January 4, 2011

ENGR110/210
Perspectives in Assistive Technology

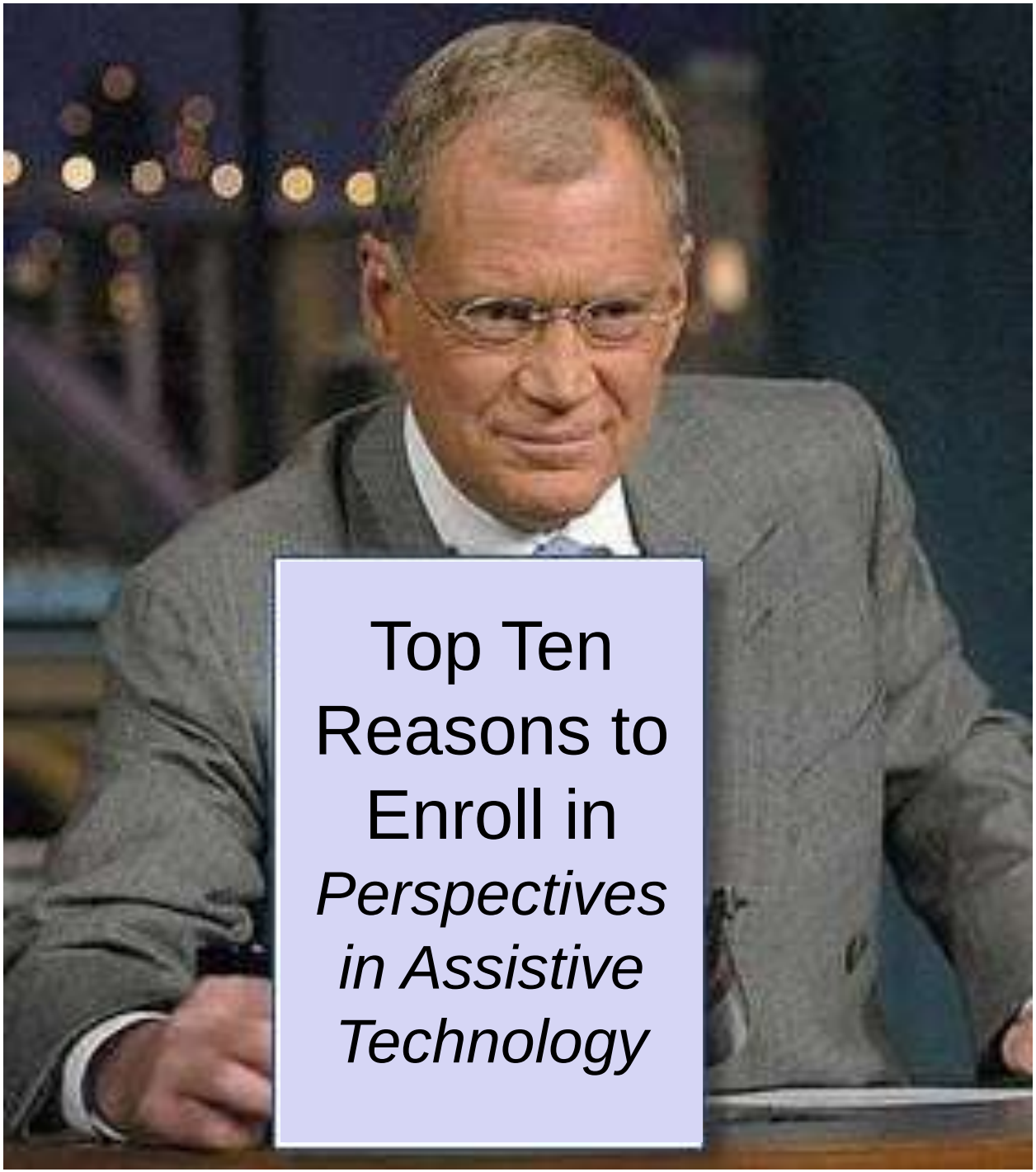
David L. Jaffe, MS

Professor Drew Nelson

Harpreet K. Sangha

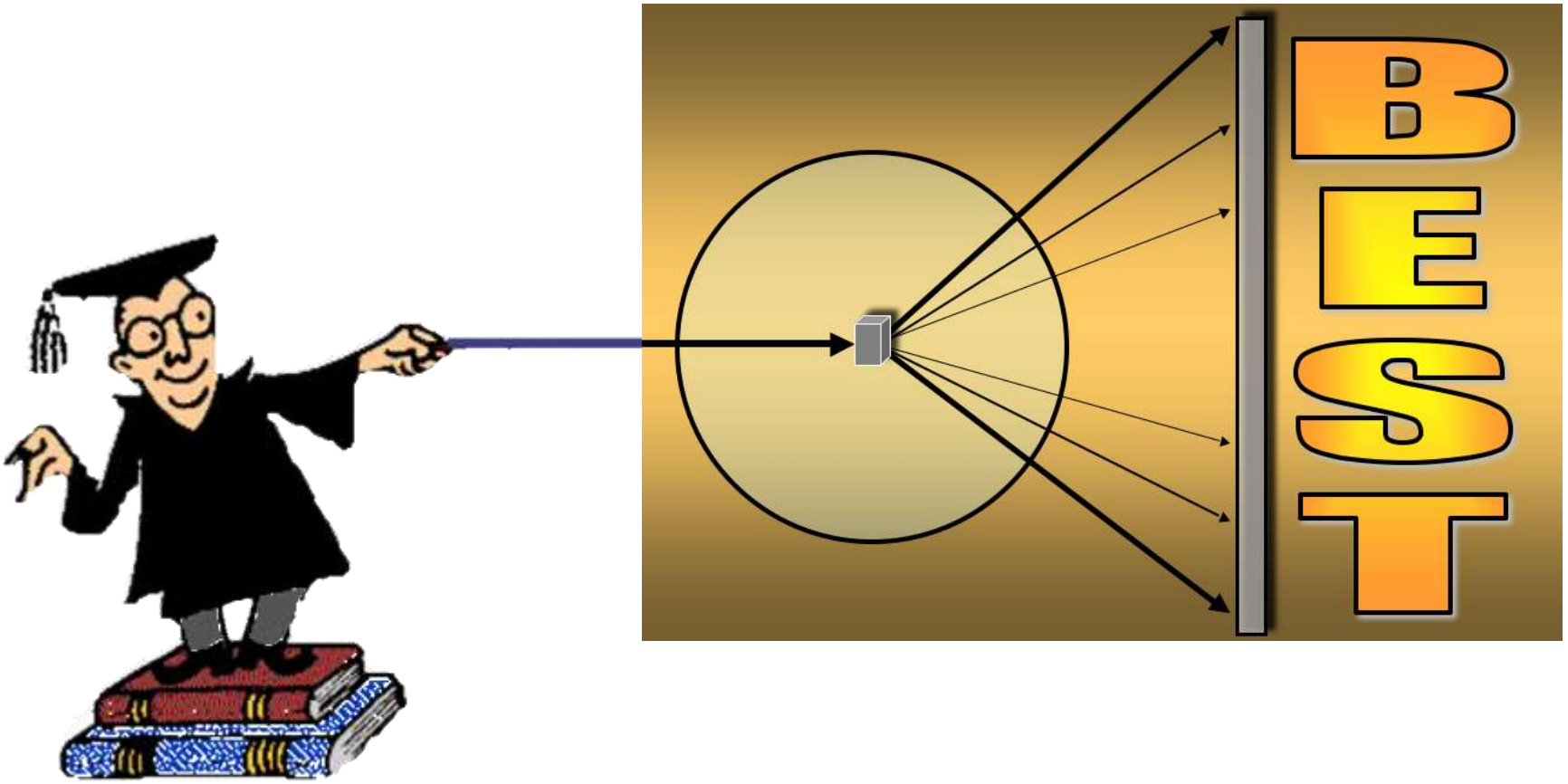

Any questions so far?

Top Ten Reasons to Enroll in *Perspectives in Assistive Technology*


Top Ten
Reasons to
Enroll in
Perspectives
in Assistive
Technology

10

It is the best course I teach

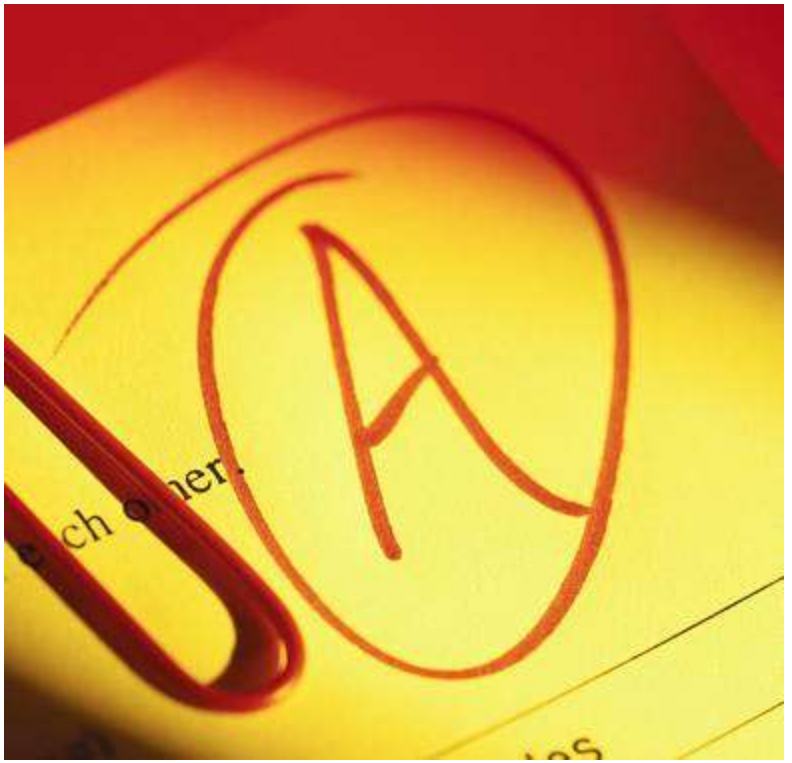


9

It is the best assistive technology course at Stanford

8

Everyone who has taken the course for a grade got an "A"



