

January 6, 2011

ENGR110/210

Perspectives in Assistive Technology



David L. Jaffe, MS



Professor Drew Nelson



Harpreet K. Sangha

Questions?



Did You Miss Tuesday's Lecture?

- Pick up handouts:
 - Student Team Candidate Projects
 - Assignment One
 - Who is Disabled? Questions for Contemplation
- Review lecture audio and slides on course website <http://engr110.stanford.edu/lecture01a.html>
- Email me a 1 – 2 page summary of the lecture including your thoughts
- Upon receipt of your summary, I will credit you with “attending” the lecture

Project Pitches & Team Formation

Agenda

1. Introduction of Course Resource People
2. Overview of Room 36 Resources
3. Student Project from Last Year
4. Project Pitches
5. Open Question Time and Random Access

Course Resource People



Deborah E. Kenney, MS, OTR/L



Douglas F. Schwandt, MS



Isaac Penny



Monroe H. Postman

Overview of Room 36 Resources



Marlo Dreissigacker

The Equally Enchanting



Craig Milroy



PRL

PRODUCT REALIZATION LAB

36

R O O M



PURPOSE

Make something!

Get your concepts out into the physical world through hands-on prototyping and exploration.

Room 36 is a subset of the

Product Realization Lab (PRL) and can be used both separately from and along with the full PRL resources.



RESOURCES – TOOLS + MATERIALS

- **TOOLS:**
 - band saw
 - scroll saw
 - drill press
 - heat forming tools for plastic
 - computer-controlled vinyl cutter (and heat transfer press for applying vinyl to fabric)
 - X-Acto cutting surfaces and tools
 - sewing machines
 - hand tools such as wrenches, pliers, saws, and drills
- **MATERIALS:**
 - foam core
 - cardboard
 - wood
 - plastics
 - fabric
 - foams, etc.

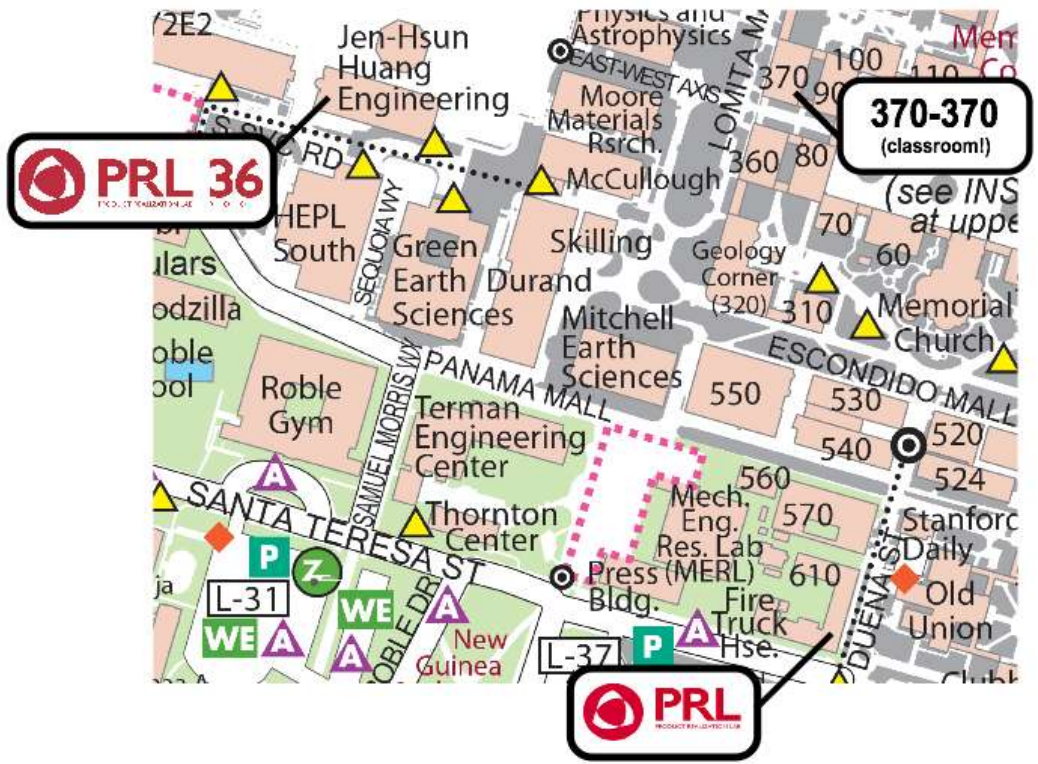
Bins of interesting materials are available for inspiration and use.

