January 10, 2013

ENGR110/210
Perspectives in Assistive Technology

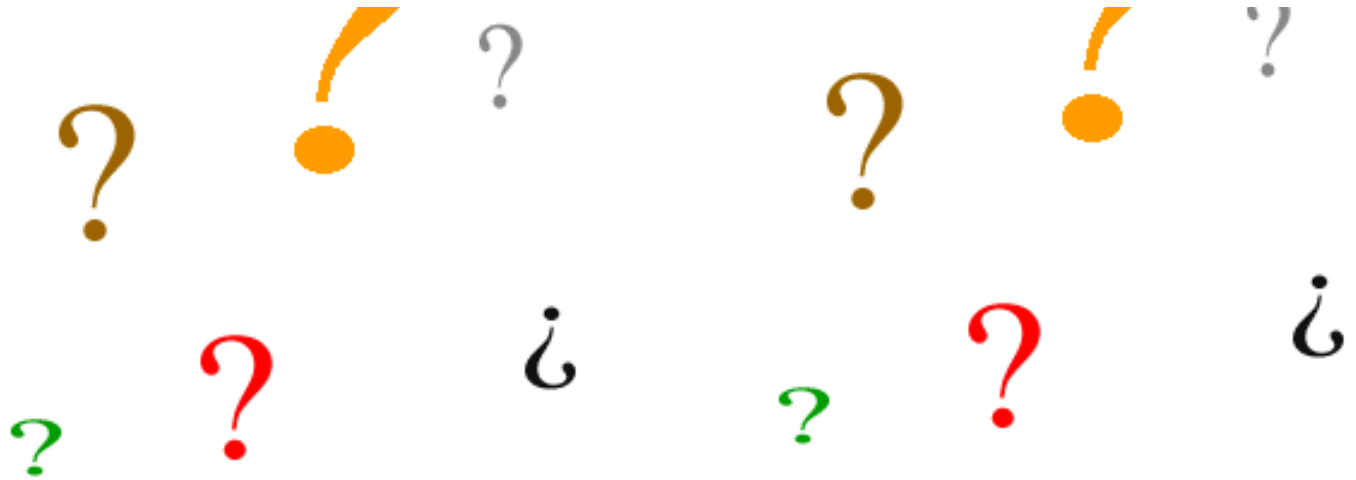
David L. Jaffe, MS

Professor Drew Nelson

Krystal Le

Questions?

Which cookies are better?



Did You Miss Tuesday's Lecture?

- Pick up handouts:
  - Student Team Candidate Projects
  - Assignments for students working on projects
  - Enrolled Student Signup Sheet
- Review first 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" this mandatory lecture

Did You Forget to Sign the Attendance Sheet on Tuesday?

ENGR110/210 Enrolled Student Attendance List

January 8, 2013

Name of Enrolled Student	Email address - @stanford.edu

Enrolled students must sign this list to confirm their class attendance.

Please see Dave after class

Agenda

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

Course Peer Liaison

Krystal Le

Course Resource People

Deborah E. Kenney, MS, OTR/L

Douglas F. Schwandt, MS

Sakti Srivastava, MBBS, MS

Mark Felling, EE, MBA

Gary M. Berke, MS, CP, FAAOP

Jules Sherman

Overview of
PRL & Room 36 Resources





Marlo Dreissigacker Kohn

STANFORD
PRODUCT
REALIZATION
LAB

PURPOSE

Make something!

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

Room 36 is part of the
Product Realization Lab (PRL)
and is a great on-ramp for rapid prototyping.

RESOURCES – COACHING

- Teaching assistants are available during all open hours for design and building coaching.

RESOURCES – TOOLS

- Tools:
  - laser cutters
  - 3D printers
  - electronics prototyping equipment, tools, and supplies
  - band saw
  - scroll saw
  - drill press
  - heat forming tools for plastic
  - vinyl cutter (and heat transfer press for applying vinyl to fabric)
  - sewing machines
  - X-Acto cutting surfaces and tools
  - hand tools such as wrenches, pliers, saws, and drills