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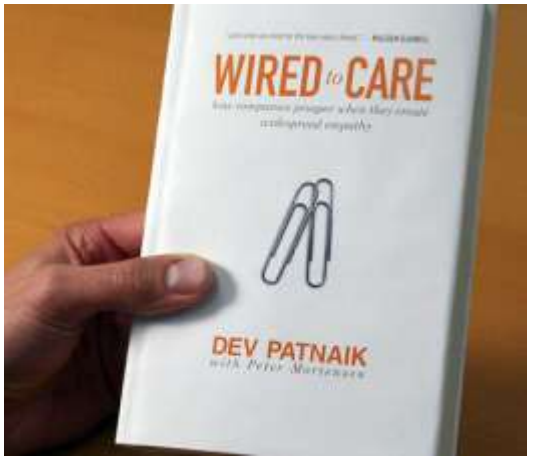


You are compelled to do it:

Top motivational factors for engineering students are behavioral, psychological, social good, and financial. Center for the Advancement of Engineering Education

Service Learning

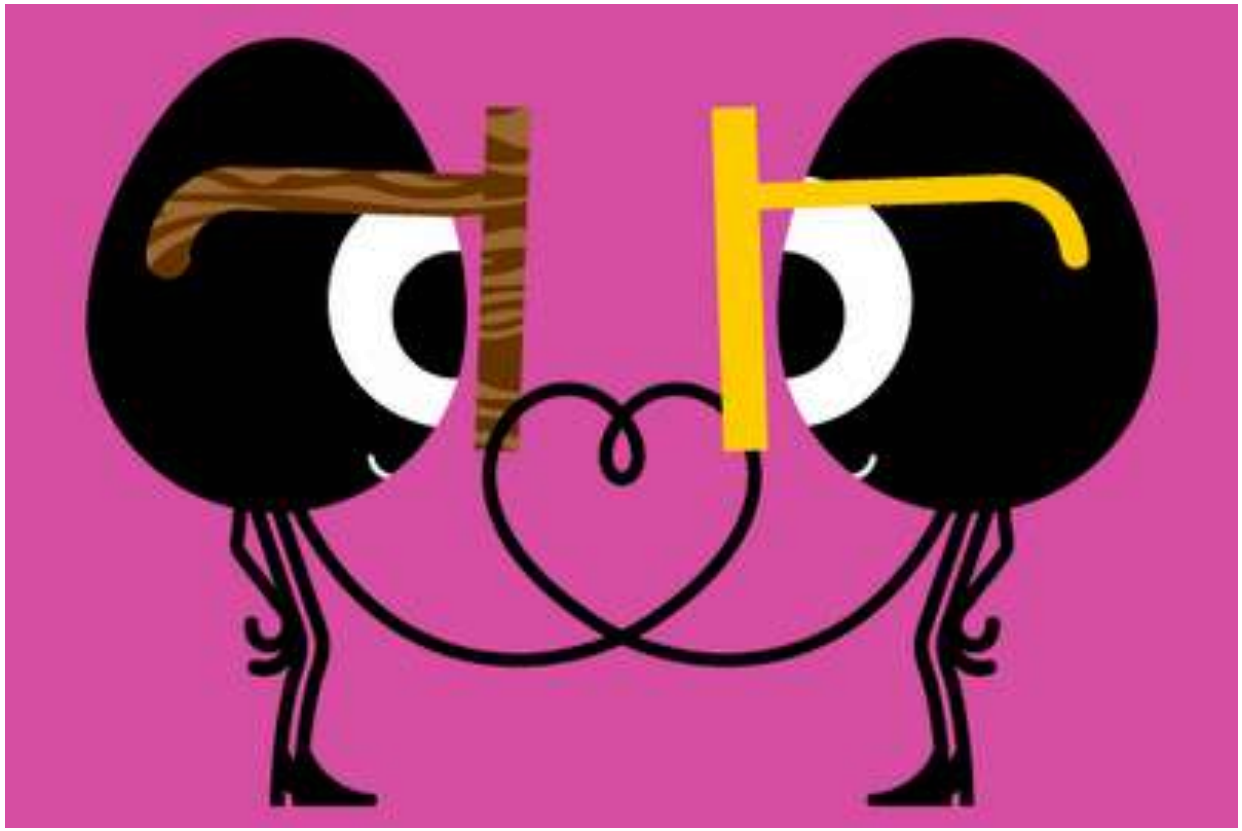
Local Community

6

You want to know if your Stanford education and skills can benefit others

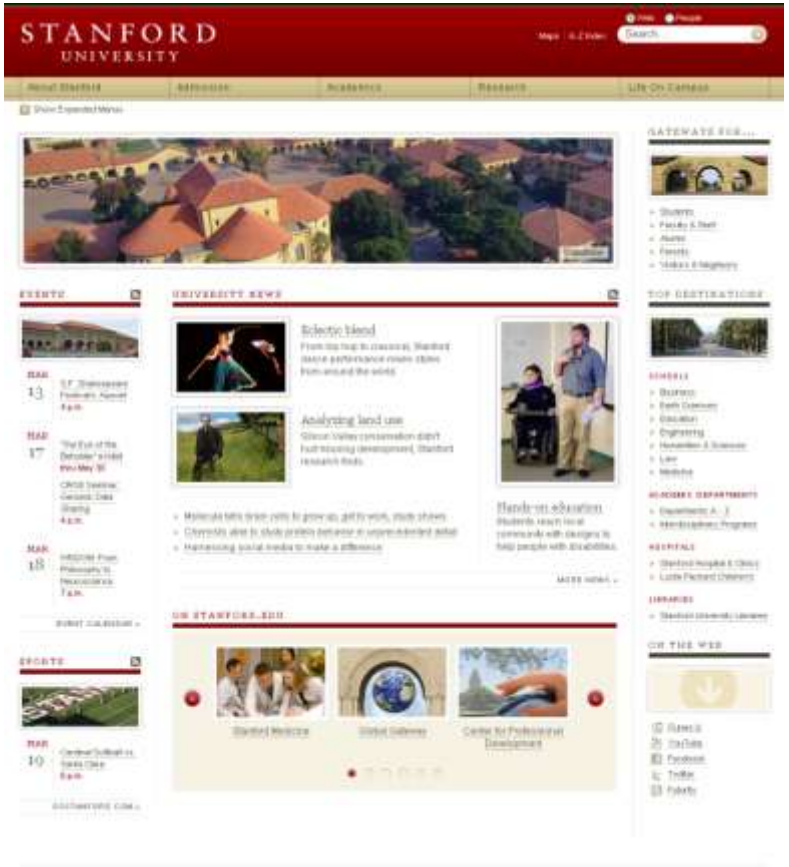
5a

To meet your love connection



5b

The fame and notoriety



4

The job opportunities

3

You have heard good things about the course

2

You want to take something completely different

And the Number One Reason to enroll in *Perspectives in Assistive Technology*

1

You want to get a head start on ME113

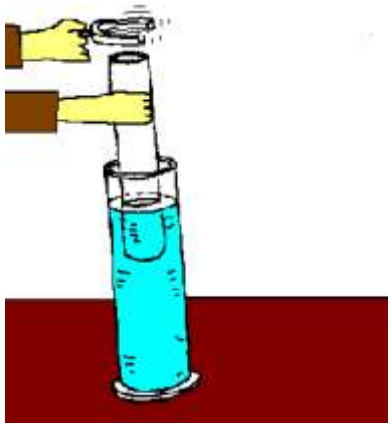
Top Ten Reasons to Enroll in *Perspectives in Assistive Technology*

10. It is the best course I teach
9. It is the best assistive technology course at Stanford
8. Everyone who has taken the course for a grade got an "A“
7. You are compelled to do it
6. You want to know if your Stanford education and skills can benefit others

5a. To meet your love connection

5b. The fame and notoriety

4. The job opportunities
3. You have heard good things about the course
2. You want to take something completely different
1. You want to get a head start on ME113



Call Me “Dave”

“Professor” from Gilligan’s Island

Dr. Zorba from Ben Casey

Mr. Jaffe, my father

I am not a professor and I don’t have a PhD or MD

David L. Jaffe, MS

Course Organizer & Emcee

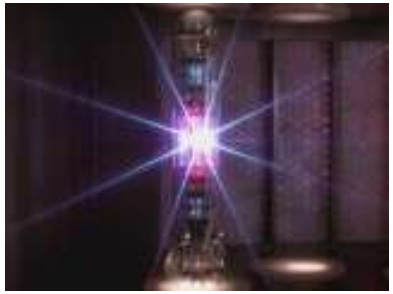
Today's Agenda

- Welcome to the Course
- Course Outline
- Introduction to Assistive Technology
- Student Project Preview
  - Prior Years' Student Projects
  - Project Suggestions for this Quarter

to the Class

- Welcome students and community
- Senior Faculty: Professor Drew Nelson
- Student Peer Liaison: Harpreet K. Sangha
- Administrative items
  - Time conflicts
  - Sign-up form
  - Attendance sheet

Who are these people and why are they smiling?



Class Genesis

- How this course came about
- Why it is being offered

Course Goals

- Expose students to the engineering, medical, and social issues facing engineers, researchers, entrepreneurs, clinicians, seniors, and individuals with disabilities in the design, development, and use of assistive technology
- Engage students in a team-based project experience that exercises team working skills and applies an engineering design process to tackle difficulties experienced by individuals with disabilities and seniors
- Provide an opportunity for students to interact with users of assistive technology in the local community along with heath care professionals, coaches, and project partners
- Enhance students' communication skills, with specific emphasis on in-class discussions, report writing, and presentations
- Encourage students to use their engineering skills and design expertise to help individuals with disabilities and seniors increase their independence and improve their quality of life
- Provide information to the greater Stanford community

What this Course isn't

- Not about starting a company
- Not about commercializing a device or product
- Not about business or manufacturing
- Projects not with big companies or in other countries
- No exams or quizzes
- No books to buy or required reading
- No problem sets
- No boring lectures

"Not that there is anything wrong with that"

What this Course <u>is</u>

- Technology and people
- Assistive Technology in its many forms
- Engineering design-development process:
  - Need-finding
  - Brainstorming
  - Prototyping
  - Testing
  - Communicating
- Team-work
- Partnering with local community

Course Credentials

- Certified Service Learning Course
- Approved course for ME undergraduate degree (see page 308, Note 7 in 2010-2011 Handbook for Undergraduate Engineering Programs)
- Prof Robert McGinn will entertain a petition to use the course toward the **Technology in Society** requirement by any student who does a serious student team project
- Listed as one of two “Save the World” Winter Quarter courses on *The Unofficial Stanford Blog*

Unbiased. Uncensored. Stanford in real time.

THE UNOFFICIAL STANFORD BLOG

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« *Pasadena-Bound?* *A Government We Deserve? The Meaning of Tuesday's Elections* »

TUSB 2011 Winter Course Guide: spice up your courseload!