Claim a project bin to store your materials and projects!



LOCATION

- Room 36 is located on the lower level of the Huang Engineering Center





GETTING STARTED

- Sign up on Webshop (webshop.stanford.edu)
- Attend a 10 minute safety and lab orientation in Room 36 (available during open sessions listed on Webshop)
- Pay fee: 1 qtr (\$40) or 2 qtrs (\$70)
 - Day passes are available for \$10
 - Use of Room 36 is included in all active PRL passes
- Hours (generally): Mon-Sat 1pm-5, 7pm-11
- **Email Marlo at marlod@stanford.edu with any additional questions**

Student Project from Last Year



Harpreet K. Sangha

Project Selection & Team Formation

- For those working on team projects:
 - Send me your top 3 project interests
 - Inform me of team members (no more than teams of 3)
 - Name your team
 - Name your project
- For those working on individual projects:
 - Research an assistive technology topic
 - Work on a paper design of an assistive technology device

Considerations for Team Formation and Project Selection

Project preference

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

Undergraduate / graduate student

- It would be best if all team members were either undergraduate or graduate students as this makes it easier to continue projects into the Spring Quarter.

Desire to continue project work into Spring Quarter

- Ideally, all team members should commit to continue their project work into the Spring Quarter.

Team's engineering skill set

- Match the team's expertise with the project needs.

Personality

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

3-Minute Project Pitches

- **Educational Activities for Children with Disabilities** - Greg Brown, RAFT
- **Projects suggested by Eskaton** - Stuart Greenbaum, Eskaton
- **Hands-free Reading Aid** - Michele Klein and Peter Borden, Jasper Ridge
- **Application of NeuroSky's Brain-Computer Interface** - Tansy Brooke, NeuroSky
- **Lat Pull Exercise Station for Wheelchair Users** - Adrian Hongo, TriActive America and Wendy Thanassi, VA Palo Alto Health Care System
- **Sirott Speech Feedback Project** - Tracey J. Baldwin, Kaiser Permanente
- **Low Cost Transfer Device** - Chris and Michael Bayne, ROTA Mobility
- **Hybrid Drive for RoChair and RoTrike** - Chris and Michael Bayne, ROTA Mobility
- **Prosthetics & Orthotics Projects** - Mike Norell, Norell Prosthetics Orthotics, Inc.
- **Data Sensing & Logging for Scheiman Rebuild Fitness Products** - George Pierce, Scheiman Rebuild Fitness
- **Projects for Veterans with Spinal Cord Injury** – Deane Denney, VA Palo Alto Health Care System (by Skype)
- **Projects for Persons Recovering from Stroke** - Debbie Kenney, Foothill College
- **No-Fall Cane** - Robin Tobias, Tobias Physical Therapy
- **Projects for Veterans with Traumatic Brain Injury** - Debbie Pitsch - VA Palo Alto Health Care System
- **Other projects** - David L. Jaffe - Stanford University

Project Pitches

- **Educational Activities for Children with Disabilities - Greg Brown, RAFT**

Project Pitches

- **Projects suggested by Eskaton - Stuart Greenbaum**



Stanford University

Perspectives in Assistive Technology

Presented by Eskaton

January 6, 2011

Longevity Rules.

- “Aging is active verb.” It is an all-inclusive, positive experience, not a *label* to be placed on old and frail adults.
- In the past 100 years, humankind has increased in life expectancy by 30 years, to 78 years old ... and counting. This increase is greater than in the past 50 centuries.

- Now that we've fulfilled the age-old dream to extend life, we need to ensure longer life is rewarding not burdensome.
- No one knows with certainty what they will want or need as they age. But, the majority of us will need some level of support from ages 65 on.
- We're growing older, in greater numbers. There are 78 million Boomers, the next generation of older adults. *(Lots of consumers – with needs, wants and money ...)*

Eskaton in brief.

- Eskaton provides nonprofit aging services.
- We have 30 communities for older adults, located throughout Northern California -- which range from independent living, assisted living and memory care, to affordable apartments, to skilled nursing and rehabilitation.
- Eskaton also provides home-based support for individuals who want to remain independent in their own homes for as long as possible.