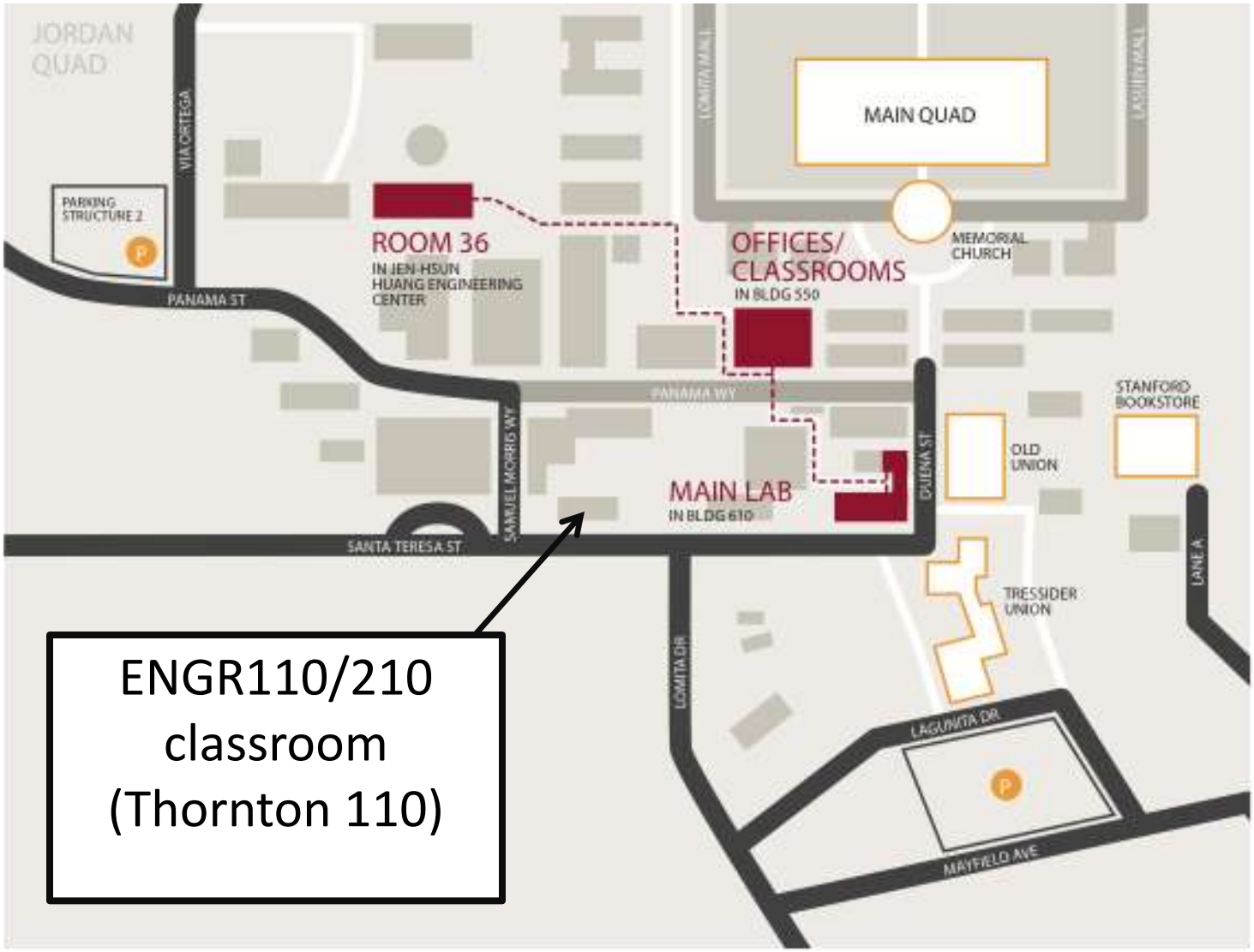
RESOURCES – MATERIALS

- Materials:
  - foam core
  - cardboard
  - wood
  - plastics
  - fabric
  - foam

- Bins of interesting materials are available for inspiration and use, and additional materials are available for purchase.

- Claim a project bin to store your materials and projects!

LOCATIONS


JORDAN QUAD
VIA ORTEGA
PARKING STRUCTURE 2
PANAMA ST
ROOM 36
IN JEN-HSUN HUANG ENGINEERING CENTER
MAIN QUAD
OFFICES/ CLASSROOMS
IN BLDG 550
MEMORIAL CHURCH
PANAMA WY
SAMUEL MORRIS WY
MAIN LAB
IN BLDG 610
DUENA ST
OLD UNION
STANFORD BOOKSTORE
SANTA TERESA ST
TRESSIDER UNION
LANE A
LOMITA DR
LAGUNITA DR
MAYFIELD AVE
ENGR110/210 classroom (Thornton 110)

GETTING STARTED

The use of **ALL** of the Product Realization Lab areas is now covered by a single safety orientation and lab fee.

1 quarter: $50

1 year: $100

Sign up for a scheduled safety orientation on WebShop (webshop.stanford.edu) to get started!

The 1 ¼ hour orientation begins at the Product Realization Lab (Building 610), and includes tours of all lab areas, including Room 36.

Resources Available:

- **Main lab (Building 610)**
  - Woodworking
  - Machining
  - Foundry
  - Welding and Metal Forming
- **Room 36 (Huang Engineering Center)**
  - Proof-of-concept models and rapid prototyping

For more information, visit prl.stanford.edu or contact Marlo Kohn at marlod@stanford.edu.

Project Pitches & Team Formation

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)
    - Freshmen & Sophomores must work in teams of 2 or 3
  - Name your team
  - Name your project
  - Name your device (after it develops a “character”)

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

  - Meet with Dave for suggestions and approval

Considerations for Team Formation and Project Selection (1/2)

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, but independent study is another option.

Considerations for Team Formation and Project Selection (2/2)

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.

Course load

- Can you spend the time working on a team project? Courses like ME218 and ME310 are very demanding.

Project Pitches

- **Inhaler Use Monitor** - Rush Bartlett & Ryan Van Wert
- **Inhaler Reminder & Inhaler Appearance Projects** - Jules Sherman
- **Projects for persons recovering from stroke** - Debbie Kenney
- **Guide Robot for the Blind** - Brian Higgins
- **Projects suggested by Aman Kumar**
- **Synchronizing with the Conductor's Beat** - Jan McKinley
- **Walker for Stroke Survivors** - Pat McCarty
- **Dog Leash Project** - Elaine Levin
- **Educational Activities for Children with Disabilities** - Greg Brown, RAFT
- **Projects suggested by Berke Prosthetics / Orthotics** - Gary M. Berke
- **Sailboat Seating Project** - Fernanda Castelo
- **Apps for Android Users** - TV Raman & Alan Viverette
- **Projects suggested by Ability Production** - Molly Hale
- **Social Development Program for Students with Autism** - Kurt Ohlfs
- **Touch Screen Technology** - Susan Swei
- **Integration of the Bookshare Go Read Android Reader with Switch Interfaces** - Gerardo Capiel
- **Project employing NeuroSky's brain-computer interface products** - Johnny Liu

- **Other projects –** Dave Jaffe

Projects Not Pitched in Person

- **Virtual Community Project, Elderly Drivers at the Wheel Project, and Household Tasks Project** - Marta Gaia Zanchi, RenovoRx
- **Customize the Wheelchair Project** - Jennifer Smith
- **Flat House Project** - Jack Moorman
- **Shower / Bathtub / Sink / Toilet Cleaning Project** - Jack Moorman
- **Wireless Dog Treat Dispenser** - Henry Evans
- **Software projects suggested by Project: Possibility**

Project Pitches

- **Inhaler Use Monitor** - Rush Bartlett & Ryan Van Wert

- Explore designs to monitor inhaler use.