Posted by Kristi at November 3, 2010 1:10AM

Stanford: land of sunshine-y studying all year

It's that time of year again! Not sure what winter classes to take? No worries; check out TUSB's course primer. Whether you're looking to satisfy a GER, find profound inspiration, or just take a fun class for **kicks**, we've got you covered.

If there's anything we missed, don't hesitate to mention it in the comments – we appreciate your feedback. Additionally, you can check out past years' course guides **here**. **Enjoy**!

Save the World: cool classes that give you Haas Center credit

- **EESS 105**: **Food and Community for a Sustainable Future** – from garden development to food dispersal to the needy
- **ENGR 110**: **Perspectives in Assistive Technology** – team-based projects for the disabled

Burst the Bubble: field trip-based

Welcome to the Farm

search

Search

The Unofficial Stanford Blog

Like 730

announcements:

The Procrastination Nation photo contest is over! Watch for the post with the winning entries.

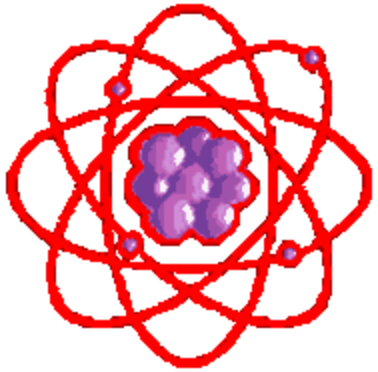
popular this week

- Big Game Tickets Available
- A time to be thankful...
- Overheard at Stanford...

a word from our sponsors

recent comments

- C.J. on This Week in Stanford 11/7/10-11/13/10



Course Structure

- A twice-weekly lectures exploring perspectives in the design and use of assistive technology by engineers, designers, entrepreneurs, clinicians, and persons with disabilities

- Opportunities for thought and discussion
- A design experience that includes need-finding, brainstorming, project identification, and design - benefitting individuals in the local community

Student Experience

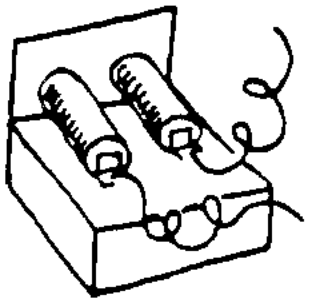
- Gain an appreciation for the psychosocial, medical, and technical challenges in developing assistive technologies

- Learn about engineering concepts, design strategies, ethical issues, and intellectual property rights

For those working on a project:

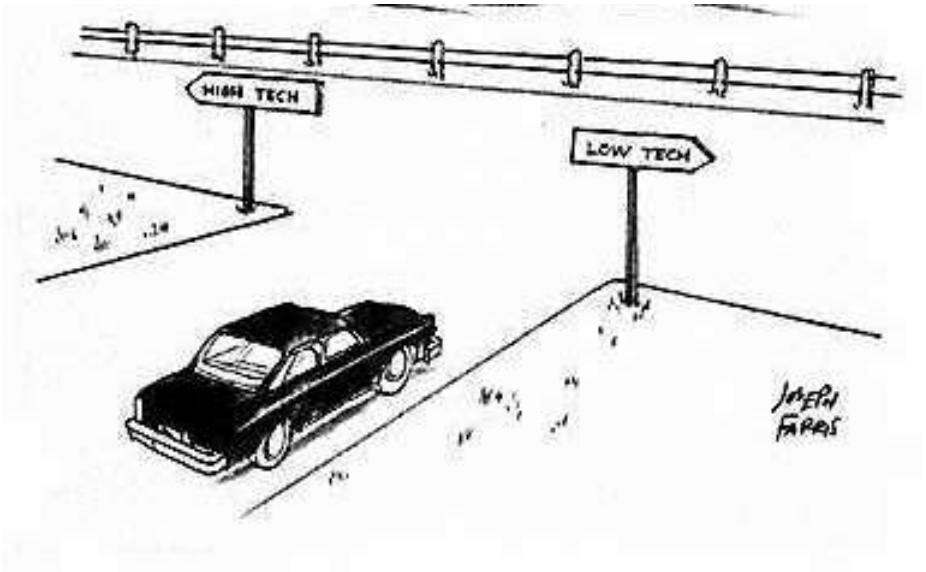
- Engage in a comprehensive design experience that includes working with real users of assistive technology to identify needs, prototype solutions, perform device testing, practice iterative design, and communicate results

- Employ engineering and design skills to help people with disabilities increase their independence and improve their quality of life



Projects

- Need not be impressive
- Low tech is ok
- Going through the design process and getting it to work are priorities



Credit Options

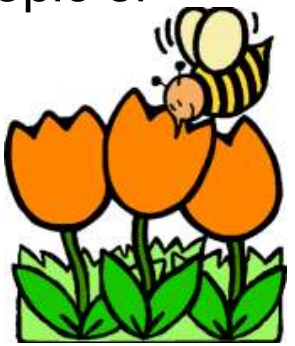
1-unit options:

- **No letter grade (Pass/NC)**

  attend **at least 10** ENGR110/210 lectures (including this one), no participation in a project, no continuation in the Spring Quarter

- **Letter grade**

  attend **at least 10** ENGR110/210 lectures (including this one), individual research on an assistive technology topic or a paper design of an assistive technology device, no continuation in the Spring Quarter



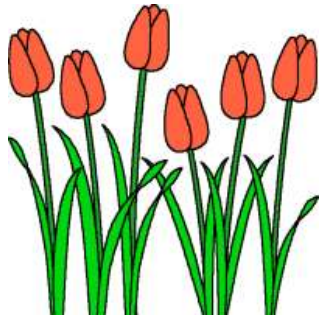
Credit Options

3-unit options:

- attend **all** ENGR110/210 lectures, participate in a team project, continue with ME113 (with your entire team) or CS194 in the Spring Quarter

- attend **all** ENGR110/210 lectures, participate in a team project, continue with independent study credit in the Spring Quarter

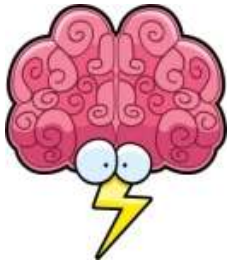
- attend **all** ENGR110/210 lectures, participate in a team project, no continuation in the Spring Quarter



Project Activities

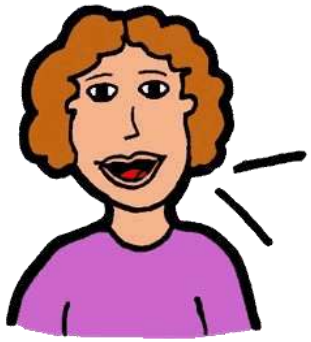
For those working on a team project:

- Review project suggestion offerings
- Select a project
- Form a team
- Investigate project needs with an individual with a disability
- Evaluate the needs and further define the project
- Gather relevant background information for the project, including any prior design approaches and commercial products
- Brainstorm, evaluate, and choose a design concept
- Prototype, fabricate, test, and assess the design
- Present team's design - giving background, criteria, initial concepts from brainstorming, selected design candidate, and any prototyping, fabrication, and testing
- Submit a report and reflect on experience



For those getting a letter grade:

- Submit and present team **Mid-term Report**
- Communicate team's project progress
- Submit and present team **Final Report**
- Reflect on your personal class experience



Grading

For those getting a letter grade:

- Mid-term Report & Presentation 30%
- Final Report 30%
- Final Presentation 30%
- Individual Reflection 10%
- Participation 10%

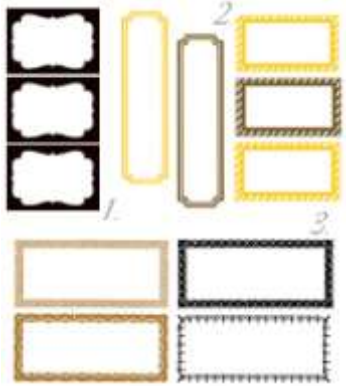
Participation includes actively listening, posing questions to speakers, engaging in class discussions, verbalizing thoughts & analyses, and communicating project progress.

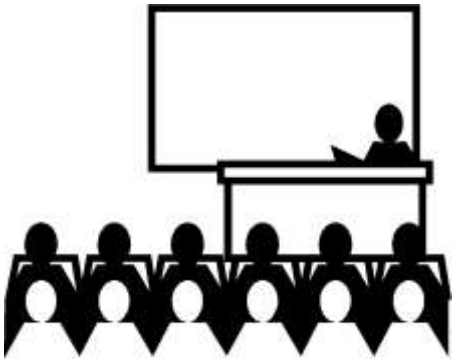
Spring Quarter Activities in ME113 or CS194

- Continue brainstorming additional design approaches
- Evaluate the approaches and select one to pursue
- Prepare an updated design proposal
- Perform detailed design and analysis
- Prepare a midway report
- Build a first cut prototype to demonstrate design feasibility
- Test the prototype and get feedback from users
- Redesign as necessary
- Construct a second, improved prototype
- Pursue re-testing and get feedback
- Prepare a final report documenting the results of a project and suggesting steps to further develop the design

Discussion Topics

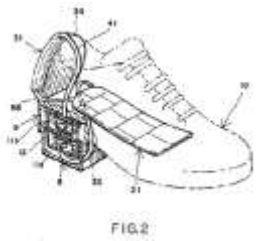
- Who is Disabled?
- Failure
- Antique technology
- New technology
- Humor
- Words & labels
- -isms





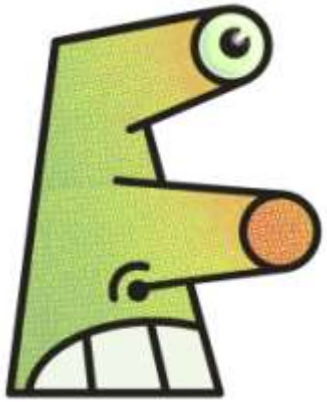
Lecture Titles 1 of 2

- Course Overview & Introduction to Assistive Technology
- Team Formation & Project Pitches
- Design Thinking and Applied Ideation for Assistive Technologies
- The Transdisciplinary Team: Bridging the Gap between Consumers and Products in Rehabilitation Medicine
- Design Challenges in Assistive Technology
- "Give Hope - Give a Hand" - The LN-4 Prosthetic Hand
- Perspectives of Stanford Students with a Disability
- Senior Perspective
- Tools and Techniques for Individuals with Visual Impairments