- Eskaton serves about 3,500 older adults daily. We have a staff of approximately 1,700. 2011 marks our 43rd year of operation.
- Eskaton also sponsors public outreach campaigns to **encourage people to plan to “age well into the future.”**
- **Eskaton innovates** -- by conducting research, introducing model programs and “incubating” new products.
- **Eskaton collaborates** -- with organizations, businesses, governments ... *and academic institutions* -- to create mutually beneficial opportunities to enhance the aging experience.

Eskaton's vision.

- Transform the aging experience.
- Use technology to advance the value *and acceptance* of aging-related services and products.
- Use technology to make aging “cool” -- not cruel, constraining or condescending.

Eskaton's ideas; Stanford's talent.

- **Build a better walker.** Make it convenient, highly functional ... and make it stylish as possible, not clunky.
- **Design an “Indy Chair.”** Re-conceptualize the wheelchair. Make it lightweight (Titanium?), maximize human power (especially for people whose strength is compromised), and make it “cool,” not intimidating or cumbersome. (“Indy” is short for individual and/or independent.)

- **Invent a portable seat.** Design a temporary resting device that is lightweight, easy-to-carry (like a cane) and stable. For use anywhere, at any time -- on a moment's notice -- the *unipod* device, balanced by gyroscope (?) could incorporate elements of the Segway and a videographer's handy-cam.
- **Develop a remote-caregiver mobile phone app.** Create a smartphone application to bridge the geographic divide between remote caregivers and their loved ones. Use the application to track performance of daily activities such as medication schedules, doctor's appointments, blood pressure, mobility, etcetera.

Contact information and resources.

Eskaton

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Project Pitches

- **Hands-free Reading Aid** - Michele Klein and Peter Borden

Slides of Hands-free Reading Aid Project
removed at the request of Peter Borden

Project Pitches

- **Application of NeuroSky's Brain-Computer Interface** - Tansy Brooke, NeuroSky

Project Pitches

- **Lat Pull Exercise Station for Wheelchair Users**
 - Adrian Hongo, TriActive America
 - and Wendy Thanassi, VA Palo Alto Health Care System

Accessible LAT Pull: Adjustable Resistance



“All Access Pad” located at VA Palo Alto Health Care System

Accessible LAT Pull: Adjustable Resistance



Accessible LAT Pull: Adjustable Resistance



How it works:

- User rolls wheelchair onto platform and secures front wheels.
- As user pulls down on handles, the connections to the platform raises it with the user on it.
- Resistance is a set percentage of the weight of the user, wheelchair, and platform.