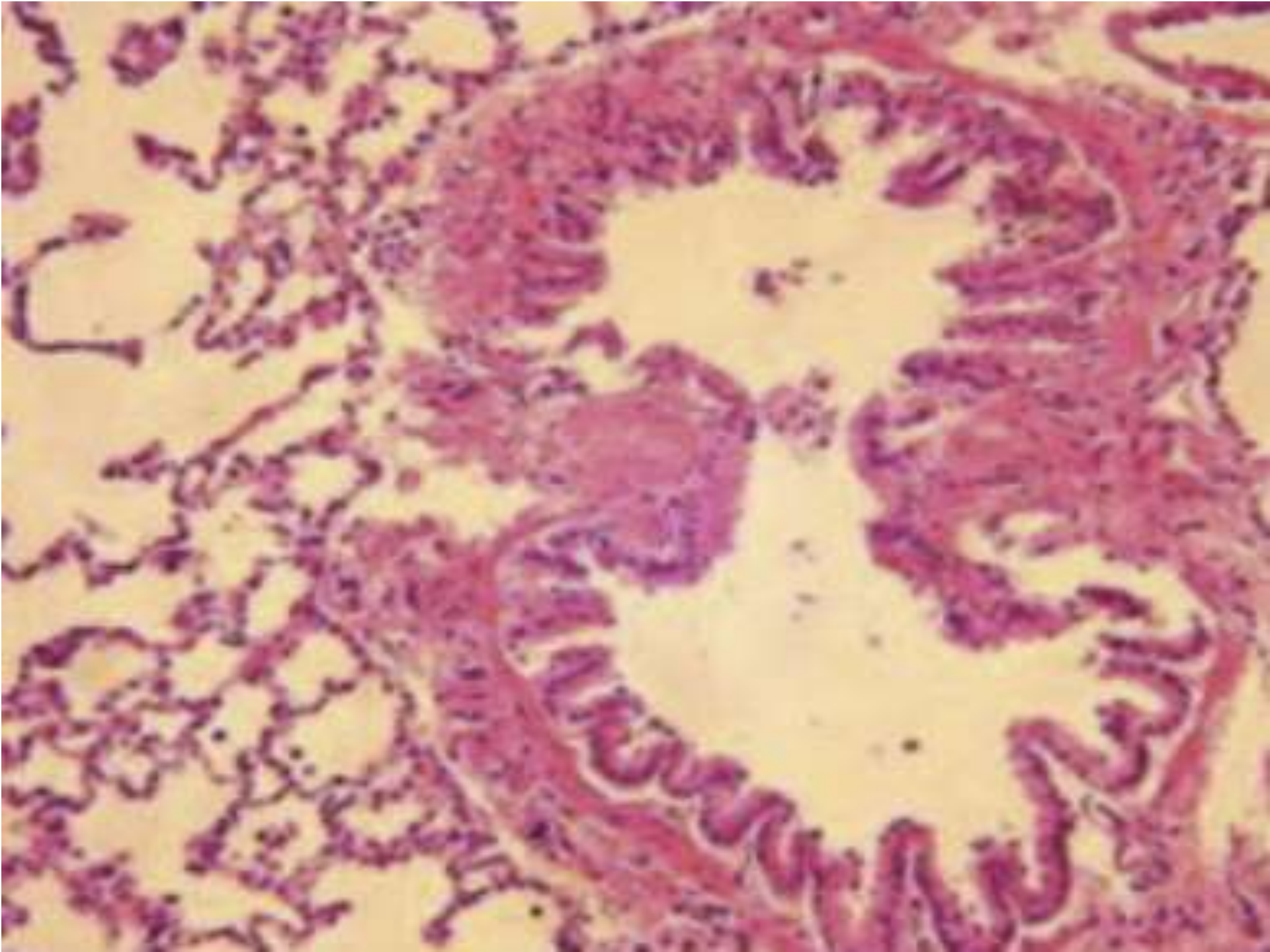
On deck: Jules Sherman

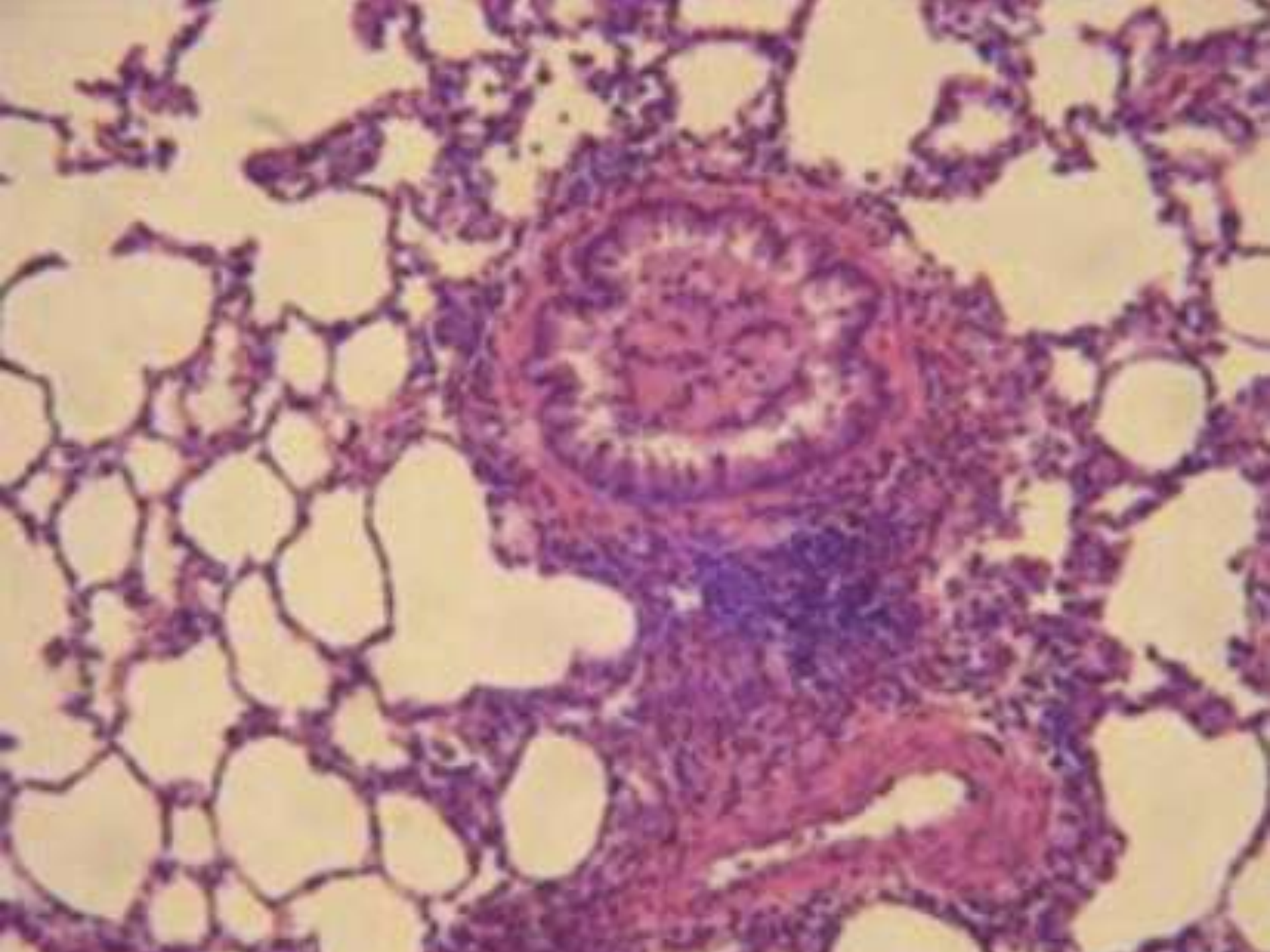
STANFORD biodesign

A 21st Century Solution for Asthma Control

Rush Bartlett, PhD, MBA

Ryan Van Wert, BScEng, MD





My Asthmapolis

ASTHMAPOLIS

Outsmarting asthma, together.