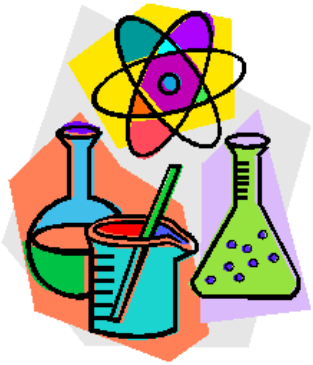
Lecture Titles 2 of 2

- Tour of Willow Garage (Menlo Park)
- The Lingraphicia – An Assistive Technology for Persons with Aphasia
- Designing Beyond the Norm to Meet the Needs of All People
- Teri Adams' Lecture – Title Forthcoming
- Gait, CP, and FES
- Practical and Appropriate Technology Solutions
- Perspectives of an Assistive Technology Manufacturer
- What Kind of Assistive Technology Do You Need if You Break your Neck? – Tour of Palo Alto VA Spinal Cord Injury
- Wheelchair Fabrication in Developing Countries

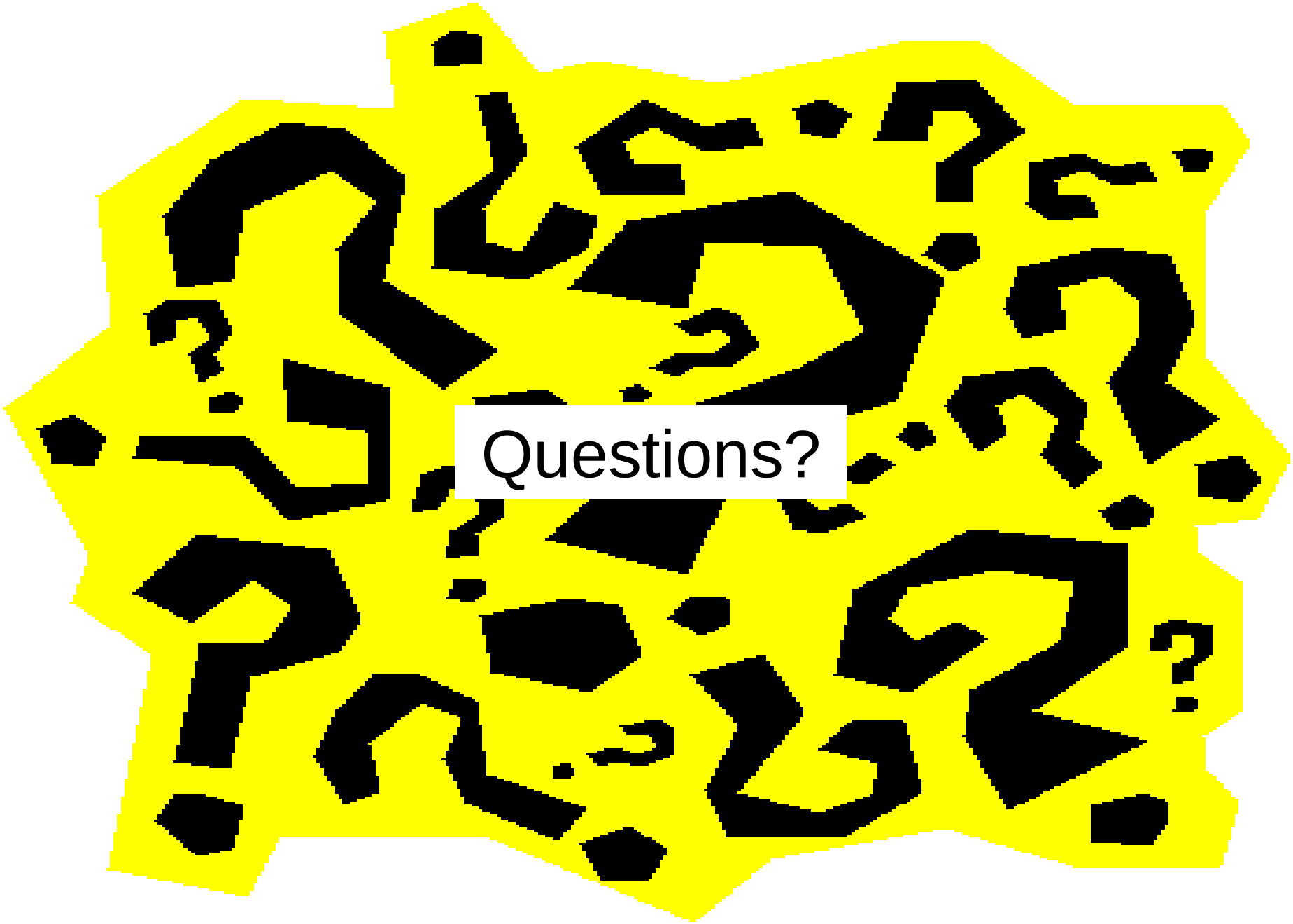


Technology Tidbits

- New products
- Research and development
- Interesting articles



Tell Your Friends


Questions?

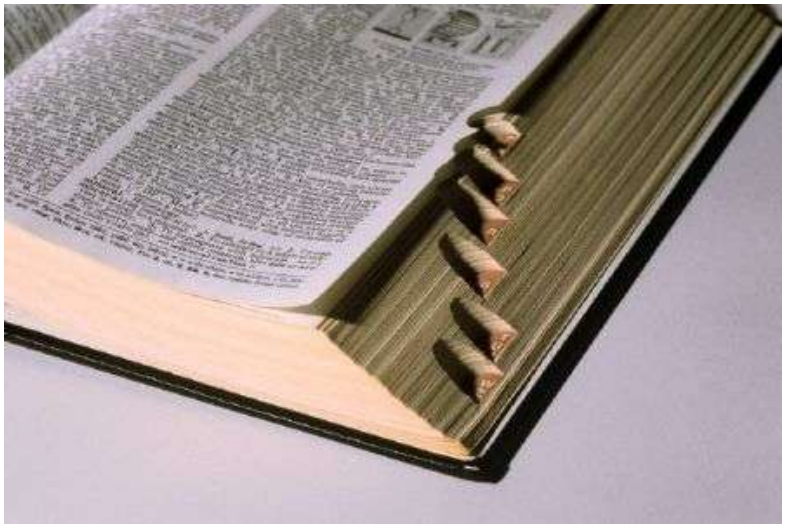
Introduction to Assistive Technology

- Definitions
- Broad overview
- What is a disability?
- Range of disabilities

- People involved - demographics and numbers
- Goal of rehabilitation
- Needs of people with disabilities
- Perception of people with disabilities

- Examples of assistive technology products and devices
- Phraseology, semantics, and social correctness

Definitions



- Disability
- Assistive Technology
- Rehabilitation
- Rehabilitation Engineering

Disability

Work-Based Definition

Persons with a disability are those who have a "health problem or condition which prevents them from working or which limits the kind or amount of work they can do".

Current Population Survey

Cornell University Disability Statistics

Disability

Anatomically-Based Definition

The Department of Veterans Affairs uses a <u>percent disabled</u> definition partially based upon loss of use of limbs, etc that “interferes with normal life functions”.

Disability

Activity-Based Definition

- Disability is defined in terms of limitations in a person's activities due to a health condition or impairment.

- Activities is a broad enough term to include working, doing housework, taking care of personal and household needs, and other age-appropriate activities. - National Health Interview Survey

- UCSF Disability Statistics Center

Disability

Opportunity-Based Definition

Disability is defined as a health condition or impairment that prevents an individual from taking full advantage of life's opportunities such as education, vocation, recreation, and activities of daily living

Disability in the US

- 71.4 million citizens have activity limitations, ~ 23% of 308 million
  - Some reports cite 32 to 78 million (100 - 650 million worldwide)
- 24.1 million individuals have a severe disability
- 11 million children have a disability
- 25% of health care costs relate to disability
- Disability is the largest minority group
- 15 million are 65 or older
- 10 million people with vision impairments
  - 1.3 million are legally blind
- 24 million people with hearing impairments
  - 2 million are deaf
- 1 million wheelchair users
- 6 million people have developmental disabilities
- Less than 5% are born with their disability

Disability in the US

- Disability rates vary by age, sex, race, ethnicity, and economic status

- Disabilities result in a reduced chance for employment

- Disability is associated with differences in income

- As the nation ages, the number of people experiencing limitations will certainly increase.

Disability Types

- Congenital / Acquired
- Physical
  - Sensory
  - Functional
- Psychological / neurological

There is a group of individuals who are so impaired that they spend 12 to 25 years in institutions before they can contribute significantly to society

There is a group of individuals who are so impaired that they spend 12 to 25 years in institutions before they can contribute significantly to society

Students!

Needs / Desires of People with Disabilities

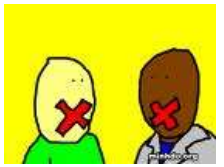
- Regain wellness & function
- Perform tasks independently
- Improve quality of life
- Take full advantage of all opportunities
  - Educational
  - Vocational
  - Recrecational
  - Activities of daily living
- Pursue happiness
- Integrate into society

Perceptions of Disabilities

- In the US:
  - A diminishing stigma
  - Mainstreaming
  - ADA
- In other countries:
  - Taken care of, but often hidden away
  - Pursuit of a technology solution is a priority