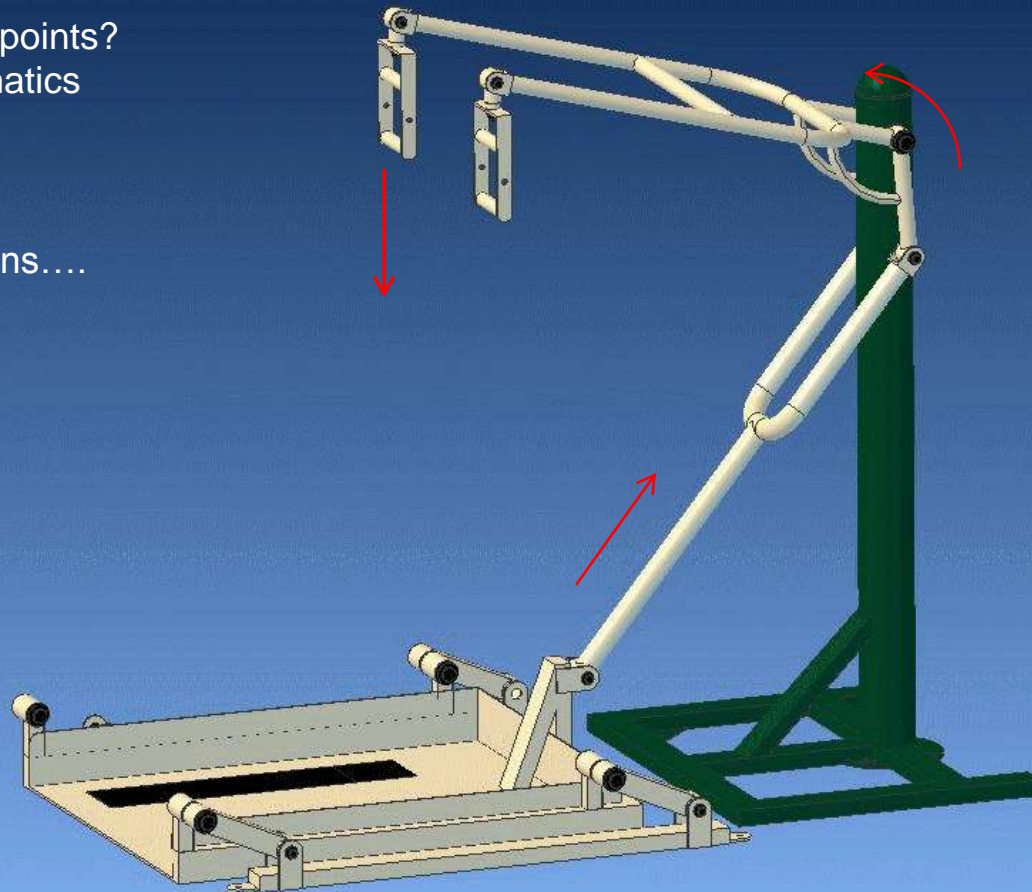


Accessible LAT Pull: Adjustable Resistance

How can the user safely change the resistance?

- Change leverage points?
- Hydraulics/pneumatics
- Gears
- Others?

Safety considerations....



Latest Design:

- No ramp
- Face forward
- Stable rise of platform
- Fewer connections

Project Pitches

- **Sirott Speech Feedback Project** - Tracey J. Baldwin, Kaiser Permanente

Biofeedback and PD

- Hypokinetic dysarthria
imprecise articulation,
impaired speech rate,
difficulty initiating speech,
hypophonia

80 – 95% w/PD speech/voice issues

Hypophonia

- Reduced vocal volume
- Monotone
- Monoloudness
- Breathiness
- Hoarseness
- Difficulty modulating vocal parameters due to impaired internal cuing

Feedback

- Internal feedback:
vocal volume, respiratory effort
due to reduced kinesthetic awareness
- Motor output:
loudness and physical effort for voice

Feedback

Reduced perception and awareness of vocal volume results in

- *internal cues are reduced*

Impaired perception of the physical effort impacts ability to monitor and regulate adequate vocal volume

Comments from patients

- I don't talk as much now because no one can hear me
- I can't be heard on the phone
- I listen to others speak, but I don't join in the conversation anymore

QOL

- Frustration
- Isolation
- Depression
- Communication breakdown
- Reduced quality of life

Proposal

- Development of an application which captures sound as it is produced by the speaker; processes the information and displays it through a variety of options. Provides instant feedback which offers individuals the internal cuing and independence required to monitor and self correct their speech

Components

- Real time processing of sound input
- Voice detection sensor activates DAF
- Programmable pitch alteration
- Programmable DAF
- Channel to track pitch, volume, expiratory muscle effort during speech
- Display visual/auditory/tactile kinesthetic

Components

- In the ear piece to provide DAF/noise
- Program that allows SLP to link to a server where she sets thresholds, collects utilization and progress data, frequency of use, and options/displays utilized by the speaker

Project Pitches

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- **Hybrid Drive for RoChair and RoTrike** - Chris and Michael Bayne, ROTA Mobility

Slides of Low Cost Transfer Device and Hybrid Drive for RoChair and RoTrike removed at the request of Michael Bayne

Project Pitches

- **Prosthetics & Orthotics Projects** - Mike Norell,
Norell Prosthetics Orthotics, Inc.

Project Pitches

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Project Pitches

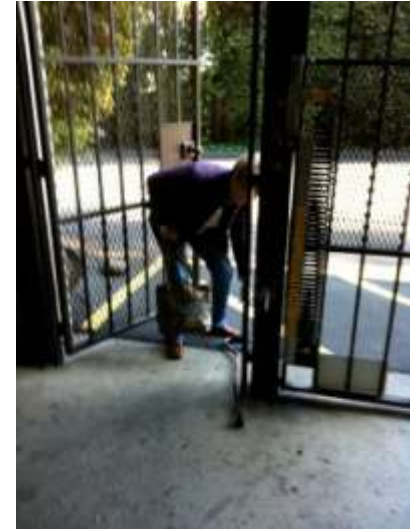
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Project Pitches

- **No-Fall Cane** – Robin Tobias, Tobias Physical Therapy

Cane Dilemma

[Video](#)



Project Pitches

- **Projects for Veterans with Traumatic Brain Injury** – Debbie Pitsch, VA Palo Alto Health Care System

Project Pitches

- **Other projects – Dave Jaffe**

Tuesday, Jan 11th



Gayle Curtis – Design Consultant
**Design Thinking and Applied
Ideation for Assistive Technologies**

Open Question Time and Random Access