Our Solution | About Us | Data Privacy | Blog | Support | Contact

Better Manage Your Asthma

For Patients

Remote Monitoring and Management

For Providers

Reduced Costs and Improved Quality

For Payers


AT&T
1:29 AM
Text
Calendar
Photos
Camera
YouTube
Stocks
Maps
Weather
Clock
Calculator
Notes
Settings
Phone
Mail
Safari
iPod

Time

Date

Location

Weather

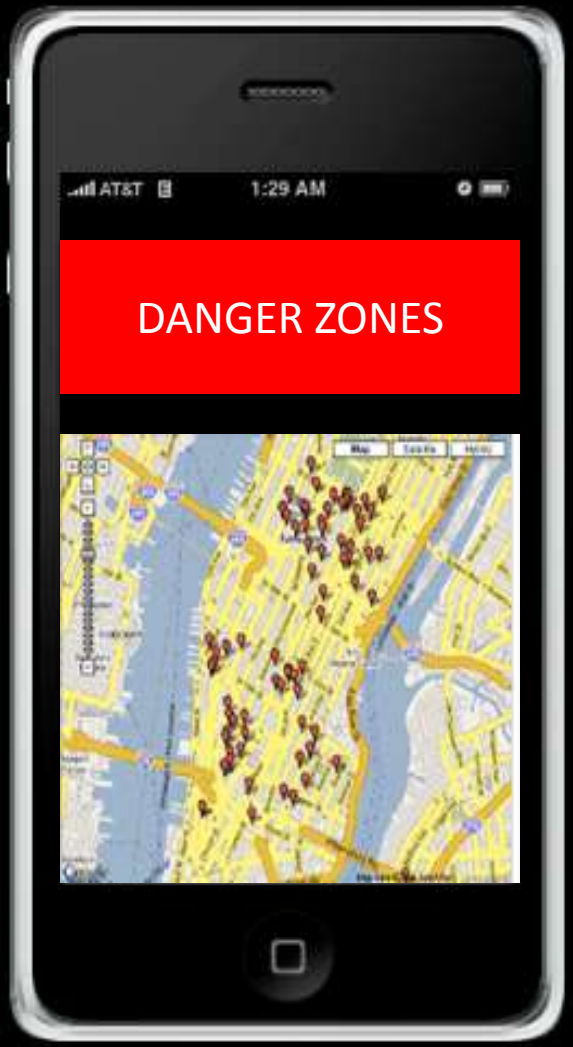
Pollen reports

Data from other users

Patient Reports

Clinician Reports

Social Media Links



Health Policy

Clinical Epidemiology

STANFORD biodesign

Current Status:

-IP search complete

-Patent application filed

We are seeking:

-Founder roles, motivated, creative individuals

-life science background/personal link to asthma

-computer science/programming expertise

STANFORD biodesign

Rush Bartlett, PhD, MBA

rushb@stanford.edu

Ryan Van Wert, BScEng, MD

rvanwert@stanford.edu

Project Pitches

- **Inhaler Reminder & Inhaler Appearance Projects** – Jules Sherman

- **Inhaler Reminder:** Explore designs for inhalers that would reduce the chance that they are forgotten by asthmatic users (including children).

- **Inhaler Appearance:** Explore designs for inhalers that would improve their appearance, including making them more discreet. This project is suitable as an individual rather than a team project.

On deck: Debbie Kenney

Mentor: Jules Sherman, MFA Product Design, Stanford

Improving the Aesthetics of Asthma Inhalers

Before you can have compliance, you have to have engagement.

I love fashion.










Hello Kitty


Hello Kitty

hmmm…

Fake Launch by *Coal Kills Kids*

By, Luis Daniel Ibarra, ID student in Mexico: Instituto Tecnológico y de Estudios Superiores de Monterrey Campus Querétaro

Aesthetics help to create an emotional attachment to a product.

How might we apply what we know in the fashion and toy industries to consumer medical products in order to ENGAGE patients?

Before you can have compliance,
you have to have engagement.

Are there ways to reduce the chance of someone forgetting their inhaler?

Zomm Wireless Leash Plus ensures you don't lose your iPhone

Dec. 8, 2011 (12:16 pm) By: *Lee Mathews*

Thank you.

Jules Sherman
Product Designer
805/705-9433
jules@julessherman.com

Project Pitches

- **Projects for persons recovering from stroke** – Debbie Kenney

- **Standing Straight Project:** Develop a dynamic device that would aid the person to realize their true center thus enabling better rehabilitation of their limbs.
- **Sock Donning Aid:** Explore a new design for a sock donning aid that can be used with one hand.

- **Cellphone and Tablet Holder:** Explore designs for a device that would make it easier to hold and use cellphone and tablets with one hand. This would serve individuals who have had a stroke, who have arthritis, cerebral palsy, or are amputees.