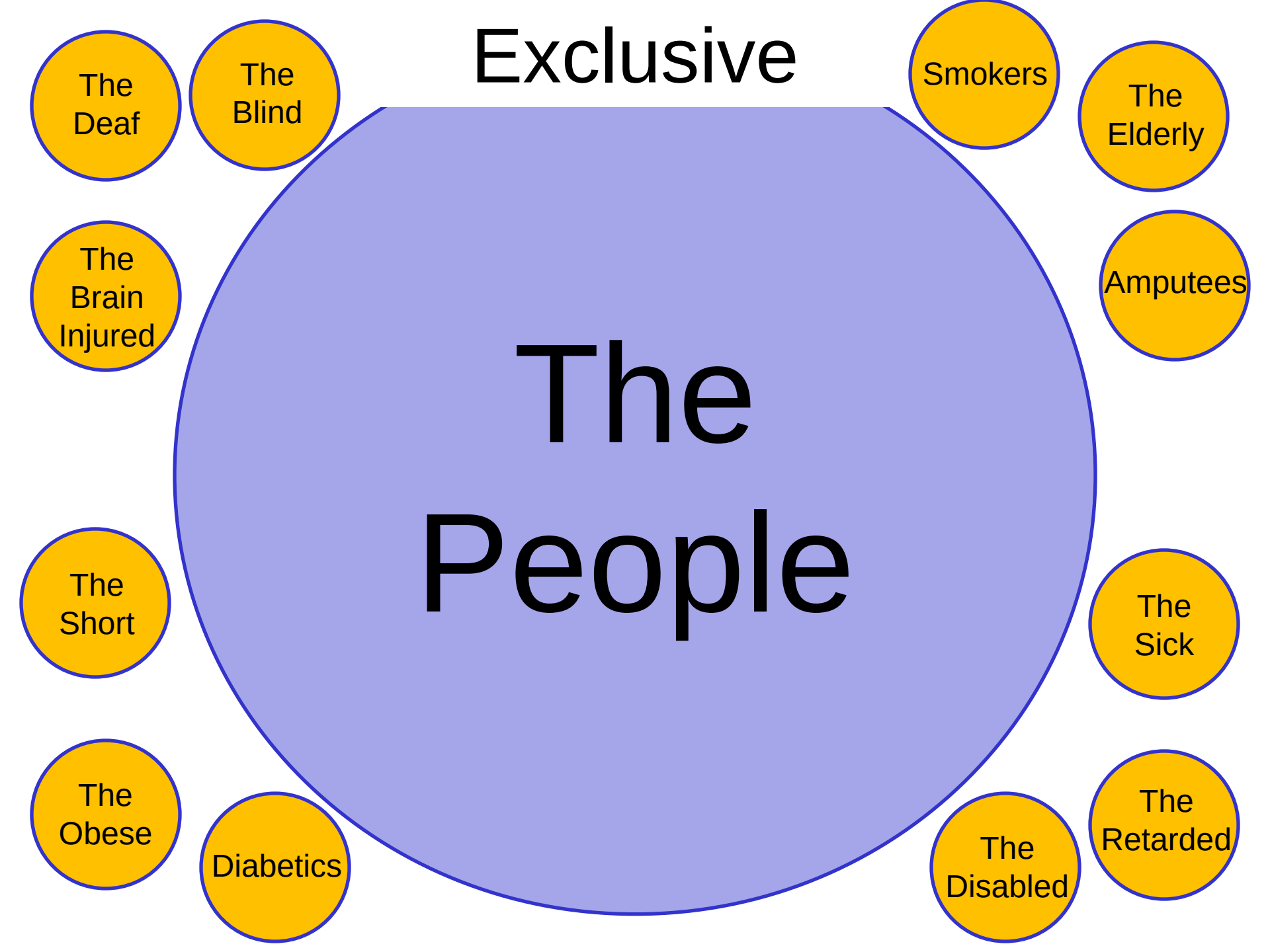
Social and Political Correctness

- Put the person rather than the condition first:
  - Individuals or people with a disability

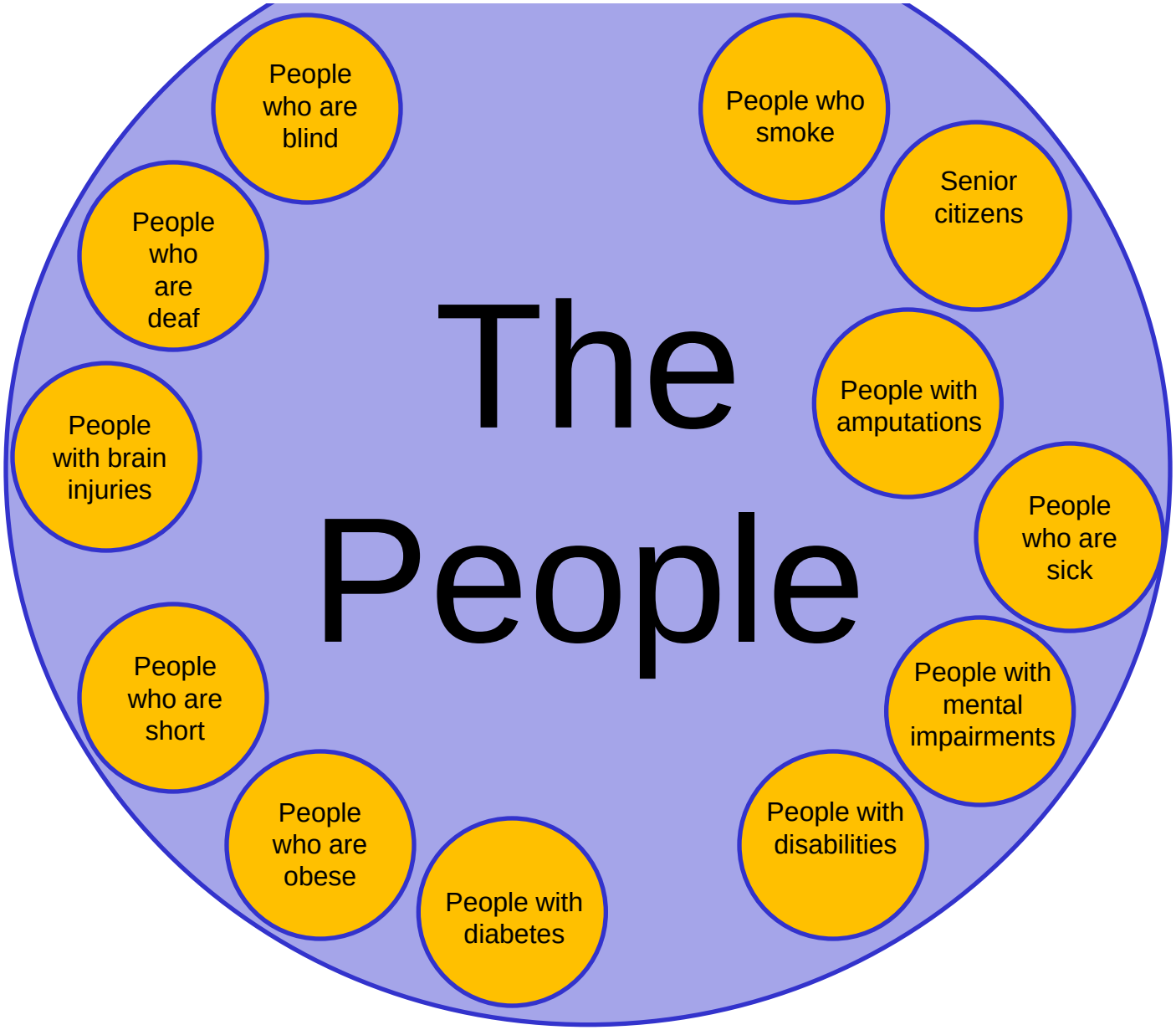


- Focus on capabilities rather than disabilities
  - Wheelchair user

- Refer to the person rather than the disability group – be inclusive
  - **<u>NOT</u>**: The Blind, the Disabled, the Deaf


Exclusive
The Deaf
The Blind
Smokers
The Elderly
The Brain Injured
Amputees
The People
The Short
The Sick
The Obese
Diabetics
The Disabled
The Retarded

Inclusive


The People
People who are blind
People who smoke
Senior citizens
People who are deaf
People with amputations
People with brain injuries
People who are sick
People who are short
People with mental impairments
People who are obese
People with disabilities
People with diabetes

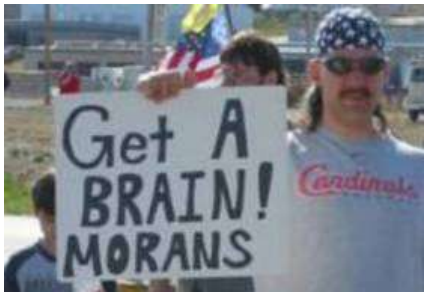
Social and Political Correctness

- Shorthand terms:
  - Para, Quad
- Derogatory terms:
  - Gimp, Crip, Spaz, Retard

- Use of terms:
  - “Patient”, “User”, “Subject”, “Consumer”
  - “Suffering from”, “Afflicted with”, “Confined to”, “Victim of”
  - “Diagnosed with”, “Living with”, “Survivor of”, “Recovering from”

Medical & Common Use

- Crippled, Retarded, Deaf & Dumb, Lame
- Mute, Moron, Imbecile, Idiot
- Vegetative state



Robert Van Etten

- Dwarf
- Midget
- Shorty
- Little person
- Munchkin
- Elf
- Height challenged
- Scooter-guy

Bob

Yell if you are paying attention

Blue Man Group

Assistive Technology

- Assistive Technology (AT) is a generic term that includes both:
  - devices that benefit people with disabilities and
  - the process that makes these devices available to people with disabilities.

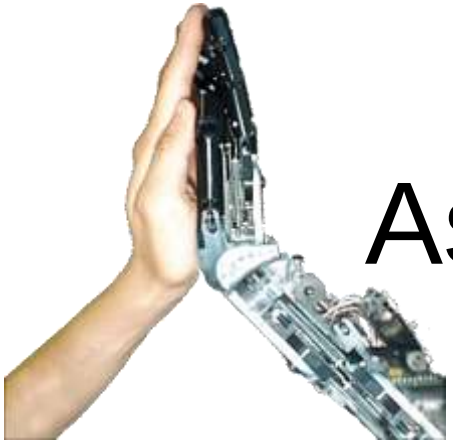
- An AT device is one that has a diagnostic, functional, adaptive, or rehabilitative benefit.

- Engineers employ an AT process to specify, design, develop, test, and bring to market new devices.

Assistive Technology

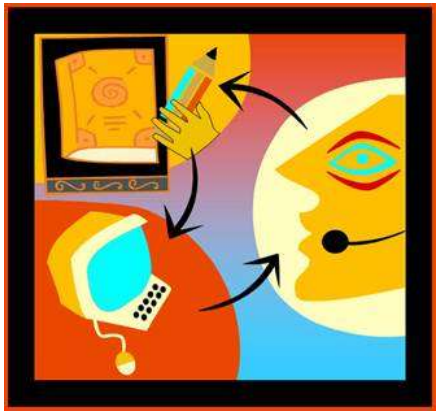
Health care professionals (not just engineers) are involved in evaluating the need for AT devices; working on research, design, and development teams; prescribing, fitting, and supplying them; and assessing their benefit.

- Physicians
- Clinicians
- Therapists
- Suppliers
- Policy makers
- Educators



Assistive Technology

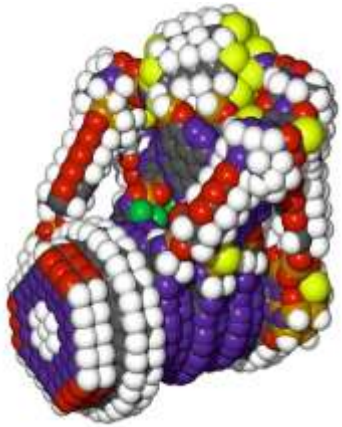
AT devices provide greater independence, increased opportunities for participation, and an improved quality of life for people with disabilities by enabling them to perform tasks that they were formerly unable to accomplish (or had great difficulty accomplishing, or required assistance) through enhanced or alternate methods of interacting with the world around them.

