, making them difficult to move and position.

- **Aim**: Explore designs to provide a safe and stable means of accessing items on upper shelves

- **Criteria**: The solution must be easy to move and position, offer a sense of security during use; have a wide, non-slip surface; provide the proper height advantage; and be collapsible for storage.
Get a Grip Project

- Get a Grip Project - Dave for Debbie Pitsch - VA Palo Alto Health Care System, Spinal Cord Injury Service

- Explore designs that would enhance a handbike user’s with quadriplegia ability to pedal the Freedom Ryder.
Dave’s Suggested Projects

- Creative Expression
- Designing Your Afterlife
- Student-Defined Team Projects
Creative Expression

- Creative Expression - Dave

- Explore ways to enhance creative expression for people with disabilities. This could include the creation of new activities or fabrication of new tools.
Designing Your Afterlife

- **Designing Your Afterlife** - Dave

Explore ways to preserve one's essence after death. In the technology extreme, this might manifest itself as an interactive system that responds to queries, retells stories, relates experiences, shares expertise, and expresses humor. The pre-dead user would be able to create and program his/her eternal computer-based persona before her/his demise.
Student-defined Team Projects

- Student-defined Team Projects - Dave

- Interview, observe, and discuss assistive technology problems with an individual with a disability or older adult. Address their desire to participate in one of the following activities by designing an adaptation to an existing device / tool or creating a new, more useful one:
  - Activities of daily living
  - Sports and exercise
  - Leisure activities and hobbies
Sample **Individual Project** - Assistive Technology Pop-Up Shop

- **Problem**: Many assistive technology products are too expensive for people with disabilities or older adults to purchase. Others are not covered by insurance. In addition, broken devices need to be repaired.

- **Aim**: Explore plans for a pop-up store that would repair devices and fabricate custom solutions.
Open Question Time and Non-Random Access

Who is working on team projects?

Get more info from project suggestor

Identify others interested in same projects

What are your project preferences?

Rank your top choices

Have course questions? Ask Dave

Hand in your Project Preference Sheet!

See Dave if you are working on an individual project
Reset the Tables & Chairs