On deck: Brian Higgins

Project Pitches

- **Guide Robot for the Blind** – Brian Higgins

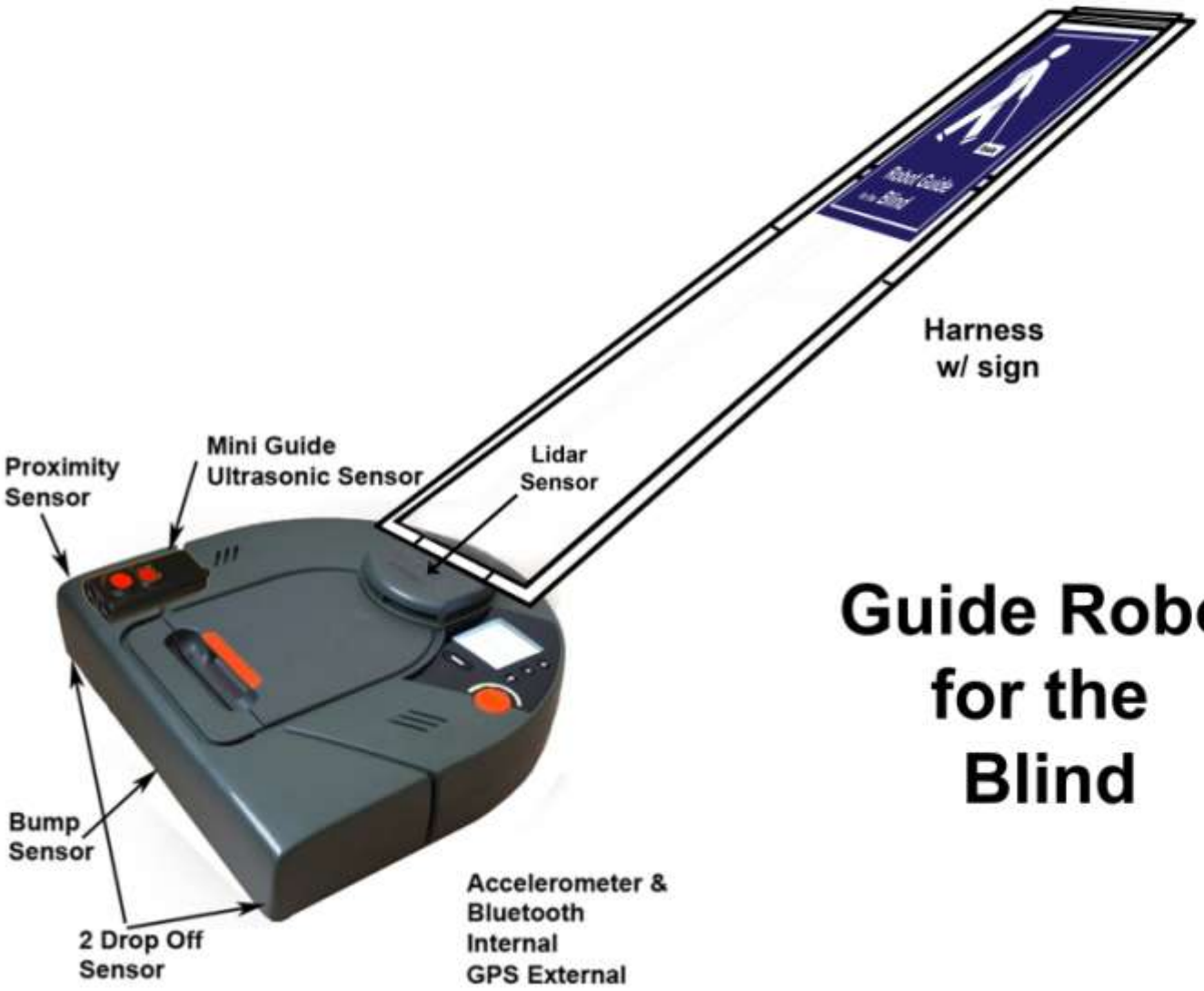
- Build a user-interface that facilitates communication between the robot and the user as well as the platform that supports the motorized computerized robot device.

On deck: Aman Kumar

Guide Robot

Guide Robot for the Blind

User-Interface Project



Guide Robot for the Blind

Background

Intellisight is a business that is developing a system for guiding people who are blind and visually impaired along a clear path that uses Lidar-type radar to sense the presence of obstacles or other terrain features and warns the user.

Problem

Current orientation and mobility solutions for individuals with visual impairments or blindness include the White Cane, Guide Dogs, Trekker, Mowatt Sensor, and Mini Guide. While these items provide basic information
suitable for getting around, they do not provide substantial details about the users environment.

A guide robot is under construction that will provide a blind traveler with information beyond what is currently available with current solutions. *Intellisight* is tackling the following portions of the project: wheels, motors, motor controllers, power system, sensor array, computer hardware and software systems.

Aim

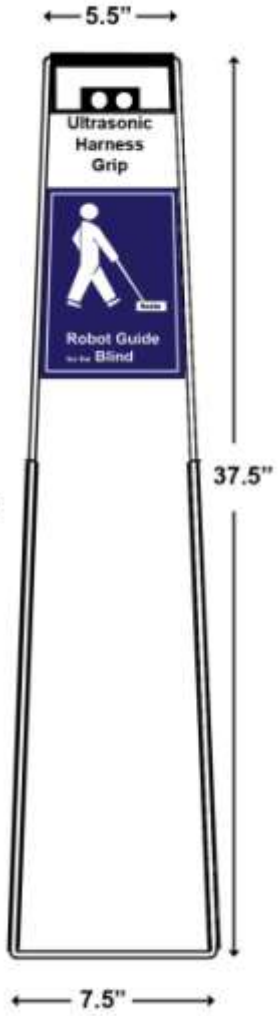
Build a user-interface that facilitates communication between the robot and the user as well as the platform that supports the motorized computerize robot device.

User-Interface Design Criteria:

1. Employ a telescoping handle that is able to support the entire weight of the robot
2. Provide a tactile interface to user
3. Include a power switch
4. Have available an adjustable height handle

THIS HARNESS IS MADE UP OF .05" ALUM.