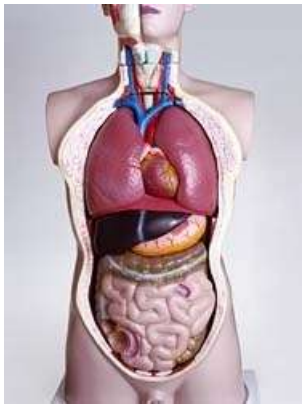


Assistive Technology

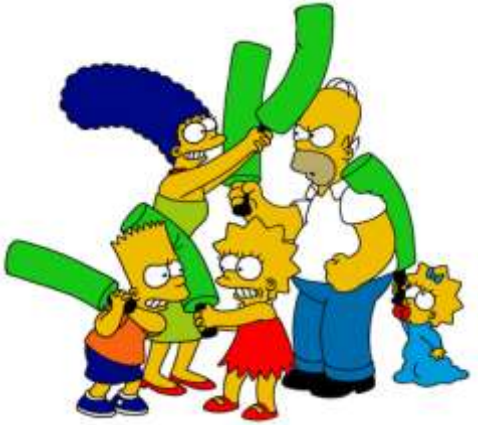
New AT devices incorporating novel designs and emerging technologies have the potential to further improve the lives of people with disabilities.

- Computers
- Robotics & mechatronics
- Nanotechnology
- Medical technologies





Rehabilitation



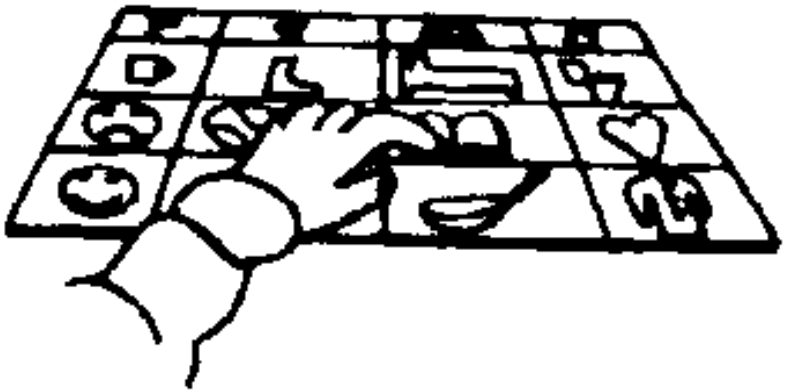
- **Medical model**: Restoration of function caused by disability – through surgery, medication, therapy, and/or retraining

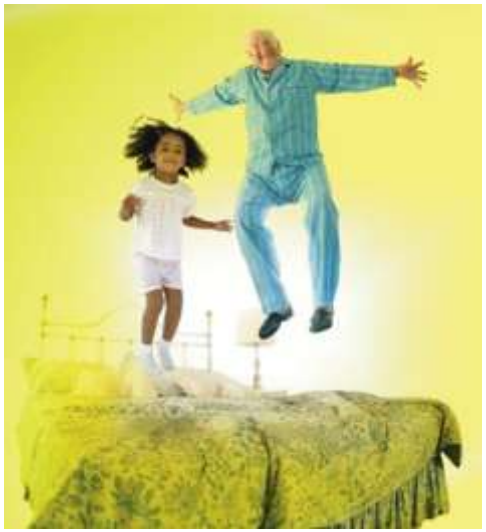
- **More inclusive model**: Includes Assistive Technology

Goals

- Goal of Rehabilitation
  - Restore function

- Goals of Assistive Technology
  - Increase independence
  - Improve quality of life





Rehabilitation Engineering

Rehab Engineers assist people who have a functional impairment by engaging in one or more of these activities:

- Device Design
- Research & Development
- Technology Transfer
- Marketing
- Provision
- Education & Training

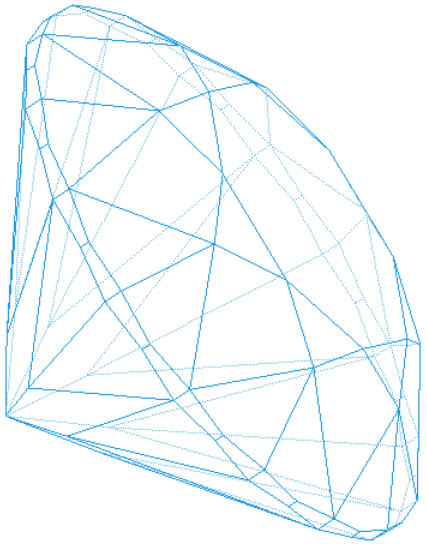
Rehabilitation Technology

The term "rehabilitation technology" refers to the systematic application of technologies, engineering methodologies, or scientific principles to meet the needs of and address the barriers confronted by individuals with disabilities in areas which include education, rehabilitation, employment, transportation, independent living, and recreation. The term includes rehabilitation engineering, assistive technology devices, and assistive technology services.

Rehab Act

Facets of Rehabilitation Engineering

- Personal Transportation (vehicles and assistive driving)
- Augmentative & Alternative Communication
- Dysphagia: Eating, Swallowing, Saliva Control
- Quantitative Assessment
- Technology Transfer
- Sensory Loss & Technology
- Wheeled Mobility & Seating
- Electrical Stimulation
- Computer Applications
- Rural Rehabilitation
- Assistive Robotics & Mechatronics
- Job Accommodation
- Gerontology - Technology for Successful Aging
- International Appropriate Technology
- Universal Access



RESNA SIGs

Assistive Technology Market

- Many people with a disability – in US and world-wide
- Every consumer has unique needs and desires
- Largest homogeneous group in the US is wheelchair users
- Lack of a well-defined mass market means that companies serving individuals with disabilities are small and their products are expensive

Example Assistive Technology Devices

- Projects I worked on at the VA RR&D Center
- Commercial devices and research projects
- Technologies that have made an impact

Head Control Interface

- Features
  - –2 degrees of freedom
  - –real-time operation
  - –non-contact interface
  - –front or rear sensing
  - –mouse or joystick substitute
- Applications
  - –control of mobility (electric wheelchair) contrast with voice control alternative
  - –control of cursor position with hands on keyboard
  - –demonstrated robot control

Head Control Interface Video

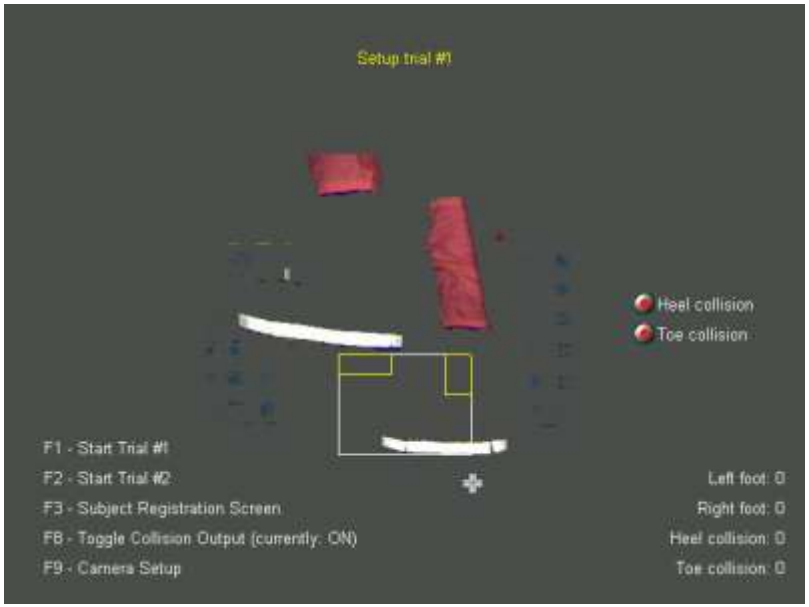
Ralph Fingerspelling Hand

- **Ralph** offers individuals who are deaf-blind improved access to computers and communication devices in addition to person-to-person conversations.
- Enhancements of this design include better intelligibility, smaller size, and the ability to optimize hand positions.

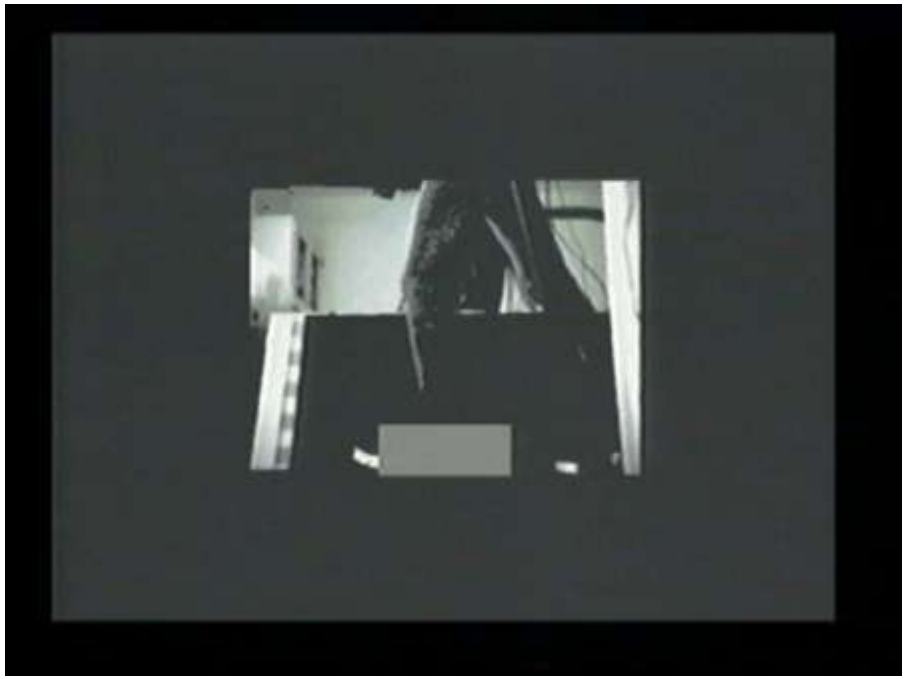
Ralph Video

Virtual Reality

- Features
  - –treadmill-based training aid
  - –step over virtual obstacles
  - –harness prevents falling
  - –computer senses “collisions”
- Applications
  - –safe training aid for clinic
  - –range of motion, coordination, balance



Virtual Reality Video



Driving Simulator

- The goal of this project was to evaluate the potential of a high quality computer-based driving simulator to accurately assess and improve the driving ability of veterans with Stroke and Traumatic Brain Injury (TBI).
- Create realistic driving scenarios to address specific cognitive, visual, and motor deficits in a safe setting
- Compare driving performance with traditional “behind-the-wheel” assessment and training

DriveSafety Model 550C 3-Channel Simulator with Saturn car cab.