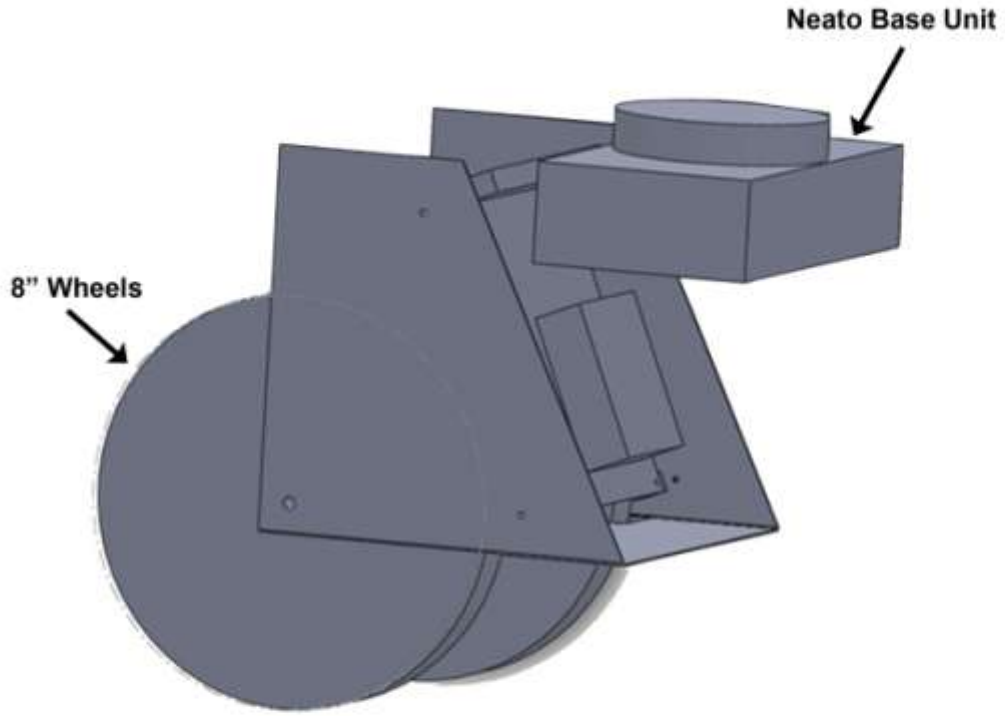
This Harness could telescope into itself @ the half way point. It locks into place with pins.



Platform Design Criteria

1. Accommodation of selected motors, motor controllers, and a computer system
2. Consisting of lightweight material
3. Ability to travel over rough terrain and down stairs

Prototype Platform Design



Platform for Neato

Prototype Goal

The completed prototype will be able to detect a clear path and provide object avoidance information; detailed information about the local environment. It will be able to scan the interior of a building to determine its room layout and employ GPS information.

Contact:

Brian Higgins
Intellisight - Autonomous Travel for the Blind
Los Altos, CA 94022
650/906-9412
http://intellisight.org
seeneye@comcast.net

Project Pitches

- **Projects suggested by Aman Kumar**

- Design a prototype device or app for communicating and visualizing symptoms of retinal detachment
- Design a prototype device or app that would assist health care professionals to assess the effects of retinal detachment therapy
- Design a prototype device or app that would provide audio feedback of stutterers speech and video feedback of muscle disruptions that accompany stuttering
- Design a prototype device or app that would connect health care professionals with stutterers living in rural areas to provide care and therapy

On deck: Jan McKinley

Vision + speech

A few project ideas

Perspectives on Assistive Technology
Winter Quarter 2013

Aman Kumar
aman@cs.stanford.edu

Retina

- Vitreal detachment happens to almost everyone as they age; some of these become retinal tears/detachment
- Most common in people with high myopia (5%)
- Painless, symptoms of flashing and floaters
- Left untreated, results in total blindness within 24-48 hours

Retina: problem

- Vision is a scary thing
- People with changes don't know to communicate symptoms, think they will clear by themselves
- By the time they realize something's wrong, it's often too late

Retina: solution

- Create an app (iOS, Android) that allows patients at high risk for retinal issues to quickly describe and communicate symptoms to their doctor
- Can be expanded to other urgent ophthalmological conditions
- Prior work: look at DigiSight Network / SightBook, a tool for remote visual diagnosis

Stuttering

- 1% of all adults stutter — 60 million people
- they are teased, ridiculed, unaware they have a condition that can be improved with treatment
- speech disorders remain some of the last disorders socially acceptable to ridicule
- massive need to facilitate education, therapy, awareness, advocacy

Stuttering: solution

- Create an app that monitors and classifies speech disfluencies for research and therapy
    - Researchers can collect field data, patients can self-monitor
- Create an app that connects speech-language pathologists to people who stutter in underserved areas
    - All you need is a good videoconference to diagnose and provide therapy
- Prior work: Stutter Social, National Stuttering Assn

Project Pitches

- **Synchronizing with the Conductor's Beat** - Jan McKinley

- Explore designs to make it possible for a visually impaired performer to synchronize with the conductor's beat.

Video

On deck: Pat McCarty

Project Pitches

- **Walker for Stroke Survivors** - Pat McCarty

- Explore designs to make it easier for stroke survivors to use a walker or a wheelchair used as a walker.

On deck: Elaine Levin

Walker for Stroke Survivors

Walker for Stroke Survivors

Project Pitches

- **Dog Leash Project** - Elaine Levin

- Explore designs for a dog leash system that will be easy for users to attach to their wheelchairs or walkers independently, prevent the leash from being caught under the mobility device, and avoid being tipped over by a strong dog.

On deck: Greg Brown

Dog Leash Project

- Video by Deborah Davis



Project Pitches

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

- Investigate and develop new educational activities appropriate for children with disabilities. This may include mechanical and/or computer software solutions that will provide interactive access for these learners.

On deck: Gary Berke

Project Pitches

- **Projects suggested by Berke Prosthetics / Orthotics** - Gary M. Berke

- **Aids:** Design an aid that provides increased independence for a male user with a bilateral traumatic trans-radial (below the elbow) amputation in toileting, showering, and dressing.

- **Prosthetics for a child:** Explore designs for a child with a missing hand that would allow him/her to play on monkey bars or throw/catch a ball.

On deck: Fernanda Castelo

Gary M. Berke MS, CP, FAAOP
Adjunct Clinical Instructor, Department of Orthopaedic Surgery

Private Practice Prosthetist
Redwood City, CA


POOH
03 2 2

throw and catch a ball


visualphotos.com

Project Pitches

- **Sailboat Seating Project** - Fernanda Castelo

- Explore a seating design for a sailor with quadriplegia that is adjustable, comfortable, functional, and secure.

Video

On deck: TV Raman & Alan Viverette

Project Pitches

- **Apps for Android Users** - TV Raman & Alan Viverette

- **Campus Information:** Develop an accessible eyes-free campus app that would provide quick and easy access to useful information such as: cafeteria menus, library hours, and Marguerite Shuttle schedules.

- **Real-time OCR:** Develop an enhancement to existing OCR software that would provide real-time spoken output.

- **Campus Wayfinding:** Develop an outdoor wayfinding app that helps individuals new to Stanford find their way around campus.

Video

On deck: Molly Hale

Project Pitches

- **Projects suggested by Ability Production** – Molly Hale

- **Wheel Washer:** Explore designs to remove dirt from the wheels of a powered or manual wheelchair or walker.

- **Transfer Assistance:** Explore mechanical designs that would provide safe, independent standing transfers including to a toilet.

On deck: Kurt Ohlfs

Wheel Washer

Transfer Assistance

Project Pitches

- **Social Development Program for Students with Autism** - Kurt Ohlfs

- Explore the development of educational gaming applications that will help to create an engaging method for students to build appropriate social emotional recognition through repetitive behavioral modeling.

Video

On deck: Susan Swei

Project Pitches

- **Touch Screen Technology** - Susan Swei

- Explore designs that would enable people with disabilities to benefit from touch screen technology.

On deck: Gerardo Capiel

Stanford Assistive Technology

January 10, 2013


A global leader for intuitive touch technologies
with over 20 million installations worldwide.

A History of Innovation

Established in 1971
as Elographics – with the
world's first electronic
touch interface

1977
AccuTouch
resistive
Introduced

1987
Introduced
IntelliTouch –
first SAW technology

2008
Introduced
first zero-bezel
touch display

2012
Elo Touch
Solutions
established

elo TOUCH SOLUTIONS

Everywhere You Are

Retail
POI

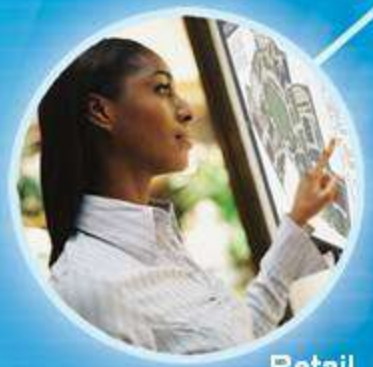
Healthcare IT
Systems

Casino Gaming
Touch Displays

Self-service
Kiosk Displays

Medical
Equipment
Touch Displays

Retail
POS



Retail
Interactive Digital
Signage

Medical
Interactive
Digital Signage

Handheld
Devices
Touch
Components

elo TOUCH SOLUTIONS

Committed to R&D

- Touch isn't just our core business – it's our only business
- Our investment in R&D is among the highest in the industry
- Global engineering resources leverage the best and brightest talent around the world
- Design consistency and cross platform leverage

elo TOUCH SOLUTIONS

Touch is everywhere. What's the problem?

- As touch becomes more ubiquitous across society, Elo would like to understand how this affects groups that may have difficulty working with touch including:
  - Visually impaired / blind
  - Limited manual dexterity

- Student group would:
  - Interview the user group to determine how their lives are impacted by touch technology
  - Determine a solution that benefits the user and is easy to use, intuitive to operate, technically feasible, and cost effective

Project Pitches

- **Integration of the Bookshare Go Read Android Reader with Switch Interfaces -** Gerardo Capiel

- Explore designs to integrate and test Bookshare's open source Go Read app with Komodo OpenLabs' Tecla Shield.

On deck: Johnny Liu

benetech

TECHNOLOGY
SERVING HUMANITY

ENGR110/210
Perspectives in Assistive Technology

Benetech and Bookshare

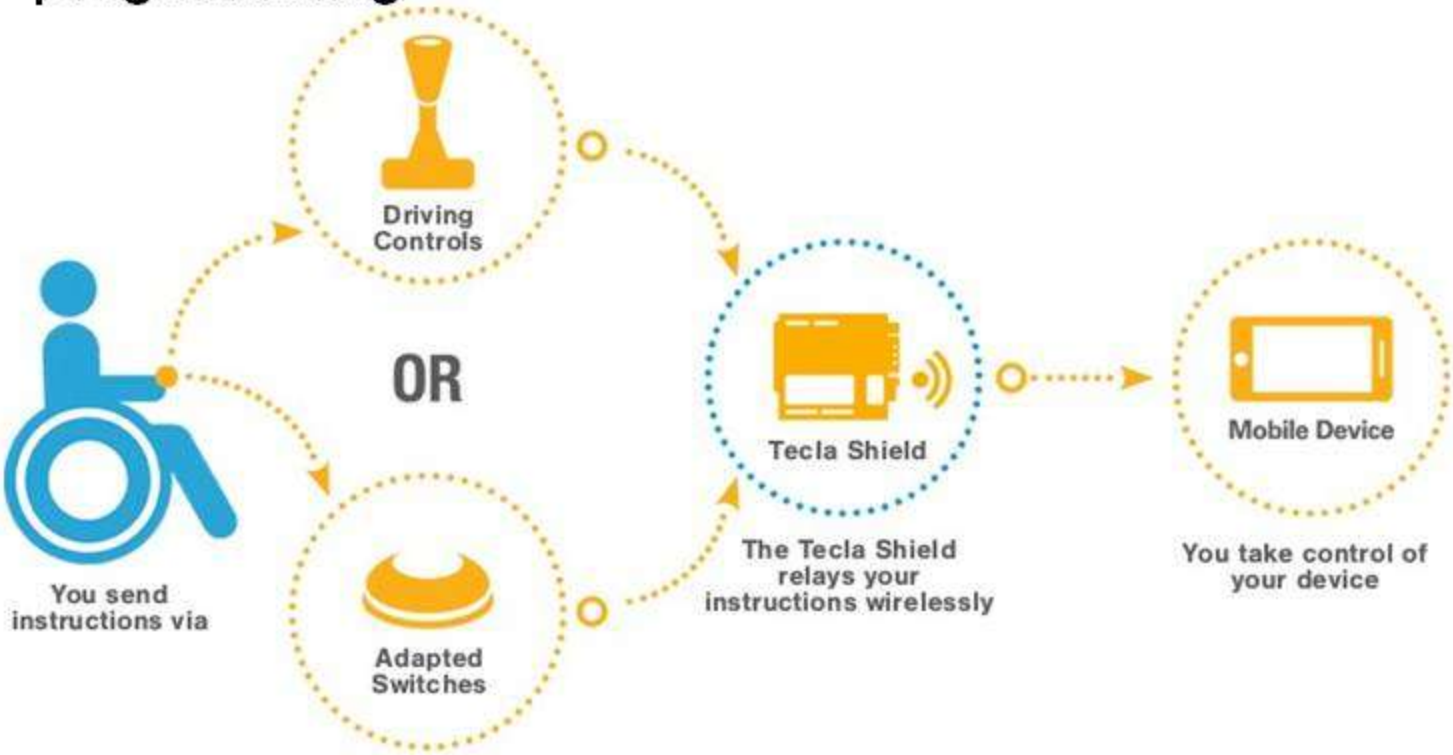
- Benetech is a nonprofit software organization focused on:
  - Access to Literacy
  - Human Rights
  - Environment
- Bookshare is our largest project in the our Access to Literacy Program
  - For people with print disabilities (blind, quadriplegic, cerebral palsy)
  - 230K+ members
  - 175K+ accessible eBooks