Brain Computer Interface

- Noninvasive – picks up surface EEGs
- Determines 6 mental states – concentration / meditation
- Detects blinks
- Controls computer games
- Open API for other applications

NeuroSky's MindSet

$200

Personal Robot 2

- Two-armed mobile robot
- Vision system
- Ethernet connectivity
- Grasps and handles physical objects
- Human-controlled or autonomous operation
- Applications for persons with disabilities and seniors

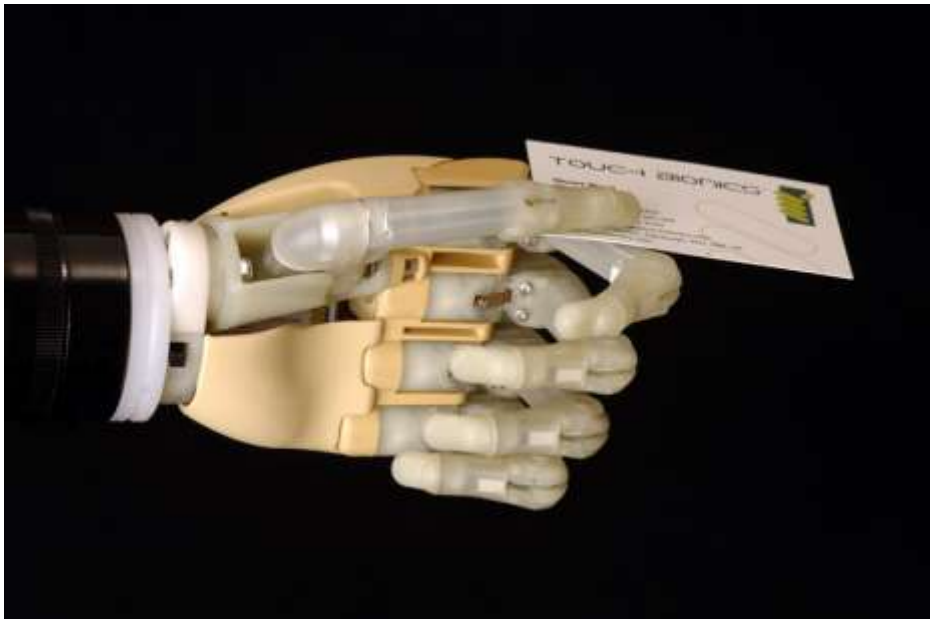
PR2 - Willow Garage

Advanced Prosthetics

The **Proprio Foot** is a $30,000 device that uses artificial intelligence, sensors, and microprocessors to adjust automatically to the user's gait as well as to surface angles. It's capable of remembering exactly how its owner walked up a flight of stairs or down a hill, and can be trained to respond differently.

Bionic Hand

- Individually powered digits
- Myoelectric signal input to open and close fingers
- Cosmetic covering available



i-LIMB Hand – a fully articulating and commercially available prosthetic hand

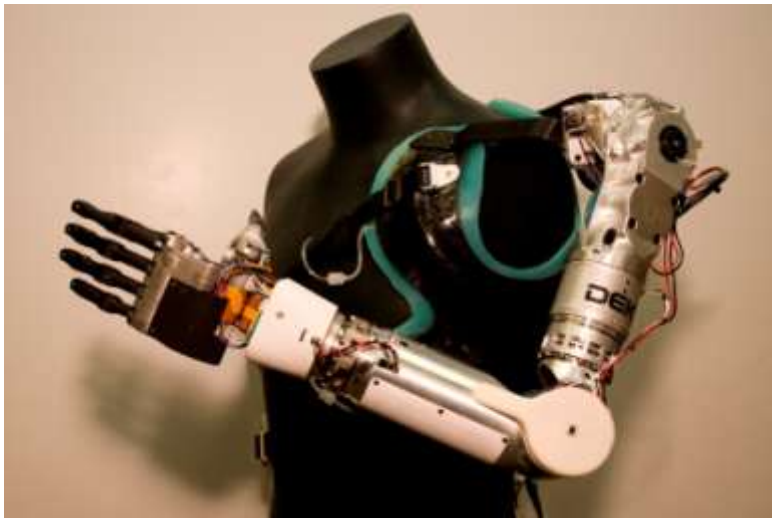
Bionic Fingers

- Each finger is a standalone functional unit
- Myo-electric or pressure sensitive sensor signals open and close fingers
- Robotic or life-like cosmetic coverings available

ProDigits – motor-powered prosthetic for those with missing fingers

Luke Arm

- Designed by Dean Kamen and others
- Funded by DARPA - $30 million
- Brain-controlled
- Mechanical hand and arm



Mobility for Small Children

- Provides mobility to children who are unable to fully explore the world on their own
- Employs obstacle sensors

UD1 - University of Delaware

PowerKnee

- The **PowerKnee** is an active orthotic device. It provides active assistance, resistance, and rehabilitation of knee function for those with impaired mobility and is constructed with patented actuator technology, an embedded computer system, sensors, and a software control system. The result is a transparently activated, sensor-driven device which greatly enhances mobility and rehabilitation.

- The photo at the right is the prototype FlexCVA attached to a knee brace. Future versions will reduce the size and allow the entire device to fit under loose-fitting clothing.

Tibion – Moffett Field

iBot Wheelchair

- The **Balance Function** elevates the user to move around at eye level and to reach high places independently. In this function, the front wheels rotate up and over the back wheels, while the user remains seated at an elevated position.

- The **Stair Function** enables the user to safely climb up and down stairs, with or without assistance, giving them access to previously inaccessible places.

- The **4-Wheel Function** enables the user to climb curbs as high as five inches and to travel over a variety of uneven terrain, such as sand, gravel, grass, thick carpet and other surfaces.

- Johnson & Johnson Independence Technology

Lokomat Walking Retrainer

- The Hocoma **Lokomat** Robotic Ambulation System for body weight supported treadmill training is an effective therapy for persons with spinal cord injuries.

- Research indicates that spinal and cortical nervous systems have the ability to recall the walking process from repeated walking therapy.

Intel Reader

- Camera, computer, optical character recognition software, text-to-speech device for people with low vision, blindness, or reading-related disabilities
- Plays pre-recorded and mp3 content
- Zoom screen display

$1500 – one pound

Standing Aid

Device to assist a young male wheelchair user to stand while urinating, without assistance

Wheelchair Lift

Portable wheelchair lift to facilitate the transfer of a patient and caregiver to/from bed and wheelchair

Page Turner

Microcontroller-based prototype page turner to allow a man with ALS, a neuromuscular disorder, to independently read a book.

Caitlin Donhowe

Aid for Donning an Artificial Leg

A motorized device with wireless remote control that makes it easier for an individual with a below-knee amputation to don an artificial leg.

Barrett Heyneman
Linus Park
Haley Kim

Aid for Donning an Artificial Leg

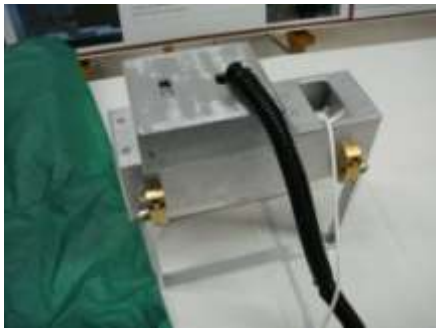
An improved device that makes it easier for an individual with a below-knee amputation to don an artificial leg (ME113)

Jaime Jimenez

Wande Olabisi

Darnell Brooks

Angelo Szychowski



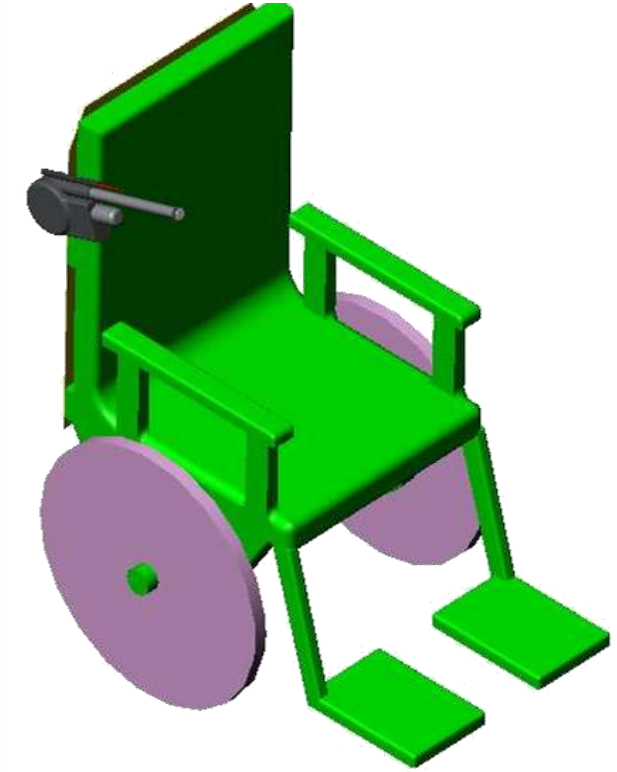
Let's Get Physical
Pediatric Gait Project

The design team, **Lets Get Physical**, developed a physical therapy motivational device for use by children with Cerebral Palsy who are learning to walk. Combining innovative audio effects with a fun, portable design, the device encourages users to keep walking outside physical therapy classes. (ENGR110 & ME113)

Nydia Cardenas
Whitney King
Roseanne Warren
Obinna Emenike

ElevAid
Device to Press Elevator Buttons

The **ElevAid** team addressed the need of a Stanford student who uses a powered wheelchair to access the elevator call button and to press the button corresponding to the floor desired.



Kevin Aberdeen

John Alabi

Kent Anderson

David Quintero

Opening Doors

Opening Doors addressed the need for a device that can assist wheelchair users in opening doors, specifically in the task of pulling.

Ana Pena
Subhanu Samarajiva
Shannon McClintock
Susan Nourse

Sonification of Movement

Sonification of Movement is a device that will make physical exercises more engaging for stroke survivors who need to practice arm movement. The device translates arm movement into musical sounds, and can be customized to help the user practice different types of motion.

Eric Corona

Clare Kasemset

Handi-Cart

The goal of the **Handi-Cart** project was to make a device that would allow wheelchair users to use a shopping cart independently and easily.

Christine Appleby

Melissa Martinez

Xin Xie

iPhone Dialer for Individuals with Visual Impairments

The **iPhone Dialer** is a simple eyes-free dialing program which does away with absolute button location and which substitutes sound and vibration for the lack of tactile feedback.