Bookshare Members

- http://blog.bookshare.org/2010/07/22/maplesfamily/
- http://www.youtube.com/watch?v=asNgQXnxbQ8
- http://www.benetech.org/literacy/pinto_profile.shtml

Goal is to Create Switch Accessible eBook Reader

- By integration open source software applications
  - Komodo OpenLabs Tecla Shield
  - Bookshare's Go Read eBook Reader for Android
- Requires about a week of Android Java programming



Puffer and Tecla Shield

Android Tablet with Interface to Tecla Shield

Project Pitches

- **Project employing NeuroSky's brain-computer interface products** - Johnny Liu

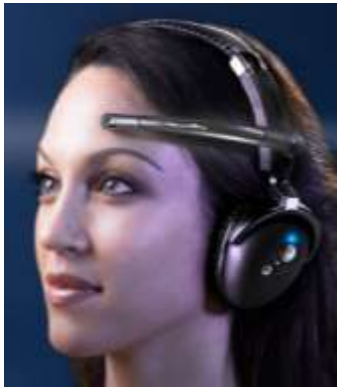
- Explore an application for a person with a disability using NeuroSky's brain-computer interface products. Examples include the control of household appliances (lights, TV, music system), operation of Bluetooth devices (iPhone), construction of an on-screen keyboard, and design of a communication system for non-vocal users with limited manipulation skills.

On deck: Dave Jaffe

NeuroSky Products

MindWave Mobile
$130

MindWave
$99



MindSet
$199

ThinkGear ASIC Module

Projects Not Pitched in Person

- **Virtual Community Project, Elderly Drivers at the Wheel Project, and Household Tasks Project** - Marta Gaia Zanchi, RenovoRx
- **Customize the Wheelchair Project** - Jennifer Smith
- **Flat House Project** - Jack Moorman
- **Shower / Bathtub / Sink / Toilet Cleaning Project** - Jack Moorman
- **Wireless Dog Treat Dispenser** - Henry Evans
- **Software projects suggested by Project: Possibility**

Project Pitches by Dave

- **Virtual Community Project, Elderly Drivers at the Wheel Project, and Household Tasks Project** - Marta Gaia Zanchi, RenovoRx

- The aim of this project is to explore and design an application or virtual community of elderly persons with same or similar interests.
- The goal of this project is to research and create devices that are capable of restoring the ability and/or increasing the safety of elderly drivers.
- The goal is to explore and create devices that are capable of restoring the ability of elderly people to attend to daily household tasks, especially the most basic ones such as making the bed and ironing.

Listen to recorded audio:
http://www.stanford.edu/class/engr110/2012/01b-PitchDay.mp3

Project Pitches by Dave

- **Customize the Wheelchair Project** - Jennifer Smith

- Explore ways to add a personal aesthetic to wheelchairs.

See last year's Project Pitches: (pages 28 - 37)
http://www.stanford.edu/class/engr110/2012/01b-PitchDay.pdf
and listen to recorded audio:
http://www.stanford.edu/class/engr110/2012/01b-PitchDay.mp3

Project Pitches by Dave

- **Flat House Project** - Jack Moorman

- Explore and design solutions that can be retrofitted to current housing for entering and leaving a house, one step up or down on a single floor, and the multi-step problem of stairs.

See last year's Project Pitches: (pages 92 – 97)
http://www.stanford.edu/class/engr110/2012/01b-PitchDay.pdf
and listen to recorded audio:
http://www.stanford.edu/class/engr110/2012/01b-PitchDay.mp3

Project Pitches by Dave

- **Shower / Bathtub / Sink / Toilet Cleaning Project** - Jack Moorman

- Explore and design solutions for cleaning problems for seniors with disabilities.

See last year's Project Pitches: (pages 98 – 99)
http://www.stanford.edu/class/engr110/2012/01b-PitchDay.pdf
and listen to recorded audio:
http://www.stanford.edu/class/engr110/2012/01b-PitchDay.mp3

Shower / Bathtub / Sink / Toilet Cleaning Project

- User is required to:
  - Bend over (shower floor)
  - Reach in an awkward manner (behind toilet)
  - Smell and inhale noxious fumes (cleaners)
  - Lean out supported by one hand (clean tub)
  - Get close to work surface (poor eyesight)
  - Take a high step with leg (clean tub)
  - Reach high over head (shower walls and ceiling)
  - Pressure weak wrists (scrubbing)
  - Get up from a low seat (cleaning floors)
  - Sanitize cleaning tools (toilet bowl brush)
  - Remove mold (difficult work)
  - Notice drips and leaks (hearing and eyesight issues)
  - Access to cleaning tools and supplies (high or low storage)

Project Pitches by Dave

- **Wireless Treat Dispenser** - Henry Evans

- Explore a design for a simple wireless treat dispenser for a service animal that would operate by a switch or a wireless signal.

Wireless Dog Treat Dispenser

Problem: Many wheelchair users with severe disabilities have service animals, but have no way to reward them.

Challenge: Design a wireless dog treat dispenser which attaches to the wheelchair and is activated by:

- voice
- cheek-mounted bluetooth EMG
- a laser mounted on glasses
- a Dynavox with headtracker
- some other mechanism that does not require use of the hands.

Project Pitches by Dave

- **Software projects suggested by Project: Possibility – link**

- Project: Possibility goal: create and support innovative software projects that are empowering for the software developers who implement them and for the persons with disabilities who use them.

Projects Not Pitched

See the handout or website for these project descriptions

- **Projects for veterans with spinal cord injury**
- **Projects suggested by Parents Helping Parents**

Project Pitches

- **Other project options**
  - Accessible interfaces for commonly used devices
  - Online multi-site tele-video games for seniors
  - Projects listed in NSF guide
  - Student-defined projects (with Dave's approval)

Tuesday, Jan 15th

Gayle Curtis - UX Design Consultant

John C. Tang, PhD - Microsoft Research

Need Finding for Assistive Technologies

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

Have course questions? Ask Dave

Send Dave your top 3 choices

See Dave if you are working on an individual project

Class Dismissed