Isaac Penny

Steerable Surfboard for a Surfer with Quadriplegia

The purpose of the **Steerable Surfboard** projects is to develop a prototype design with a fin-based steering system controlled by means of a forward-mounted joystick for a surfer with quadriplegia. (ME113)

Natasha Prats

Dharma Tamm

Ashley Pete

Kyle Imatani

Showering Aid for Persons with Below Knee Amputations

The **RISE** project's goal was to develop an aid that provides below-knee amputees confidence, comfort, and balance while showering. (ME113)

Clay Heins

Durell Coleman

Karen Nesbitt

Pamon Forouhar

Kane's Canes

This project explored designs for a cane-type device that would provide balance, stability, and support while standing, walking, and negotiating stairs without the disadvantages of a traditional walker. An existing prototype was enhanced by adding or improving three features: 1) creating an adjustable angle between the forearm segment and the bottom member, 2) adding a mechanism for varying the height of the bottom member, and 3) providing better forearm rests.

Harpreet K. Sangha

Recharging Vest

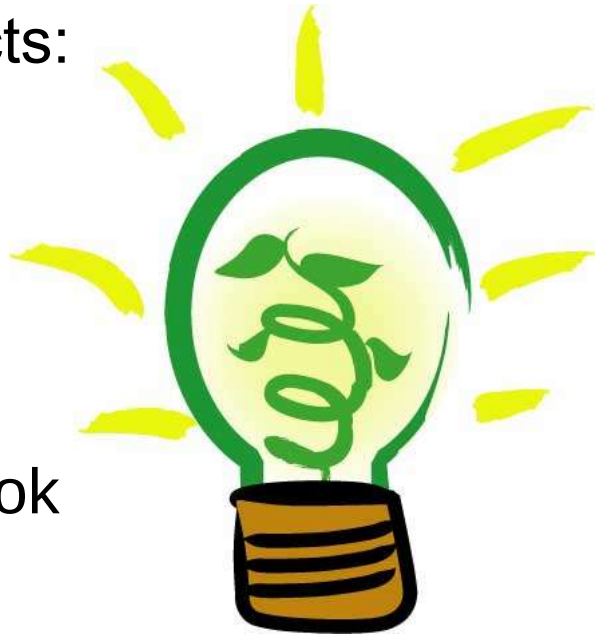
This project seeks to redesign the Medtronic recharging vest to enhance its recharging efficiency and ease of use by patients who have an implanted rechargeable deep brain stimulator. The team has identified three objectives to pursue for the improved vest design: 1) it should be very easy to put on and to position, 2) it should be comfortable to wear without feeling restricted or confined, even while moving around, and 3) it should be easy to custom fit to the user, ensuring the proper alignment of the implanted stimulator with the recharging unit. The final design addresses all three of these objectives: easy to put on, comfortable to wear, and individually customizable. User tests will determine how well the team's prototype meets these design goals.

Dara Roberts

Reid Miller

Project Ideas

- Listed in handout – presentations on Thursday
- Further work on prior year's projects:
- Accessible interfaces for:
  - iPods and MP3 players
  - Cell phones
  - Game consoles
  - Remote controls
- Projects listed in the NSF guidebook
- Student-defined projects



Project Pitches & Team Formation

- Educational Activities for Children with Disabilities
- Projects Suggested by Eskaton
- Hands-free Reading Aid
- Application of NeuroSky's Brain-Computer Interface
- Lat Pull Exercise Station for Wheelchair Users
- Sirott Speech Feedback Project
- Low Cost Transfer Device
- Hybrid Drive for RoChair and RoTrike
- Prosthetics & Orthotics Projects
- Data Sensing & Logging for Scheiman Rebuild Fitness Products
- Projects for Veterans with Spinal Cord Injury
- Projects for Persons Recovering from Stroke
- No-Fall Cane
- Projects for Veterans with Traumatic Brain Injury
- Other projects

Student Project Resource People

- Debbie Kenney – Occupational Therapist
- Doug Schwandt – Mechanical Engineer
- Isaac Penny – Grad Student
- Monroe Postman - Engineer





Contact Information

- Websites:
  - http://engr110.stanford.edu
  - http://me113.stanford.edu
  - http://cs194.stanford.edu

- Telephone numbers and email addresses:
  - Dave Jaffe – 650/892-4464
    - dljaffe@stanford.edu
  - Drew Nelson – 650/723-2123
    - dnelson@stanford.edu
  - Harpreet K. Sangha
    - hksangha@stanford.edu

Questions?

Manufacturing Mentoring Program

Professor Rick Reis

Manufacturing Mentoring Program

The **Manufacturing Mentoring Program** brings together experienced manufacturing executives and managers with Stanford students interested in learning more about what is involved in taking a design or prototype of a product into actual production at a pilot or even mass production level.

All mentors have extensive manufacturing experience, many in a hands-on capacity and/or as managers of manufacturing plants around the world. They have a tremendous wealth of real world knowledge about the joys, frustrations and challenges of going beyond a good idea or prototype. Some are recently retired while others still quite active in their professions. All are interested in sharing their knowledge and experience with students.

Interested students do not need to come to the table with a particular product or service in mind although such ideas would be welcome. Students do need to be interested in learning more about the challenges faced in real-world manufacturing.

Various forums such as seminars, group lunches, informal one-one gatherings, e-mail exchanges, among others are being developed to facilitate mentor-mentee exchanges.

http://prn.stanford.edu/students/mentors

Next Event

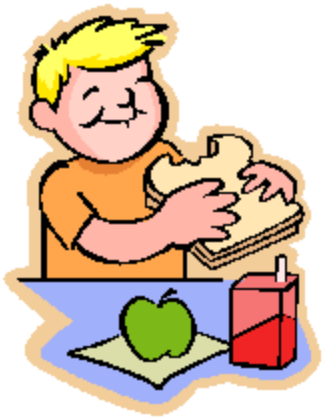
Mentor - Mentee Lunch

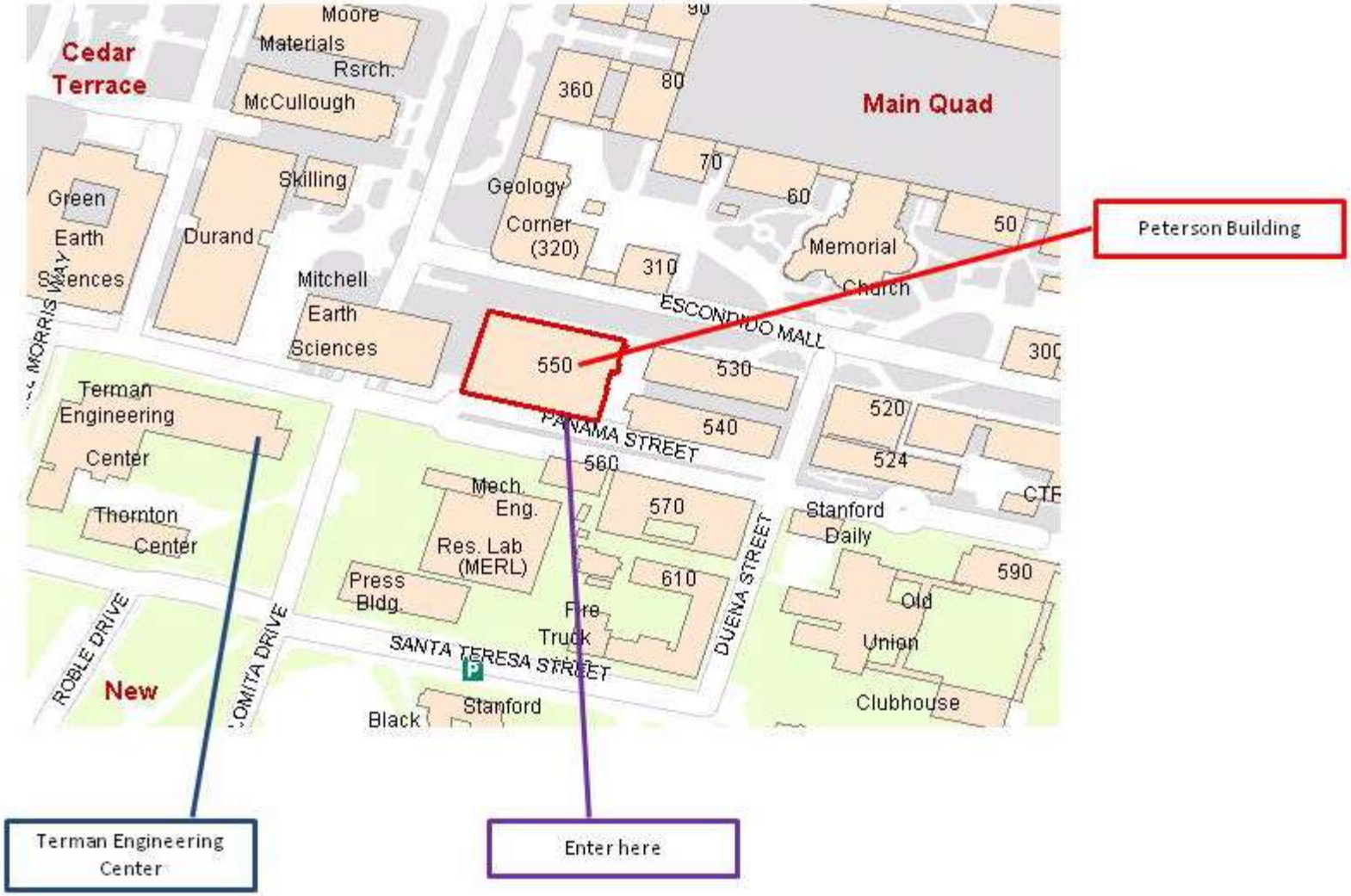
Friday, January 7th

Noon – 1:30pm

Peterson Building – Building 550

2nd Floor – Studio 1




Cedar Terrace
Moore Materials Rsrch.
McCullough
Main Quad
360
80
70
60
50
Geology Corner (320)
Memorial Church
Peterson Building
Skilling
Green Earth Sciences
Durand
Mitchell Earth Sciences
310
ESCONDIDO MALL
550
530
540
520
524
300
MORRIS WAY
Terman Engineering Center
PANAMA STREET
560
570
Mech. Eng.
Res. Lab (MERL)
Thornton Center
Press Bldg.
610
Fire Truck
DUENA STREET
Stanford Daily
590
Old Union
Clubhouse
ROBLE DRIVE
LOMITA DRIVE
SANTA TERESA STREET
New
Stanford Black
Terman Engineering Center
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